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# Firm relocation decisions in The Netherlands: An ordered logit approach*

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**Abstract.** This article explores the determinants of firm migration in The Netherlands. First, based on the existing literature a theoretical framework is developed. Second, based on aggregate data firm relocation processes in The Netherlands are discussed in terms of numbers, sectoral composition, origins and destinations (regions), distance moved and employments effects. In the third part a formal model will be tested using individual data of firms. The relocation decisions of individual firms will be related to firm and location characteristics by means of an ordered logit model. The results indicate that the decision to relocate is mainly determined by firm internal factors and to a lesser extent by site related factors.

**JEL classification:** R30, R12, D21

**Key words:** Firm migration, relocation decisions, ordered logit

## 1 Introduction

In the past decade, the number of firm moves in The Netherlands has grown steadily and considerably. The mobility of firms is greater than is often assumed. In terms of numbers of firms it is not much less important than the (since Birch 1979 and 1987) much more debated issue of new firm formation. In The Netherlands, the three firm demographic components of firm births, firm relocations and firm deaths amounted to totals of 80,000, 68,000 and 42,000 respectively in 1995. Furthermore, the number of firm migrations has grown substantially over time: in 1987 only 36.000 firms moved whereas in 1995 this number increased to 68.000. Also in terms of employment firm migration is an important

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phenomenon: in 1995 about 180.000 jobs were involved in the process of firm migration. The figures over time imply that the number of firm migrations is related to the cycle of economic rise and decline. The latter may not only affect firm migration decisions, but the relocation of firms may also be an important factor in the explanation of differences in regional economic development. The economic effects of firm migration are of importance at different levels. First of all, it may facilitate a firm to move to a location with higher profits. Secondly, firm migration may also have effects on the regional economy or even on the national economy.

When taking into account the spatial pattern of firm migration it is clear that firm migration causes a redistribution of firms and related employment and, therefore, has implications for spatial policy (Kemper and Pellenbarg 1997). To avoid congestion problems a more equal spread of economic activities over space may lead to economic growth at lower cost (Sijtsma et al. 1996). Furthermore, to avoid environmental pollution and conflicting use of land for residential, recreational and economic purposes relocation of existing firms is often required. Given the high cost of firm migration this may lead to conflicting goals of firms and society in general. From the viewpoint of an individual firm, relocation may not really be necessary because they see alternative (cheaper) solutions. However, at a macro level relocation of firms can be profitable and, therefore, individual firms may be encouraged to move by government policy.

In order to get insight into these problems a more careful analysis of the factors that influence the firm migration decision is needed. Until now most firm migration studies are based on aggregate data and focus on the development of firm migration over time and space and by sector. Much less attention is paid to the decision making process of individual firms on the micro level. This article explores the determinants of firm migration in The Netherlands, using individual data on firm and (re-)location characteristics from a sample of over 1,300 firms. The analysis is placed in and developed from the framework of the emerging demography of firms' approach (Gordijn and Van Wissen 1992; Van Geenhuizen 1995; Van Wissen 1996). Five demographic key events of firms (birth, growth, shrink, relocation and death) can be considered. All the types of demographic events can be related to firm activities and decisions with regard to finance, investment, production, marketing, etc. The demographic key events are to be under-stood in relation to a multitude of factors internal and external to the firm. In this article we concentrate on only one of the firm demographic key events: firm migration.

In Sect. 2 of the article a theoretical framework of the firm migration decision is described. Section 3 discusses the firm relocation processes in The Netherlands in terms of numbers, sectoral composition, origins and destinations (regions), distance moved and the employment effects. This part of the article uses aggregate data collected by the Dutch Chambers of Commerce (KVK 1997 and 1998; Kemper and Pellenbarg 1997). In Sect. 4 of the article, the propensity to relocate of individual firms is related to internal and external factors developed and hypothesised on insights from the previous paragraphs by means of an

ordered logit analysis. The article ends with a section of conclusions and policy implications.

## 2 Theoretical framework of the firm's migration decision

Following Nakosteen and Zimmer (1987) we start with the following theoretical framework, which is relatively close to the human capital model of labour migration. They assume that the firm's goal is to maximise profits. In this context the firm's migration decision is among many other factors that influence profitability. They also assume that the individual firm is a price taker in both product and factor markets. For a profit maximising firm $i$ in region $j$ the following profit function results:

$$E_{ij} = E(X_i, Z_j, \varepsilon_{ij}) \tag{1}$$

where $X_i$ denotes observed firm or market specific factors, $Z_j$, are observed location specific factors, and $\epsilon_{ij}$ are unobserved firm-location specific effects, which are assumed to be randomly distributed across industries. Firms in an industry K continuously monitor their profits relative to a fixed target threshold in that particular industry. The threshold depends on the competitive standards of the industry. Firms react to the inequality:

$$E_{ijk}(X_i, Z_j, \varepsilon_{ij}) < E_k \tag{2}$$

Standard economic theory suggests that marginal firms will close in the long run if output prices fail to compensate average variable cost. Intramarginal firms "adjust" by absorbing decreases in the market valuation of their exclusive cost advantages. Some marginal firms may consider migration in order to increase the profit rate again above $E_k$. Relocation is an option if the firm expects that in another location $X_i$, $Z_j$, or $\varepsilon_{ij}$ can be altered sufficiently to make $E_k$ attainable. Firms that relocate are likely to have assessed the earnings prospects of a move and judged them to be favourable. We can view relocation as a capital investment project with net present value calculated at each point in time, $t$, and expressed in conventional fashion:

$$PV_i(t) = \int_t^{\infty} (E_{ij'} - E_{ij})^{-rt} dt - C_{ij'} \tag{3}$$

where $j'$ denotes a competing location, $r$ denotes shareholders' rate of discount, and $C_{ij'}$ denotes the present value of moving costs. Nakosteen and Zimmer (1987) conclude that a firm that reacts to this calculation by relocating should tend to exhibit a profitability rate exceeding the rate that it expected as a result of remaining in its original location.

Yet, location itself is one dimension of a broader investment decision that involves a significant commitment of resources, including fixed capital, over long-term time horizons. In a neo-classical landscape, location matters because costs and revenues vary over space. Besides spatial differences in prices of input and outputs, transport costs play an important role in location theory. According

to McCann (1998) transport costs can not simply be separated from the prices of inputs and outputs because besides production cost also other logistic costs (like storage, etc.) have to be taken into account. Since different firms have different cost and revenue structures, the optimal location of firms may show a broad spatial variety.

Firms may in practice locate in an area for apparently non-economic motives related to place of birth and recreational opportunity. However, regardless whether the present location is chosen for reasons of good luck or judgement, to survive in the long run firms need to attain a certain profit rate. Uncertainty and imperfect information causes that firms often can not simply calculate an optimal location. Over time, possibly even before an investment has generated sufficient returns to recoup fixed expenditures, the assumptions underlying the investment can change as a result of, for instance, market dynamics, rival behaviour, technological innovation and resource depletion and discovery. Firms also miscalculate, even if for no other reason than that in reality they do not have perfect information (Hayter 1997, p. 123).

