Infrastructuur en bedrijfsmigratie:

een casestudie in Zuid-Holland van 1988 tot 1997

Infrastructure and firm migration:

a casestudy in the province of South-Holland from 1988 to 1997

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Samenvatting

Infrastructuur en bedrijfsmigratie:
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Deze paper heeft als doel de invloed van transport infrastructuur te kwantificeren met behulp van een aantal discrete keuzemodellen. De modelschattingen komen overeen met de bedrijfsdemografische literatuur en tonen aan dat bereikbaarheid een bescheiden rol speelt als pull-factor voor verhuizende bedrijven. Verder blijken keep-factoren van grote invloed op het verhuisgedrag; mogelijk streven verhuizende bedrijven naar het in stand houden van bestaande ruimtelijke relaties. Zoals ook blijkt uit de literatuur is bereikbaarheid onbelangrijk als push-factor: bedrijven verhuizen met name om bedrijfsinterne redenen. Verder blijken de locatievoorkeuren van de bedrijfssectoren aanzienlijk te verschillen. Bedrijven in de zakelijke dienstverlening en industrie lijken een voorkeur te hebben voor locaties dicht bij de oprit van een autosnelweg. Verder lijkt een suburbanisatie patroon zichtbaar van de handel en winkel sector. Bedrijven in de overheidssector en de algemene diensten blijken een voorkeur te hebben voor locaties die dicht bij treinstations én de oprit van snelwegen liggen. De onderwijs- en gezondheidssector blijken een voorkeur te hebben voor locaties dicht bij een treinstation.

Summary

Infrastructure and firm migration:
a casestudy in the province of South-Holland from 1988 to 1997

The objective of the paper is to quantify the influence of transport infrastructure on firm migration by estimating a number of discrete choice models. The model estimates correspond to firm demographic literature and reveal a modest importance of accessibility as pull-factor when a firm is searching for a new location. Another finding is the strong influence of keep-factors which indicate that a firm that relocates strives to maintain the existing spatial relations. As expected transport infrastructure plays a minor role as a push-factor: the motives to relocate are often firm-internal. Furthermore outspoken differences in location preference between industry sectors are measured. Firms in business services and manufacturing appear to have a preference for locations near motorway on-ramps. Furthermore the results reveal a suburbanisation pattern of the trade & retail sector. Firms in the government sector and in general services appear to prefer locations near train stations as well as motorway on-ramps. Education and health services show a preference for locations near train stations.

Introduction

Transport infrastructure influences the spatial developments by affecting the generalised transport costs (Rietveld, 1994). If a firm relocates it's activities form the city centre to a peripheral location close to a motorway onramp, this can be interpreted as a *distributive effect* of transport infrastructure. This paper addresses the question to what extend accessibility or other transport infrastructure related variables influence firm migration.

What is known about firm migration? Research has shown that on a yearly basis seven to eight percent of all firms move, a considerable share (Pellenbarg, 1996). Furthermore firms appear to move over relatively short distances, as a result of *keep-factors* (Pellenbarg, 1996). Factors influencing the propensity of a firm to move are referred to as *push-factors*. The decision to relocate is mainly determined by firm internal factors relating to the life-cycle of firms and to a lesser extent by site related factors (Louw, 1996; Van Dijk and Pellenbarg, 2000; Brouwer et. al., 2002). The attractiveness of a new location is described by *pull-factors*.

The influence of transport infrastructure on firm migration seems difficult to quantify, despite some empirical studies found in literature. At earlier editions of the CVS a significant influence is reported for motorway proximity by Hilbers et al. (1994) and de Bok et. al. (2003). Similar evidence is found broadly in international literature (Kawamura, 2001; Holl, 2003). An explanation for this relationship can be found in the dependency on automobiles for most facets of their business activities (Hilbers et. al. 1994; Kawamura, 2001). In terms of urban development this motorway orientation of economic activities has led to a suburbanisation pattern of economic activities (Kawamura, 2001; Shukla and Waddell, 1991). Research in the field of the New Economic Geography (Krugman, 1991) stresses the need to account for externalities and agglomeration advantages. These externalities are related to the transport infrastructure and have to be accounted for when analysing the location of economic activities.