Therefore, the behavioural theory of the firm may offer additional insight into the decision process with regard to location and migration decisions of firms. For Simon (1959) the idea of optimal decisions, and minimising and maximising, is a theoretical abstraction and he replaces this picture of the firm with the firm as a learning, estimating, searching, information-processing organism. The decision-maker is more a satisficer than an optimiser. Bounded rationality does not imply irrational behaviour but recognises limitations to the abilities of decison-makers in evaluating information. In general, according to behavioural theory, firms consider only a limited number of choices. Alternatives are searched and evaluated in a strongly sequential way. Firms will often choose the first alternative that exceeds a certain reservation standard. The model of Nakosteen and Zimmer assumes that firms will continuously monitor their profits relative to a certain target level. Because the location affects the profis should also imply a continuous evaluation of the present location. Following the behavioural theory and taking into account the search and transaction cost, the firm will evaluate the present location only occasionally.

We may assume that at the start a firm chooses the optimal location P within the spatial margins of profitability (Smith 1966; see Fig. 1). Due to the dynamics in the economic environment or the dynamics within the firm, the optimal location (P) may become less optimal. If the firm continuously evaluates the present location, the moment its location is no longer reflected by the optimal point P (due to spatial market changes, etc.), then it is behaving sub-optimally if it does not relocate immediately, unless there are search and transaction costs of relocation. Following the behavioural approach it is reasonable to assume that when a firm faces a profit rate that is out of line with the industry or even faces losses in the near future this may be related to reconsider the present location. When the evaluation of the present location shows that the firm is reaching the spatial margins of profitability (M) a firm may start thinking about relocation as an instrument to improve the current level of profits. In this case the relocation

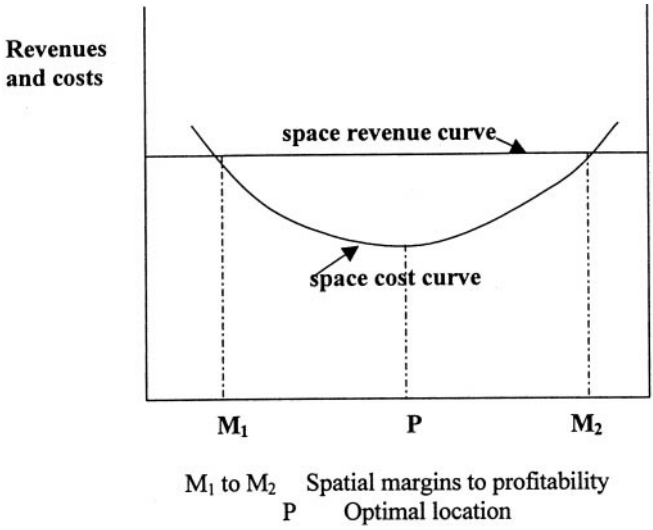


**Fig. 1.** Spatial margins to profitability. *Source* based on Smith (1966, p. 106)

decision is driven by *push*-factors, i.e., reasons to leave the present location. We can thus interpret Fig. 1 as a geographical measure of sub-optimality, and argue that, given the existence of transaction costs, information asymmetries, etc., the more sub-optimal a location becomes, the greater will be the likelihood of relocation.

It is also possible that a firms' present location is still within the spatial margins of profitability, but that the decision maker gets information about one or more other locations with a higher expected profitability. In this situation the relocation decision is driven by *pull*-factors, i.e., forces that attract a firm to another location. In addition to push and pull factors studies on firm migration often distinguish a third factor, the so-called *keep*-factor, i.e., reasons to stay at the present location. This factor mainly relates to the fixed and variable cost incurred with a move. The keep-factor reflects that the firm has done large investments (building, infrastructure) at the present location. If such a firm decides to relocate rather large investments have to be made at the new location. This implies probably a lower probability that the firm will move, because the difference between the profits of the new and the old location have to be rather large to compensate for the high (fixed) costs of moving. Also the variable cost can work as a factor, when a firm depends strongly on sub-contractors and specifically skilled labour which is not or only in a limited way available elsewhere (Lloyd and Dicken 1977; Pellenbarg 1985).

The interplay of the so-called *push*-, *keep*- and *pull*-factors is very important in the location decision process. Lack of space for expansion is always push-factor number one, and accessibility problems are a good number two. Both factors play the leading part again as pull-factors, but then they are more or less of equal importance (see Pellenbarg 1985, 1995 and the recent studies by

Beernink et al. 1998, and Hanemaayer and Rekkers 1998). The third key-variable in the explanation of the firm migration process is the labour market, in the sense that the wish to retain its present employees is keep-factor number one for most firms that are facing the necessity of finding a new location. Especially for firms which invested in highly specialised labour and face high hiring, firing and training cost, the cost of inter-regional moves can be extremely high compared to intra-regional moves. The practical result of this keep-force is that managers often try to minimise the migration distance, so that employees, if possible, can stay working in the firm without the necessity of moving house. Now that the number of two-job households is increasing so much in The Netherlands, this consideration becomes even more important than it was before.

In fact, the identification of push-, pull- and keep-factors only gives a superficial kind of explanation of firm migration processes. In the course of time some firm migration research projects have tried to dig to a deeper level of explanation, taking into consideration how decision processes regarding firm migration develop in more detail, and which constraints have to be met, during these processes, by the decision makers. Already in the 1970s Townroe (1973) developed an enlightening model with five successive decision stages, viz., 1) stimulus, 2) problem definition, 3) search, 4) formulation and comparison of alternatives, and 5) choice and action. The choice-stage was further divided into eight subsequent steps. Later, other authors produced even more complicated models of the location decision making process (see among others Lloyd and Dicken 1977, p. 330). The application of their schemes and models in empirical research is scarce. Recently however, Louw gave a good example of a practical application of decision stage models in his PhD thesis about locational choice behaviour of (migrating) large offices in The Netherlands (Louw 1996).

Louw divided the decision making process into three phases, viz., an *orientation phase*, a *selection phase* and a *negotiation phase*. This roughly corresponds to the phases 3, 4 and 5 of Townroe. It turns out then, that spatial factors (these are geographical position, accessibility, parking possibilities, proximity of facilities and public transport, and quality of the spatial surroundings) play an important role in the first two phases. Financial and contractual factors are getting more important in the third phase, when it comes to negotiating a result. The dominance of spatial factors in the search process is most important for firms that want to own their site and building, and relatively less important in case a firm rents its premises.

Studies like the one undertaken by Louw no doubt contribute significantly to our understanding of the location decision making process, and more such studies should be welcomed. One particular challenge is to identify the role of the group of actors, which is taking part – in one form or the other – in the relocation process. Real estate agents, developers, consultants, accountants, builders, movers, facility managers and of course government officials of all kinds all contribute somehow to what is taking place in the process of a firm's relocation, and thus may have some influence on the outcome of the decision process which is involved in the relocation.

Following Lloyd and Dicken (1977) this brings us to another categorisation of the factors influencing the firms migration decision as compared to the previously mentioned subdivision in push, pull and keep factors. The latter factors are based on characteristics of the present and possible alternative locations. The subdivision suggested by Lloyd and Dicken is based on the decision power of different actors and reflects to what extent the firm is able to control the situation and to what extent the firm has to accept external changes. One might expect that the firm has more control over the changes and developments in the firm than over its environment. Certain site factors are more or less fixed and can only be changed in the long run, whereas other factors may change within a short period. Therefore, we distinguish between:

– 'firm internal' factors (e.g., quality of management, organisational goals, ownership structure, growth rate of turnover, employment and profits),
– 'location' factors (absolute and relative characteristics of the location site, e.g., lot size and size of possible expansion space; distance to customers and suppliers), and
– 'firm external' factors (e.g., government policy, regional economic structure, technological progress, etc.).

With regard to the main subject of this article, firm relocation, the set of explanatory variables may include:

(a) *Firm internal factors:*

– Organisational structure (e.g., relocation of activities from and to other establishments of a multi-establishment organisation; spatial concentration or dispersion of organisational growth; life cycle of the firm);
– Management (e.g., knowledge and perception of alternative location sites);
– Organisational goals (e.g., expansion strategy, minimisation of average home-to-work distance as part of a policy of maximisation of employee satisfaction, or firm location close to public transport alternatives);
– Financial reserves (e.g., availability of savings to pay for relocation costs);
– Size and structure of fixed capital good investments (inertia);

(b) *Location factors (site and situation):*

– Size of lot or premises (e.g., expansion of activities within existing building or on existing lot technical possible);
– Occupancy characteristics (owned versus rented; single or multi-tenancy);
– Availability of space for expansion;
– Accessibility (by road, by public transport; by air, etc.);
– Parking facilities;
– Quality of public space;
– Distance to suppliers;
– Distance to markets;
– Local government policy (with regard to spatial planning and land-use);

(c) *Firm external factors:*

- Changes in numbers, composition or location of suppliers and business customers (due to entries or exits in the population of firms);
- Labour market issues;
- Government policy (regional policy; subsidies available elsewhere, transport, environmental and mobility policy);
- Amount, location and quality of suitable location sites available elsewhere;
- General economic conditions.

The present location of a firm may be the place where the firm started, but it is also possible that previously the firm has been at other locations. We assume that the firm has chosen the present location as the most optimal or satisfying location given the information available at that time. The need to change the present location can be related to the three types of factors mentioned before. Firm internal factors can be related to the 'life cycle' of the firm. When a firm produces only a limited number of products the 'firm life cycle' can be strongly influenced by the 'product life cycle' (Verbon 1966). Initially the production plant is small and produces at relatively high costs and can sell the product at relatively high prices. This may, for instance, permit a location in an environment serving a productive firm nursery. When the product and the firm become mature, the firm will grow. This may imply the change to another production technique, with another mix of inputs, to reduce the cost by means of utilising economies of scale and/or of other agglomeration economies. It is likely that this also implies that another location with a larger space, better access to inputs and better access to markets is now the optimal location. Although for firms with many products in different stages of the product life cycle the relation between the product life cycle and the firm life cycle is less obvious, these firms may also adopt a policy of growth. In that case the firm life cycle may also lead to changing needs with regard to the location. Cities may serve as incubators or nurseries, suburbs for 'teenage' firms, whereas hinterlands are possibly attractive for mature production plants.

Just like firm internal factors, location characteristics and firm external factors may change over time and become less optimal for the firm in its present location. Urban economic theory argues that real estate and land prices will tend to arbitrage away any accessibility advantages of location. Prices will only adjust if the demand for certain locations changes. This may occur if existing firms are willing to pay higher prices, but it may also lead to outmigration of existing firms and new firms coming in. In this way, firm relocation is the result of changing location characteristics. Firm external factors may also change over time and make the present location less optimal. Nowadays several firms located in the densely populated Randstad area in The Netherlands are thinking of moving (parts) of the company to less densely populated areas because they have problems in recruiting personnel. This is due to the fact that the labour market in the Randstad is tight and housing prices are extremely high. Many workers prefer (and can get) a job outside the Randstad where they can buy a much cheaper and nicer

house and save a lot of commuting time. As a result firms consider relocating to the less densely populated areas outside the Randstad. Similar changes in other location and external factors since the initial settlement of the firm may also cause relocation.

The ultimate challenge, however, is to be able not only to describe and understand what is taking place, but to explain it in terms of a model and thus be able to predict the phenomenon on the basis of the expected development of its causal factors. No doubt a dependable prediction of the size and spatial pattern of future firm migration movements would be of great value for spatial planning purposes, especially where the planning of industrial sites is concerned. Because of this reason the *Rijksplanologische Dienst* (National Spatial Planning Agency) has already shown a special interest in the development of knowledge in this field. In Sect. 4 we will describe a first step towards developing an explanatory model of the firm relocation process. First, however, in Sect. 3 a brief overview will be given of the temporal, sectoral and spatial pattern of firm migration and its effect on regional employment in The Netherland based on aggregate data.

## 3 Firm relocations in The Netherlands: Structures and trends

### *3.1 Firm relocations in The Netherlands*

As mentioned in the introduction, in the past decade, the number of firm moves in The Netherlands has grown steadily and considerably. The mobility of firms is greater than is often assumed. In terms of numbers of firms it is not much less important than the (since Birch 1979) much more debated issue of new firm formation. In The Netherlands, the three firm demographic components of firm births, firm relocations and firm deaths amounted to totals of 80,000, 68,000 and 42,000 respectively in 1995. These figures originate from the "Mutation Balances" of the Chambers of Commerce (CoC). From 1987 onwards, the "Mutation Balances" deliver national data on births, relocations and deaths of firms. These data are not 100% accurate because they suffer from a high degree of non-existing or empty firms, no longer existing firms, double registrations, etc. Nevertheless, there is no reason to assume that the flaws of the data source are sector or region-specific. This means that the major tendencies reflected in Table 1 are still meaningful. With this in mind and because no other data with nation-wide information for several years are available, we will give a short overview of the spatial pattern of firm migration in The Netherlands. More detailed information can be found in a series of publications written by Kemper and Pellenbarg (1988, 1991, 1993, 1995, 1997).

In the period 1994–1995 the national total number of firm migrations has indeed grown considerably, i.e., with almost 10,000 moves compared to the previous two-year period 1992–1993. In the late 1980s and early 1990s the two-year growth was only 5,000 and 4,000. The earlier supposition (Kemper and Pellenbarg 1995) that the number of firm migrations is related to the cycle of economic rise and decline is supported by these figures.