The objective of this contribution is to quantify the influence of transport infrastructure on firm migration by estimating a number of discrete choice models. The objective is to determine significant location factors for each industry sector. The results will be interpreted with existing knowledge from firm migration literature.

Theoretical model for firmmigration

The presented research is based on a behavioral approach, describing the spatial decision making of an individual firm in a disaggregated physical environment. At a certain point in time this firm has various characteristics that determine its preference, such as its size, the firm's growth or its industry sector. The firm is located at its current location in the physical environment in which multiple alternative locations exist. The choice alternatives in this physical environment are unique real estate objects, characterized by real estate attributes such as the size of the real estate object and location attributes, such as location type and accessibility. The firm migration behavior of an individual firm within this physical environment is regarded as a choice process that consists of a sequence of considerations and decisions as visualized in Figure 1.

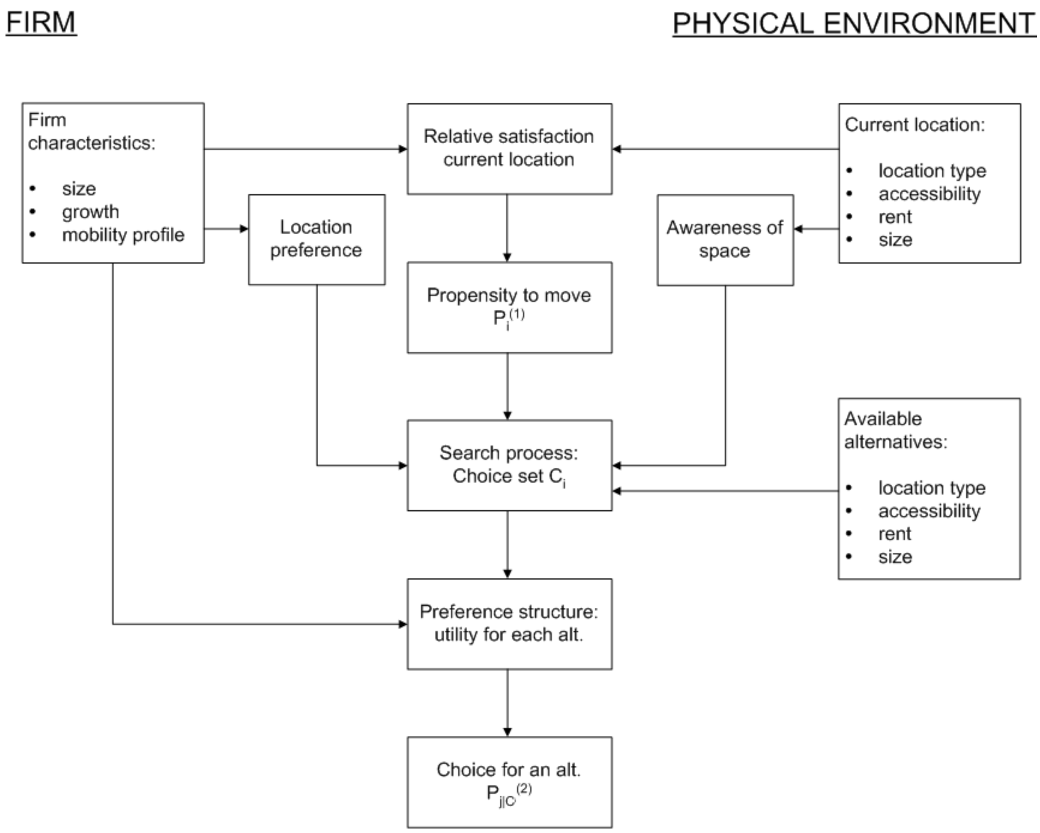

Figure 1: Conceptual model for individual firm migration.