**Table 1.** Firm mobility in The Netherlands

| | Number of moved firms | | Migration factor 1995* | | |
|---|---|---|---|---|---|
| | 1994 | 1995 | Short distance | Long distance | Total |
| Manufacturing | 3,700 | 3,950 | 5.8 | 1.6 | 7.4 |
| Construction | 3,620 | 4,250 | 6.6 | 1.1 | 7.7 |
| Wholesale | 9,300 | 9,800 | 7.4 | 2.7 | 10.1 |
| Retail | 6,280 | 6,550 | 3.6 | 0.6 | 4.2 |
| Commercial services[a] | 16,800 | 18,400 | 7.6 | 2.4 | 10.0 |
| Personal services[b] | 5,300 | 5,750 | 4.2 | 0.9 | 5.1 |
| Other[c] | 18,000 | 19,000 | 6.3 | 3.0 | 9.3 |
| TOTAL | 63,000 | 67,700 | 5.9 | 1.9 | 7.9 |
| Total 1993 | | 58,000 | 5.7 | 1.8 | 7.4 |
| Total 1991 | | 54,000 | 5.5 | 1.8 | 7.3 |
| Total 1989 | | 43,000 | 5.3 | 1.4 | 6.7 |
| Total 1987 | | 36,000 | 4.9 | 1.2 | 6.1 |

[a] Transportation, storage, communication, banking and insurance, business services
[b] Hotels/restaurants, sports and recreation, house agents, laundry, hairdressing etc.
[c] Mainly financial holdings
(*) Short distance: migration within Chamber of Commerce district; long: to another district.

*Source*: Kemper and Pellenbarg 1997.

Table 1 shows the sectoral break down of the firm migrations in 1994–1995. A considerable part of the firm moves are found in the category "other". Migrating firms in the financial management sector dominate this category of moves. Such firms are usually very small, and move rather easily. If we ignore this category we observe just as in preceding years that most of the mobile firms are to be found in the wholesale and commercial service sectors, where the annual percentage of mobile firms (Table 1: total migration factor) has now grown to 10 percent. In retailing and personal service the migration factor is only 4 to 5%. For all sectors together firm mobility rose from 7.4% in 1993 to 7.9% in 1995. The sectoral pattern of growth and decline of mobility in 1994–1995 is the reverse of that of 1992–1993. Then, in a recession period, the basic economic sectors became less mobile while non-basic sectors still gained in mobility. Now, in an economic growth period, the basic sectors show a growing mobility, while the non-basic sectors show fewer moves. The brief analysis in Subsect. 3.2 of the spatial pattern of firm migrations will concentrate on the basic economic sectors, i.e., manufacturing, wholesale and commercial services, and moreover be confined to interprovincial moves only.

### *3.2 The spatial pattern of firm relocations*

Table 1 already indicated that short distance moves are much more frequent than long distance moves. In this subsection we will concentrate on figures on long distance, interprovincial firm migrations. The total number of interprovincial movements in The Netherlands has grown strongly, after a stabilisation in 1992–1993, and now (1995) amounts to 6,300. The CoC counting of 6,300 long distance

moves in 1995 is less than 10% of all firm moves, demonstrating that firm migration is indeed mostly short distance. It is first of all a local and regional phenomenon. Only a small minority of the migrant firms cover larger distances with their migrations. Still, the long distance migrations are the most interesting ones: they contribute more than other locational decisions to the change of the economic map of the country, even if we recognise their relative modest absolute numbers.

Table 2 shows the magnitude of the interprovincial firm migrations in terms of the *balance* between in- and outgoing migrations, for the three sectors of manufacturing, wholesale and commercial services. Clearly, the provinces of North and South Holland (containing the three major cities of the country, viz., Amsterdam, Rotterdam and The Hague) are the big losers. The pattern of inter provincial firm migrations in The Netherlands can rightfully be characterised as a flight from the Randstad, and a comparison with figures for earlier years indicates that this flight is growing in magnitude. The migration deficit (number of emigrating firms minus number of immigrating firms) of the three Randstad provinces together, which is now (1994–1995) on an annual average of 515 (Table 2), was in 1992–1993, 1990–1991 and 1989–1990 respectively 433, 320 and 106. Especially the province of North Holland (with Amsterdam) saw a strong growth of the migration deficit. In South Holland (with Rotterdam and The Hague) the deficit dropped slightly.

**Table 2.** Firm migration 1994–1995 for three economic sectors, by province (2-year average)

| Province | Migration In | Migration Out | Balance (in-out) | Manufac-turing | Wholesale | Commercial services |
|---|---|---|---|---|---|---|
| Groningen | 138 | 183 | −45 | 4 | −8 | −41 |
| Friesland | 158 | 107 | 51 | 11 | 5 | 35 |
| Drenthe | 180 | 141 | 40 | 7 | 15 | 19 |
| Overijssel | 301 | 298 | 3 | 2 | 8 | −7 |
| Flevoland | 330 | 194 | 136 | 10 | 44 | 82 |
| Gelderland | 765 | 659 | 106 | 13 | 41 | 53 |
| Utrecht | 863 | 893 | −31 | −5 | −23 | −3 |
| North Holland | 1083 | 1254 | −171 | −38 | −75 | −59 |
| South Holland | 1017 | 1329 | −313 | −32 | −91 | −191 |
| Zeeland | 103 | 89 | 14 | −2 | 8 | 8 |
| North Brabant | 858 | 658 | 201 | 23 | 71 | 107 |
| Limburg | 215 | 205 | 10 | 7 | 5 | −2 |

*Source:* Kemper and Pellenbarg 1997

The net winners in the long distance migration process are the provinces of North Brabant, Flevoland and Gelderland. These three provinces constitute a ring around the Randstad where the outflow of firms of the Randstad lands. But also the more peripheral provinces such as Friesland, Drenthe, Zeeland and Limburg have positive migration balances. When the migration for the period 1994–1995 is compared to the period 1990–1991 (see Kemper and Pellenbarg 1993 and 1997 for details) the outward flows from the three Randstad provinces have amplified in this short period. The biggest migration flows no longer are

between the Randstad provinces themselves, but between them and the adjoining provinces to the East and South. A growing number of firms is moving over greater distances. The periphery of The Netherlands becomes more and more involved in the overflow of economic activity of the national core region, the Randstad. Only the most distant province in The Northeast, Groningen, is not (yet?) taking part in this scheme of national economic redistribution.

### *3.3 Employment effects*

Migrant firms usually are (very) small firms. Migration is typical for young firms that have survived the often difficult and hectic starting-up phase and are now entering a growth phase, characterised by accommodation problems. For small firms, unable to expand at their existing site, migration is a usual answer to such accommodation problems. The larger the firm grows, the more difficulties become associated with changing one location for the other, especially the loss of investment in fixed assets. The larger and older firm will therefore often turn to other strategies to accommodate firm growth, for instance the creation of branch plants or a take over of another firm (Pellenbarg 1995).