First of all the decision to move is a result of the relative satisfaction at the current location (push factors). Once the decision to move is made, the firm will search for alternative locations. This search process will lead to a choice set with limited suitable alternatives. First of all the search process is limited to a set of available locations. Furthermore the set of available alternatives can be reduced to known alternatives by assuming an awareness space of this firm, similar to residential migration (Brown and Moore, 1970). This space includes locations that the firm has knowledge about through direct contact, through the media or specialized agencies. Finally the search process is restricted to alternatives that are feasible, or in other words that are compatible with the preference of a firm (for instance a minimum size of a location). Once a limited set with feasible alternatives is created the firm will determine its expected utility based on the attributes of each alternative (pull factors) and the preference structure of the firm. From these alternatives, the firm will choose the alternative with the highest expected utility as its new location.

The influence of accessibility can be both important for the decision to relocate (push factor) as well as for the decision for a new location alternative (pull factor). Empirical results found in literature suggest that accessibility mainly expresses itself as a pull factor rather than a push factor. The focus of this paper is to determine to what extend accessibility is important in each choice stage of firm migration. The different choice models in the presented approach, as well as the formation of the choice set will be addressed subsequently.

Choice models

The presented model in Figure 1 distinguishes a separate relocation decision and a conditional decision for a new location from a subset of alternative locations. This is similar to approaches applied in firm demography (Van Wissen, 2000). The joint decision of firm *i* to move and to relocate to location *j* is the product of the probability firm *i* will move and the conditional probability that firm *i* chooses location *j* from a subset of alternatives:

$$P_{ij} = P_i^{(1)} \cdot P_{j|C_i}^{(2)} \qquad (1)$$

with:

P_{ij}	:	probability firm *i* will relocate and chooses location *j*
$P_i^{(1)}$	:	probability firm *i* will move
$P_{j\|C_i}^{(2)}$	:	probability that firm *i* chooses location *j* from a unique subset C_i

To analyse the importance of accessibility and other attributes in firm migration both decisions will be analysed in this paper. The choice models first of all include a variety of accessibility related attributes. These attributes include the distance to different infrastructure nodes as well as a set of attributes measuring the potential accessibility. Another spatial attribute is the distance from the original location to a location alternative. This variable has been added because it was regarded as an important explaining variable. Furthermore a variable has been added describing the location type. Finally, the average rental level in a district has been added as a proxy for the real estate quality.

Choice set definition

Systematic choice sets are generated for each observed firm relocation to account for the context in which the location decision was made. This choice set is a representative set of alternative firm locations that have been evaluated in the location decision. The presented approach applies the lowest level of detail possible, which implies that a large number of alternatives are available. McFadden (1978) has proven that consistent model estimates can be obtained when the full choice set is replaced with a subset containing the observed choice and a random sample from the possible alternative choices. Unfortunately few empirical examples exist in which revealed preference data of firm relocation is combined with the formation of systematic choice sets. The only contemporary example of the combination of revealed preference data and systematic choice sets, is given by Waddell and Ulfarsson (2003), estimating discrete choice models for employment location. Within their approach the choice set consisted of the chosen alternative and nine randomly selected location alternatives, although no further specifications are given about the choice set algorithm.

In the research presented in this paper, a systematic choice set generator has been developed that constructs a representative choice set for each observed firm relocation. These choice set are a results of a procedure that subsequently determines subsets, where each next set is a subset of the previous set (similar to Bovy and Stern, 1990):

- set of *existing* alternatives: all chosen firm locations in the dataset;
- set of *available* alternatives: alternatives that were available in the period of moving;
- set of *feasible* alternatives: alternatives that are of corresponding property type (office, retail property or industrial property), corresponding region and of corresponding size;
- *choice set*: consists of chosen location and nine random alternatives from the feasible alternatives.

A drawback from regular regression analysis is that it is difficult to account for supply side restrictions (Hilbers et. al., 1994). An important methodological advantage of this approach is that it overcomes this drawback. By constructing systematic choicesets supply side restrictions are accounted for explicitly: alternatives are drawn from the available supply distribution. For example: if only very few α-locations would be available, few α-locations will be drawn in a choice set. Because of this relatively limited occurrence in the choice sets, a modest number of observations that did choose α-locations, can lead to model estimates that reveal a preference for these locations.

The data for the casestudy

The research has been conducted on a revealed preference dataset containing individual firm migrations in the Netherlands, stemming from the LISA-dataset. LISA is the "National Information System of Employment". The datasets were available for three LISA registration areas, nearly covering the province of South Holland (see Figure 2). The available firm migration datasets cover a large timespan: from 1988 to 1997.

For each firm move in the dataset the 6-digit postal zone of the original location and the new location is known. This is nearly the address level: each 6-digit postal zone contains 10 addresses on average. Multiple firm characteristics are available for each observation. These include firm size (number of jobs) and business sector (5-digit sector code). Based on this sector code the mobility profile has been derived. To avoid any irregularities from small (not existing) firms, the observations will be limited to firms with more than five employees. Some observations had to be excluded from the analysis because address information of the new location or the original location was incomplete. This yielded a dataset containing nearly 6000 relocated firms. The information about each observed firm migration is extended by adding a variety of location attributes about the original and new firm location. For the reason that accessibility is a complex phenomenon a set with a variety of accessibility measures has been tested for its explanatory value.

The first set of accessibility attributes describes the distance to the physical infrastructure: the nearest motorway onramp and nearest train station. These attributes are calculated in GIS, using coordinate information. It appeared that the distance attributes were highly correlated. This was solved by translating the distance measures into a composed distance location type describing the position of a location to the physical infrastructure. First of all α-locations are typical train stations locations: within 800 m. of a train station and not too close to a motorway onramp. Locations nearby motorway onramps (within 2000 m.) are labelled as γ-locations. If a locations is close to a train station as well as a motorway onramp (within 800 m and 2000 m respectively) it is labelled as a β-location. If a location has a considerate distance to both the nearest train station and motorway onramp it is labelled as a ρ-location.