The employment data for firm migration in The Netherlands do reflect the characteristic of migrant firms as small firms. On average, in the period 1994–1995 a yearly total of 180,000 jobs were involved in the firm migration process, indicating an average size of the migrant firm of 2.8 employees. The interprovincial migrations (6,300 in 1995) are responsible for 17,000 transferred jobs, of which we count 3,400 in manufacturing, 5,800 in the wholesale sector and 7,800 in commercial services. Small numbers, but migrant firms are growing firms, so that an exodus of firms for a region means the loss of future growth, or vice versa in the case of a region with a net influx. Measured over longer periods, the contribution of the firm migration process for individual regions sometimes has been rather substantial (Pellenbarg 1985).

Just like in foregoing periods, the provinces of South- and North-Holland are losing the greatest numbers of jobs. North-Brabant is the province with the biggest employment gains in the firm migration balance, which could be expected when looking at the number of firm migrations to this province. The employment balance for Utrecht was not so good. There is still a surplus, but it is decreasing, following the trend of the balance in terms of firm numbers, which turned negative in recent years. Gelderland, after a negative employment balance in 1992–1993, shows a positive balance again in 1994–1995. Flevoland witnessed a lower employment effect of firm migration especially in manufacturing and wholesale, Overijssel saw a positive employment effect turn into a (small) negative effect, and finally Groningen and Friesland have small positive employment effects, especially caused by firm migration in the manufacturing sector.

## 4 Firm migration: An empirical application

### *4.1 Introduction*

Section 3 demonstrated that firm migration is an important element in The Netherlands demography of firms with a clear spatially different impact on the regional economy and regional employment. The next step is to get insight into the driving forces underlying the process of locational change. In Sect. 2 we already developed a theoretical framework for the firms' migration decision. This decision process is a very complicated process in which several stages can be distinguished. In each stage another set of variables can be the most important factor. In this first approach, however, we do not account for the different stages in the decision process, but we will estimate an empirical model for the explanation of the stated preference to move to another location based on micro data for Dutch firms. In Subsect. 4.2 we will discuss the data and the variables in the model. Subsection 4.3 deals with the estimation procedure and 4.4 with the empirical results.

### *4.2 The explanatory model*

#### 4.2.1 The data

The overview of firm migration patterns in The Netherlands in Sect. 3 is based on aggregated data and these data do not allow for an explanatory analysis because of the rather limited number of background explanatory variables and the flaws of this data source. For the present analysis we make use of a very rich micro data set derived from regular surveys among the panel of firms managed by the Faculty of Spatial Sciences of the University of Groningen. We use the results of the questionnaire for which data are collected in 1995–1996. A detailed description of the data can be found in Van Steen (1998a). Due to the panel character of the data for most firms in the sample we have also information at earlier points in time. The panel questionnaire used in 1995–1996 focussed especially on relocation possibilities. The data set contains a lot of relevant variables, but due to the panel character of the data, where during time firms may withdraw from the sample and new firms are coming in, some variables are only available for small subsets of the data. This implies that we only make limited use of background variables from previous surveys of the panel. In future research we intend to analyse subsets of the data with more detailed explanatory variables, but with less observations. Descriptive statistics of the variables for the 1338 cases used in the empirical analysis in this section can be found in Appendix A.

#### 4.2.2 The dependent variable

From the survey we know the actual behaviour of firms for each year from 1980 onwards and also the propensity to move within the next two years. We have

**Table 3.** Frequency of the propensity to move (PMOVE) in 1996 or 1997

| PMOVE | Frequency | % | Cumulative % |
|---|---|---|---|
| 0% | 763 | 57.0 | 57.0 |
| 0–10% | 315 | 23.5 | 80.6 |
| 10–25% | 102 | 7.6 | 88.2 |
| 25–50% | 40 | 3.0 | 91.2 |
| 50–75% | 26 | 1.9 | 93.1 |
| 75–90% | 23 | 1.7 | 94.8 |
| 90–100% | 24 | 1.8 | 96.6 |
| 100% | 45 | 3.4 | 100.0 |
| Total | 1338 | 100.0 | 100.0 |

detailed information about the present location characteristics of firms and this information can be used to explain future migration. If firms moved in previous years the present location is the final result. In this article we will focus on the stated preference of the firms with regard to migration. Firms were asked to indicate the probability of moving (PMOVE) in 1996 or 1997. They could choose from the following categories: 0%, 0–10%, 10–25%, 25–50%, 50–75%, 75–90%, 90–100% and 100%. This implies that the respondent expresses a preference with an ordinal ranking. There is no significance to the unit distance between the set of observed values. With this eight categories the dependent variable $y$ = PMOVE can take on values between 0 and 7. For this type of dependent variable the ordered probability model is a suitable tool of analyses (see Subsect. 4.3 for more details about this model). The distribution of the propensity to move is shown in Table 3. From this it is clear that almost 60% of the firms in the sample will not move. Almost a quarter shows a propensity to move of less than 10% and about 10% indicate that there is a chance of more than 25% that they will move to another location.

### 4.2.3 The explanatory variables

Based on the theoretical framework developed in Sect. 2, we adopt an eclectic approach for the operationalization of the explanatory variables used in the empirical model. The stated preference of the firms with regard to migration will be related to a set of variables according to the subdivision in three categories suggested by Lloyd and Dicken (1977):

- firm internal factors
- location factors (site and situation)
- firm external factors

Below these factors will be discussed in more detail:

*Firm internal factors.* In this category we use three variables: economic sector, firm size (number of employees) and previous migration behaviour. With regard to the *economic sector* we distinguished seven sectors: manufacturing industrial sector (INDU), construction (CONS), wholesale (WHOLE), retail and horeca

(hotels/ restaurants/cafes) (RETHOR), transport (TRANS), commercial services (COMSERV) and non-commercial services (NCSERV). The industrial sector is the reference group. Based on Table 1 we expect that the industrial sector will have a lower probability of moving than the service sectors. The costs of moving are generally higher for the industrial sector, because the investment in capital stock and the capital intensity is higher. This implies that these firms will only move when the expected profits of moving are rather high. With regard to the service sector the costs of moving can be very high if they move over a long distance when it implies that a large part of their personal does not move with the firm. In that case the hiring, firing and training cost can be very high and make relocation over a long distance unattractive. For short distance moves these cost are probably fairly low. Theoretically, we expect the mobility of the construction, wholesale and transport sector somewhere in between the industrial and the service sector. The value added produced in these sectors is much less tied to the location of the firm and the investments on the location are smaller than in the industrial sector. Therefore, the costs of moving will be less in these sectors than in the industrial sector. For the firms in the sector retail and horeca we expect that they are most of the time sticking to the present location because they are tied to the local market. Firms in this sector are traditionally clusterers because they serve customers who economise on travel by doing multipurpose shopping, or, seeking food or shelter where there are many providers to minimise shoppers' discouragement. In addition, retail and horeca business can also enjoy dynamic increasing returns in a site: they thrive if their reputation in the neighbourhood continues to be good. When they are moving it is probably to another building close by and not to another part of the city or to another city. If they have a problem with the present location an upgrading of (the environment of) the present building can probably more easily solve this problem than moving to another location. Although the physical costs of moving for this sector are expected to be lower than for the industrial sector, the expected gains are probably also much lower. As a result the propensity to move is expected to be much lower for retail and horeca than for the industrial sector.

With regard to the *size of the firm* we expect that small firms can move more easily to another location than large firms. For the empirical analysis we used the number of employees as indicator for firm size. The costs of moving and the organisational problems for small firms are expected to be much less than for large firms. A counter argument might be that small firms tend to pay market rents, whereas medium sized and large firms may be able to negotiate discounts for large sites or get subsidies from the government easier. This means that although in absolute terms, large firms may have higher relocations costs than small firms, in relative terms they might be lower. Besides that the size of the firm is in indicator for the absolute costs of migration, the size of the firm may also reflect the stage in the life cycle of a firm. Although we do not know the stage in the life cycle of the firm, besides the size of the firm, also previous relocation behaviour can serve as a proxy for this. We expect the need to move to another location to be related to the growth pattern of the firm over time.

When firms move to a new location they will choose a location which permits them to adjust to changes in activities in the near future. We expect that firms who moved in the recent past will less likely feel the need to move to another location. Therefore, we included the variable *previous migration* in the model. This does not necessarily imply that the longer a firm is at the present location the higher the need to move. There might be a difference between firms with a stable size and firms who are growing or shrinking. Rapidly growing firms may need repeated changes of location. Therefore, it is possible that growing firms who have been for only five years at the present location may show a higher propensity to move (again) than stable firms who are already 15 years or more at the same location. Van Steen (1997, p.40) concludes that firms who did not move in the first 20 years after their establishment will most probably never move to another location. Therefore, in the empirical model we distinguished between firms who moved in the period 1991–1995 (M9195), the period 1986–1990 (M8690), the period 1981–1995 (M8185) and firms who moved before 1980 (M80). The firms who never reported a move are used as the reference group.

*Location factors (site and situation).* As shown in Sect. 2 this type of variables is rather important for the location decision process. Therefore, and because the data permit it, we will in this article pay a lot of attention to these variables. We distinguish between five groups. The first four groups consist of variables describing the present type of location. Since the firm initially made a choice for a specific location the attractiveness of the site may have changed, due to for instance increasing traffic congestion, the building of new roads or changes in government spatial or environmental planning. It is likely to assume that some sites are more at risk for changes in attractiveness than others and thus that the propensity to leave may differ by site and situation. For instance, locations in the inner city, near city borders and in residential areas are expected to be more influenced by increasing congestion and/or government environmental policy than industrial zones specifically developed to host certain types of firms. It is also possible that certain types of locations can easier adapt changes of firms moving through the various steps in the firm life cycle than other types of locations. Therefore, we expect that the migration intensity will differ by type of site. The fifth category of variables does not reflect characteristics of the present location, but reflects to what extent firms think that potential changes might affect the suitability of in the present location. It indicates the type and magnitude of changes in the firm and/or the location that may lead to a decision to relocate. Below the five groups of variables are described in more detail.

1. *Type of area:* innercity (INNERC) cityborder (BORDERC), residential area (RESIDENCE) or in the countryside (RURAL). The first three categories probably have the largest problems with regard to accessibility and the possibility of expansion at the present location. However, a substantial part of the firms in the inner city are engaged in activities (retail, horeca) that can hardly be profitable outside a city centre. Therefore, we expect that firms at

the city border and in residential areas will show the highest propensity to move.

2. *Type of enterprise zone/industrial site:* site with mainly offices (OFFICEL), site for mainly transport activities (ISTRANS), site for heavy industry (ISHEAVY) and site for light industry (ISLIGHT). We expect that firms located at a site specifically designed for this type of activity will be less inclined to move than firms at other locations. Of all firms in the sample 66% was situated at one of the four mentioned types of sites.
3. *Infrastructural facilities:* location close to main road to city centre (MAINROAD), close to motorway (MOTORWAY), close to highway (HIGHWAY), close to railway station (RAILWAYST) or close to public transport hub (PUBTRHUB). Of all firms 64% is located near to at least one of these facilities. From the empirical studies cited before, we know that accessibility is for most firms very important. Therefore, we expect that firms located close to a public transport facility will be less likely to move. This is even more true for firms close to a motorway or a highway. Sites with good accessibility may also have an indirect promotional advantage, because the visibility of the firm increases when many people pass the building.
4. *Ownership of the building:* We expect that owners of the building (OWNERB, 68% owns the building) are less likely to move to another location than firms who rent the building, because the cost of getting rid of the present building are much higher for owners. It may also work the other way around: a firm will easier decide to own the building if they expect to stay for a long time. When real estate prices increase over time, a firm that owns the building may still have a relative cheap location. In some occasions this may, however, also increase the possibility of relocation when the firm is relatively footloose and can make a profit when they sell the present building and move themselves to a cheaper location. Taking all the effects together we expect that owners will show a lower propensity to move. We also know whether or not the firm is the only user of the building (ONLYUSER, 78%) of the building. We expect that when a firm has to share the building with other users they are more likely to move, because firms prefer a building for them alone.
5. *Opinion about potential changes of the present location:*
   – Potential location stress

     In the questionnaire the firms were asked to indicate to what extent they are likely to move to another location if certain changes will occur. Based on about 20 questions a composite variable is constructed which serves as a proxy for the possibility to adjust to changes at the present location. The composite variable can be labelled ‘stress tolerance threshold’ or ‘potential location stress’. Possible changes which might affect the suitability of the present location are: growth of the number of employees, the accessibility, increasing criminality, government policy with regard to the environment and spatial planning and finally, investment premiums and lower rents at another location. Based on a weighting scheme an indicator LOCSTRESS was created which ranges from 0 to 100 with mean

17 (for details see Van Steen 1998a, p. 106). We estimated the model with this continuous variable and also with a breakdown in only three categories. The reference group (LOCSTRESSLow) has a score on LOCSTRESS below 10. Firms with a value of LOCSTRESS between 10 and 20 have a medium location stress (LOCSTRESSMedium). Finally, when LOCSTRESS is between 20 and 100 firms have a high location stress at the present location (LOCSTRESSHigh). A high score on LOCSTRESS for a particular firm implies that several types of changes may lead to reconsidering the appropriateness of the present location. Therefore, we expect that firms with high potential location stress will be more likely to move to another location.