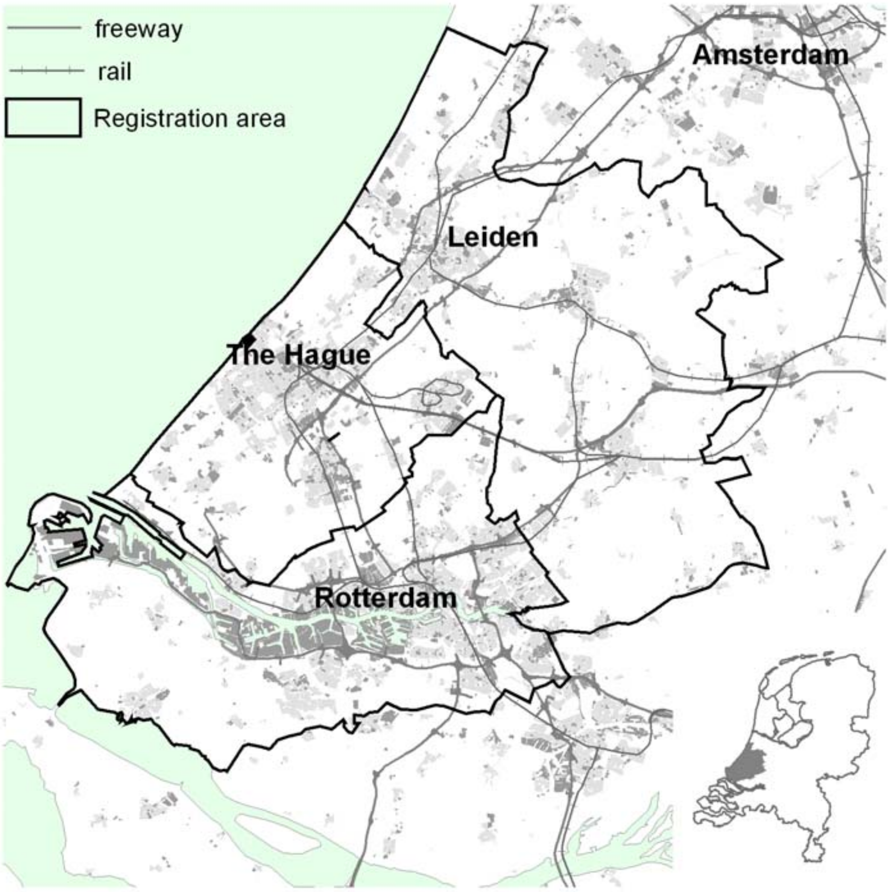

Figure 2: Research area: the province of South Holland

The second set of accessibility attributes consists of a variety of potential accessibility measures that describe the transportation system as well as the land use. These so called contour measures (Geurs and Ritsema van Eck, 2001) denote the number of opportunities that can be reached with a specific modality within a specified travel time: for instance the number of jobs or customers within 30 minutes by car. These contour measured were computed with travel times stemming from the LMS, the National Modeling System. The opportunities come from the WMD-dataset, the Living Environment Database. This dataset contains an extensive variety of socio economic variables of 4 digit postal zones in the Netherlands. A total number of 36 different contour measures were computed which turned out to be highly correlated. To avoid problems when using these correlated contour measures a factor analysis has been used as a technique to reduce the number of variables but to maintain the information in the data. The factor analysis using varimax rotation yielded 6 uncorrelated components with an eigen value higher than one (See Table2). The factor components are interpreted by their factor loadings. The first four factors are included in the analysis. The factors describe 1) the accessibility by train, 2) the national accessibility by car, 3) the regional accessibility by car and 4) the local accessibility by car. The fifth and sixth factors have a limited outspoken profile so these have not been used in further analysis.

To add information about the environment of a location alternative, a categorical variable for the business environment has been used. This typology has been derived from an environment typology from the WMD-dataset. The original 15 categories were reduced to five business environments each accounting for a representative share of business locations. First of all City Centre environments have been distinguished with a high land use density and a mixed land use. The second category is the Urban Business districts with a mono functional land use. Then a Mixed Urban location type has been distinguished with heterogeneous land use and a moderate density. The fourth urban category relates to Residential districts. The last category represents the Non Urban locations.

The firm migration dataset did not contain rental levels for each firm location but from a theoretical perspective it seems reasonable to add a rent level to the utility function. For the firm relocations on the office market a rent level proxy variable has been used derived from the Strabo/VTIS dataset. This rental level index of a 4-digit postal zone is computed as the average rental level (€/m^2) of all observations within this postal zone. To force a value range comparable to the other variables the rental levels have been rescaled to 100€/m^2.

Infrastructure as a push factor

To evaluate the importance of accessibility attributes as a push factor, a binary choice model has been estimated describing the migration probability for a firm; $P_i^{(1)}$ in equation (1). This probability is described with a binary regression model that includes firm specific attributes as well as attributes describing the original location.

$$P_i^{(1)} = \frac{1}{1+e^{-(\beta_0 + \sum_{l=1}^{L} \beta_l * x_{li} + \sum_{m=1}^{M} \beta_m * x_{mo})}} \qquad (2)$$

with:

x_{li}	:	attribute *l* for firm *i*
x_{mo}	:	location attribute *m* at original location *o*
β_l	:	coefficient for firm specific attribute *l*
β_m	:	coefficient for location attribute *m*
β_0	:	constant

Table 1: Estimation results propensity to move

Variable	*β*	*S.E.*	*Sig.*	Variable	β	S.E.	Sig.
Firm characteristics				**Characteristics current location**			
Individual firm attributes				Accessibility attributes			
Growth rate	0,393	0,040	0,000	α-location	-0,049	0,042	0,238
Shrink rate	0,798	0,064	0,000	β-location (Ref.)			
				γ-location	-0,135	0,029	0,000
Industry sector				ρ-location	-0,006	0,029	0,826
Finance	0,258	0,061	0,000	Reg. acc by train	0,095	0,011	0,000
Business services	0,611	0,044	0,000	Nat. acc by car	0,046	0,011	0,000
Government	0,528	0,062	0,000	Reg. acc by car	0,063	0,011	0,000
Education (Ref.)				Local acc by car	0,086	0,010	0,000
Health service	0,121	0,052	0,019				
General Services	-0,075	0,060	0,216	Environment attributes			
Agriculture	-0,188	0,065	0,004	City Centre	-0,108	0,032	0,001
Manufactering	0,246	0,048	0,000	Urban Business District (Ref.)			
Construction	0,412	0,048	0,000	Mixed Urban	-0,200	0,031	0,000
Transp., Wareh. & Comm.	0,534	0,050	0,000	Residential	-0,136	0,035	0,000
Trade & Retail	-0,107	0,043	0,013	Non-urban	-0,254	0,032	0,000
Restaurants & Food service	-0,896	0,083	0,000				
Constant	-2,724	0,048	0,000				
Number of observations	181359						
Cox and Snell	0,011						
Nagelkerke	0,028						

The estimated coefficients for the propensity to move can be found in Table 1. The relative importance of accessibility can be evaluated with the estimated β-coefficients. The results shows evidence for results found in literature: the influence of accessibility as a push-factor is minimal compared to other push-factors. The most important factor for a firm to decide to relocate prove to be firm internal factors, relating to firm growth or firm decline. The propensity to move also shows significant and plausible differences between sectors: firms in business services prove to be the most likely to move, while Restaurants show the highest 'stickiness' to their location. The accessibility attributes show a negative and significant estimate for γ-locations (near motorway onramp). This suggests that firms near motorways are less likely to move, probably because these firms are relatively more satisfied (or: less dissatisfied) with their current location. Regarding the Business environment the Urban Business Districts show the highest firm move probabilities, what may indicate a more dynamic economical environment at these locations.

Infrastructure as a pull factor

The importance of accessibility attributes as a pull factor can be evaluated from the model estimated for the location choice model, $P^{(2)}_{j|C_i}$, in equation (1). This decision is modelled with a spatial preference model in the form of the multinomial logit (MNL) model, based on random utility theory. By definition, the utility of an alternative consists of an observed and an unobserved (random) component but if the unobserved component is assumed to be Gumbel distributed (McFadden, 1974), the MNL-model results in:

$$P^{(2)}_{j|C_i} = \frac{e^{V_j}}{\sum_{k \in C_i} e^{V_k}} \qquad (3)$$

with:

V_j : the observed utility of location j

C_i : subset C_i for firm i with K alternative locations

The observed utility has the form of a linear additive utility function. Separate choice models have been estimated for each industry sector so no extra firm specific attributes had to be added to the utility function. The observed utility is therefore specified as a function of M alternative specific attributes multiplied by M estimable coefficients, describing the preference structure of the industry sector.

$$V_j = \sum_{m=1}^{M} \beta_m \cdot x_{mj} \qquad (4)$$

with:

x_{mj} : generic attribute *m* for location *j*

β_m : utility coefficient of attribute *m*

The importance of each accessibility attribute as a pull factor can be derived from the coefficients in the utility function. Table 2 and 3 show the estimated coefficients and the associated robust t-statistic for all estimated location choice models. The models are estimated with the freeware program BIOGEME (Bierlaire, 2003). An effect coding scheme has been applied for the αβγ-location types and business environment attributes in order to derive coefficient values for every attribute level.

If we look at the estimated coefficients for the accessibility variables some preferences can be observed. Based on the positive and significant coefficient for γ-locations, firms in business services and manufacturing appear to have a preference for locations near motorway onramps. A similar preference is measured for the firms in trade & retail. These firms also appear to have a preference for Urban Business Disrticts. The combination of these two attributes perhaps reveal a suburbanisation pattern of retail activities, in Dutch also referred to as “woonboulevards”. β-locations appear to be preferred by the government and general services. Education and Health services show a preference for locations near train stations (high positive coefficients for α-locations). Overall, the revealed location preference for the industry sectors seems plausible.