– *Need for revitalisation:* Firms are also asked whether or not a revitalisation of the direct environment is needed. They could choose from four categories: not necessary (reference category), not really necessary (REVI2), necessary (REVI3) and really necessary (REVI4). When firms state that revitalisation is really necessary this may increase the likelihood of moving because it indicates that the firms are not happy with the present location. However, for some firms revitalisation can act as a substitute for relocation, especially when there are hardly alternative locations, they expect that revitalisation will take place in the near future and the costs of revitalisation are merely paid by the government and not by the firm itself.

The shares of the variables mentioned under 1., 2., and 3. do not sum to 100%. In contrast, the various variables show a substantial overlap. Therefore, we have to take into account the problem of multicollinearity. This problem can be even more serious when we also include the variables LOCSTRESS and REVI, because some types of areas are more likely to have location stress and the need for revitalisation than other areas.

*Firm external factors.* With regard to these factors we will take into account differences in economic performance and the regional labour market situation by means of a set of *regional dummies* and *the opinion of firms about government policy*.

The data contain information about the location in one of the 40 Dutch COROP-regions, which can be aggregated to the 12 Dutch provinces. For the empirical analyses we tried several regional subdivisions. The best results were obtained by subdivision in *five groups of provinces*. The three northern provinces Groningen, Friesland and Drenthe (NORTH), the eastern provinces Overijssel, Gelderland together with the new province of Flevoland (EAST), the central provinces North-Holland and Utrecht (CENTRALNO, reference category), the province of South-Holland (CENTRALSO) and the southern provinces North-Brabant, Limburg and Zeeland (SOUTH). We expect that the need for relocation will be lower in the peripheral areas, because in these provinces there is generally plenty of room for expansion. However, a counter argument is that firms move from the periphery to the central part of the country because they need to move

to a location closer to the market or to facilities like a major international airport or seaport. Based on Sect. 3 we may conclude that the former argument is more likely in The Netherlands.

Another important external factor is *the opinion of firms about government policy* (Van Steen 1998b). In The Netherlands, government policy can make rather strict rules in spatial planning and with regard to, for instance, environmental limits for pollution and noise. On the one hand, we expect that firms that have a positive opinion about government policy will be less inclined to move to another location. On the other hand, firms may be stimulated to move to another location when government policy creates attractive (and sometimes subsidised) locations to move to. In the questionnaire firms are asked to give their opinion on a scale from 1 to 10 about, respectively, the EU-policy, the national policy and about the policy at the regional (province) and the local (municipality) level. Based on the results on the 10-point scale, finally, three relevant groups are distinguished for the variable that indicates the judgement of local policy: insufficient (score $\leq 5$; POLMUN1, reference group), sufficient (score between 5 and 7; POLMUN2) and good (score 7 to 10; POLMUN3) good. Because about 15% did not answer the question about local policy we created a separate group with opinion unknown (POLMUN4). Similar variables were created for the other policy levels.

### *4.3 Model estimation*

We will now estimate an explanatory model for the stated preference of the firms with regard to migration. Firms were asked to indicate the probability of moving in 1996 or 1997 as an ordinal ranking in eight categories. There is no significance to the unit distance between the set of observed values. The dependent variable $y$ (PMOVE) can take values from 0 and 7. For this type of date the ordered probability model is a suitable tool of analysis (see Greene 1995, p. 469–481). From the two alternative model types, the ordered logit and the ordered probit, we choose to present the results of the ordered logit model because the results for the ordered probit model were only slightly different. This is to be expected, because according to Greene the probit specification is only a trivial modification and appears to make virtually no difference in practice (Greene 1997, p. 673).

The ordered logit model is based on the following specification:

$$y_i^* = \beta' \mathbf{x}_i + \varepsilon_i \,,$$

where $\mathbf{x}_i$ is the set of explanatory variables and $\varepsilon_i$ is the disturbance term. As usual $y_i^*$ is unobserved. What we do observe is:

$$\begin{aligned} y_i &= 0 \quad \text{if} \quad y_i^* \leq \mu_0 \,, \\ &= 1 \quad \text{if} \quad \mu_0 < y_i^* \leq \mu_1 \,, \\ &= 2 \quad \text{if} \quad \mu_1 < y_i^* \leq \mu_2 \,, \\ &\quad \ldots\ldots \\ &= 7 \quad \text{if} \quad y_i^* > \mu_6 \,. \end{aligned}$$

This is a form of censoring. The $\mu$'s are unknown parameters to be estimated with $\beta$. The respondents have their own intensity of feelings, which depends on certain measurable factors, **x**, and certain unobservable factors, $\varepsilon$. In principle, they could respond to the questionnaire with their own $y_i^*$ if asked to do so. Given only eight possible answers, they choose the category that most closely represents their own feelings on the question.

In the ordered logit model $\varepsilon_i$ has a standard logistic distribution, whereas in the ordered probit specification $\varepsilon_i$ has a standard normal distribution. The explanatory variables are nearly all categorical (dummy) variables. To avoid identification problems for each variable one level has to be omitted from the set of explanatory variables reflecting the various levels. The combination of omitted levels gives the characteristics of the reference group and the estimate for this group is reflected by the coefficient for the constant. Each of the other coefficients reflects the difference in the probability of moving for a firm with a characteristic that differs from the reference group. Estimation of the ordered logit model has been done with LIMDEP version 7. In the discussion regarding the results we will use three conventional levels of significance: if $t > 1.66$, 1.96 or 2.33 the coefficients are significant at, respectively, the 10%, 5% or 1% level. For details about the estimation procedure and the interpretation of the results see Greene (1995, p. 469–481 and 1997, p. 672–676).

The model estimation started with the full set of variables described above. To avoid that we assume a linear relation for certain variables (e.g., the number of employees and LOCSTRESS) we replaced the continuous variables by a set of dummies. Because no differences were obtained for various levels of several variables we reduced the number of estimated parameters by combining various levels. Because the other coefficients for variables reflecting the opinion about the government policy were far from significance at conventional levels, only the judgement of local policy was included in the full model. Also for the location factors a lot of insignificant coefficients were found. As mentioned above, for these variables the problem of multicollinearity may occur. Therefore, we re-estimated the model twice: with only those variables who showed in the full model with all variables at least a $t$-value of 1.3 and next for the variables with at least a $t$-value of 1.6 in the full model. Location stress (LOCSTRESS) at the present location and to a lesser extent the need for revitalisation turned out to be very significant explanatory variables. To test whether multicollinearity is a problem we estimated the full model also without LOCSTRESS and/or REVI. Omitting LOCSTRESS from the model affected some of the parameter estimates, especially the location factors. Omitting REVI hardly changed the results. We also run an OLS regression with the continuous variable LOCSTRESS as the dependent variable and all other variables of the full model as explanatory variables. It turned out that only M80(+), RESIDENCE(+), OFFICEL(+), EMPLBIG(−), POLMUN4(−) and REVI(+) showed significant coefficients at the 5% level. It implies that firms who moved before 1980, are located in a residential area or office location and are feeling an urgent need for revitalisation of the environment expect significantly more often to be confronted with location stress. Firms who

are very big or firms who are very happy with local policy expect that this will seldom occur. Nearly all other variables showed very low $t$-values. This implies that potential location stress is only to a very limited extent related to the other variables in the full model.