In general the estimated models have a modest explanatory value. Important result is the strong influence of the original location of an observed firm relocation. In all models the estimated coefficient for the distance to the original location proved to be significant. The migration distance therefore has a strong influence on the utility function. A possible explanation found in literature is the existence of keep-factors, a result from the existing spatial relations with employees, customers or suppliers (Pellenbarg, 1996). The accessibility of locations appears to be of a modest importance in the location preference of firms. Furthermore it proves to be important to account for the accessibility of locations in different ways. The results suggest that straight forward distance measures to physical infrastructure are more significant compared to abstract accessibility measures derived from the potential accessibility. A possible explanation can perhaps be found in the fact that the first category is perceived more directly than the second category. Secondly this research only contains intra-regional firm relocations and the potential accessibility measures are much less distinctive within the same region. Perhaps that potential accessibility measures, also describing the accessibility of the labour market, play a more dominant role in inter-regional firm location. Furthermore industry sectors appear to have a distinctive location preference.

Table 2: Estimation results for firms on the office market (significant coefficients in bold)

	office market											
	Finance		Business services		Government		Education		Health services		General services	
Variable	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Migration attribute												
Distance to original loc.[$km^{1/2}$]	**-1,97**	-12,70	**-1,61**	-30,98	**-1,56**	-10,22	**-2,39**	-12,60	**-2,21**	-16,59	**-1,64**	-12,94
Accessibility attributes												
α-location [-]	-0,05		-0,30		-0,24		0,28		0,20		-0,20	
β-location [-]	-0,09	-0,47	0,13	1,79	**0,48**	2,65	0,14	0,71	**-0,34**	-2,16	**0,43**	2,64
γ-location [-]	0,11	0,58	**0,17**	2,52	-0,05	-0,25	-0,22	-1,17	0,15	1,05	0,06	0,36
ρ-location [-]	0,03	0,21	0,00	-0,01	-0,19	-0,92	-0,20	-1,18	-0,01	-0,08	-0,29	-1,83
Reg. acc by train [-]	**-0,29**	-2,58	**-0,40**	-8,39	0,00	-0,02	-0,09	-0,71	-0,18	-1,73	**-0,43**	-3,20
Nat. acc by car [-]	0,12	0,48	0,06	0,87	0,11	0,57	0,08	0,35	-0,01	-0,04	-0,11	-0,59
Reg. acc by car [-]	0,13	0,54	-0,12	-1,99	-0,24	-1,09	-0,26	-1,24	-0,14	-0,86	-0,25	-1,76
Local acc by car [-]	-0,17	-0,88	**-0,24**	-3,89	-0,13	-0,73	-0,34	-1,40	**-0,30**	-2,13	-0,19	-1,19
Environment attributes												
City Centre [-]	-0,11	-0,51	**-0,21**	-2,72	0,06	0,27	**-0,98**	-4,60	**-0,46**	-2,70	0,01	0,05
Urban Business District [-]	0,34	1,49	**0,43**	6,21	0,23	1,11	0,12	0,57	**-0,42**	-2,24	0,07	0,41
Mixed Urban [-]	-0,17	-0,89	-0,09	-1,14	0,07	0,34	-0,02	-0,12	**0,44**	2,85	0,02	0,15
Residential [-]	-0,29	-1,16	-0,21	-1,96	0,14	0,40	**0,60**	2,48	0,29	1,39	0,04	0,15
Non-urban [-]	0,23		0,07		-0,51		0,28		0,14		-0,15	
Rent level index [100€/m^2]	**1,07**	2,71	-0,19	-1,16	-0,81	-1,76	-0,57	-1,34	-0,34	-1,03	-0,44	-1,39
Number of observations	268		1397		182		252		385		246	
Init log-likelihood	-594		-3153		-398		-565		-853		-565	
Final log-likelihood	-375		-2134		-298		-287		-469		-386	
Rho-square	0.369		0.323		0.250		0.493		0.450		0.317	

Table 3: Estimation results for firms on the industrial and retail estate market (significant coefficients in bold)

	industrial estate market								retail estate market			
	Agriculture		Manufactering		Construction		Transport, Warehousing & Comm.		Trade & retail		Restaurants & Food services	
Variable	Value	t-test	Value	t-test	Value	t-test	Value	t-test	Value	t-test	Value	t-test
Migration attribute												
Distance to original loc.[$km^{1/2}$]	**-2,90**	-12,22	**-1,64**	-22,55	**-1,82**	-26,34	**-1,12**	-26,14	**-1,54**	-39,83	**-2,34**	-6,17
Accessibility attributes												
α-location [-]	-2,97		-0,30		0,02		0,08		-0,20		-0,16	
β-location [-]	**1,54**	2,20	0,08	0,62	0,16	1,24	-0,08	-0,75	0,11	1,47	0,31	0,63
γ-location [-]	0,56	1,02	**0,19**	2,00	0,00	0,02	0,12	1,55	0,11	1,77	0,24	0,73
ρ-location [-]	0,87	1,66	0,03	0,26	-0,18	-1,82	-0,12	-1,41	-0,02	-0,27	-0,40	-0,98
Reg. acc by train [-]	-0,39	-1,29	**-0,30**	-3,83	**-0,37**	-5,17	**-0,20**	-3,68	**-0,31**	-6,44	-0,01	-0,04
Nat. acc by car [-]	0,30	1,24	-0,10	-1,07	-0,15	-1,70	-0,09	-1,23	**0,15**	2,40	0,34	0,60
Reg. acc by car [-]	0,02	0,10	**-0,28**	-4,08	-0,06	-0,92	**-0,28**	-6,39	-0,06	-1,16	-0,77	-1,78
Local acc by car [-]	-0,30	-1,64	**-0,20**	-2,61	**-0,16**	-2,25	**-0,20**	-3,44	**-0,31**	-5,85	-0,56	-1,44
Environment attributes												
City Centre [-]	-0,49	-1,29	-0,13	-0,99	**-0,67**	-4,79	0,17	1,63	**-0,36**	-4,74	-0,89	-1,87
Urban Business District [-]	-1,08	-1,86	**0,38**	4,20	-0,08	-0,77	0,10	1,32	**0,26**	4,19	0,38	1,00
Mixed Urban [-]	0,33	0,85	-0,10	-0,82	**0,29**	2,70	0,01	0,15	**-0,17**	-2,21	0,49	1,57
Residential [-]	0,29	0,94	0,01	0,11	**0,58**	4,65	**-0,33**	-2,59	0,00	0,02	0,15	0,38
Non-urban [-]	0,95		-0,17		-0,12		0,05		0,26		-0,12	
Rent level index [100€/m^2]												
Number of observations	230		736		890		791		1555		68	
Init log-likelihood	-526		-1647		-2016		-1785		-3464		-153	
Final log-likelihood	-160		-968		-1069		-1241		-1856		-66	
Rho-square	0.695		0.412		0.470		0.305		0.464		0.565	

Conclusions and discussion

The scientific contribution of this paper is first of all to extend the knowledge into the influence of transport infrastructure on firm migration. The model estimates quantify the transport infrastructure influence and the results correspond to firm demographic literature. We found a modest importance of accessibility as pull-factor when a firm is searching for a new location. Furthermore outspoken differences in location preference between industry sectors are measured. Another finding is the strong influence of keep-factors which indicate that a firm that relocates strives to maintain the existing spatial relations. As expected transport infrastructure plays a minor role as a push-factor: the motives to relocate are often firm-internal.

From a methodological point of view the presented approach yields plausible result. From that respect this firm migration approach can be used to address specific research questions. For example: model estimates can be made for different time periods to analyse the extent of preference dynamics: do firms show a changed location preference over time? These changes can be driven by structural changes in industry sectors or by incentives from a changing spatial policy of the government.

The estimation results also seem valuable for the development of a simulation model to describe the spatial behaviour of a firm in a spatially disaggregated environment. The results show that it is essential to account for the original location of a moving firm. Besides the accessibility of locations additional attributes about the environment have a significant influence on the location preference and can improve the explanatory value of the choice models.

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