In Table 4 the results are presented for the full model, the reduced model with only the variables that obtained $t$-values of at least 1.3 or 1.6 in the full model, and finally the full model without the variable LOCSTRESS. Based on the Chi-square statistic for the decrease of the LogLikelihood the overall fit of the model is significant at the 1% level. The estimated coefficients for the unknown parameters $\mu$'s (not reported in Table 4, but available from the authors upon request) in all models show the expected increase in order and hardly vary between the four models in Table 4. Compared to the reference category $\mu_0$, the higher order $\mu$'s differ significantly at the 1% level. When variables with low $t$-values are omitted from the model the overall fit decreases only slightly. However, when LOCSTRESS is omitted from the model the decrease in the overall fit of the model is quite substantial. This indicates that, if this variable is removed from the model, its effect is only for a small part covered by the other locational variables. Given the result for the regression results described in the previous subsection with LOCSTRESS as dependent variable this is not very surprising.

### *4.4 Empirical results*

Next we will discuss the estimation results for the three previously distinguished categories of variables.

#### 4.4.1 Firm internal factors

With regard to the statistical significance of the individual coefficients the results for the four specifications presented in Table 4 do not lead do different conclusions. In contrast to the univariate statistics presented in Table 1, the multivariate analysis shows that the industrial sector turned out to be not a significant determinant of the propensity to move with the exception of the retail and horeca sector. In accordance with the expectations this sector shows a very low propensity to move. Although the service sector shows the expected positive coefficients which indicates a higher propensity to move than the economic sector, only for non-commercial services the difference comes close to significance at the 10% level in the full model.

For firm size we estimated the model with a set of dummies for size categories. We started with seven categories, but on the basis of the empirical outcome three categories are enough: small firms with less than ten employees (EMPLSMA, reference category), medium sized firms with 10–250 employees (EMPLMED) and large firms with over 250 employees (EMPLBIG). Firm size turns out to be a significant at the 1% level in all for models. In accordance

**Table 4.** Ordered logit results

| | Full model | | Only $t > 1.3$ | | Only $t > 1.6$ | | Without LOCSTRESS | |
|---|---|---|---|---|---|---|---|---|
| Variable | Coeff. | $t$-value | Coeff. | $t$-value | Coeff. | $t$-value | Coeff. | $t$-value |
| Constant | −0.03 | −0.09 | −0.04 | −0.17 | −0.31 | −1.24 | 0.54 | 1.61 |
| *Firm internal factors* | | | | | | | | |
| CONS | 0.04 | 0.15 | | | | | −0.12 | −0.50 |
| WHOLE | −0.06 | −0.32 | | | | | −0.07 | −0.35 |
| RETHOR | −0.68 | −3.34 | −0.75 | −4.52 | −0.74 | −4.53 | −0.71 | −3.60 |
| TRANS | 0.08 | 0.30 | | | | | 0.07 | 0.27 |
| COMSERV | 0.19 | 1.08 | | | | | 0.01 | 0.04 |
| NCSERV | 0.47 | 1.58 | 0.38 | 1.38 | 0.34 | 1.22 | 0.41 | 1.40 |
| EMPLMED | −0.48 | −2.37 | −0.50 | −2.52 | −0.51 | −2.56 | −0.48 | −2.34 |
| EMPLBIG | −0.75 | −2.50 | −0.78 | −2.72 | −0.75 | −2.64 | −0.95 | −3.20 |
| M80 | −0.04 | −0.30 | | | | | 0.09 | 0.64 |
| M8185 | −0.28 | −1.47 | −0.26 | −1.39 | | | −0.23 | −1.17 |
| M8690 | 0.31 | 1.78 | 0.36 | 2.13 | 0.37 | 2.17 | 0.32 | 1.87 |
| M9195 | −0.43 | −2.44 | −0.40 | −2.33 | −0.38 | −2.21 | −0.38 | −2.16 |
| *Location factors* | | | | | | | | |
| INNERC | −0.12 | −0.68 | | | | | −0.02 | −0.11 |
| BORDERC | 0.30 | 2.06 | 0.35 | 2.63 | 0.39 | 2.94 | 0.27 | 1.91 |
| RESIDENCE | 0.21 | 1.13 | | | | | 0.40 | 2.23 |
| RURAL | −0.26 | −1.33 | −0.26 | −1.40 | | | −0.29 | −1.49 |
| OFFICEL | 0.27 | 1.16 | | | | | 0.47 | 2.00 |
| ISTRANS | −0.11 | −0.62 | | | | | −0.15 | −0.85 |
| ISHEAVY | −0.43 | −1.65 | −0.49 | −2.00 | −0.47 | −1.91 | −0.54 | −2.15 |
| ISLIGHT | 0.08 | 0.59 | | | | | 0.10 | 0.68 |
| MAINROAD | −0.05 | −0.34 | | | | | −0.06 | −0.44 |
| HIGHWAY | −0.12 | −0.83 | | | | | −0.13 | −0.89 |
| MOTORWAY | −0.25 | −1.47 | −0.26 | −1.59 | | | −0.23 | −1.32 |
| RAILWAYST | 0.04 | 0.19 | | | | | −0.02 | −0.07 |
| PUBTRHUB | −0.19 | −0.86 | | | | | −0.15 | −0.66 |
| OWNERB | −0.35 | −2.53 | −0.39 | −2.97 | −0.46 | −3.74 | −0.43 | −3.16 |
| ONLYUSER | −0.21 | −1.34 | −0.23 | −1.56 | | | −0.16 | −1.09 |
| LOCSTRESSM | 0.81 | 4.99 | 0.80 | 5.03 | 0.81 | 5.10 | | |
| LOCSTRESSH | 1.46 | 10.61 | 1.46 | 10.88 | 1.46 | 10.95 | | |
| REVI2 | 0.39 | 2.64 | 0.36 | 2.54 | 0.36 | 2.56 | 0.53 | 3.62 |
| REVI3 | 0.42 | 2.48 | 0.38 | 2.37 | 0.40 | 2.48 | 0.69 | 4.23 |
| REVI4 | 0.96 | 4.09 | 0.94 | 4.19 | 0.96 | 4.27 | 1.30 | 5.55 |
| *Firm external factors* | | | | | | | | |
| NORTH | −0.30 | −1.63 | −0.19 | −1.32 | −0.19 | −1.31 | −0.26 | −1.45 |
| EAST | −0.17 | −0.95 | | | | | −0.22 | −1.24 |
| CENTRALSO | −0.13 | −0.70 | | | | | −0.12 | −0.63 |
| SOUTH | −0.32 | −1.81 | −0.25 | −1.72 | −0.26 | −1.78 | −0.34 | −1.94 |
| POLMUN2 | 0.08 | 0.51 | | | | | 0.03 | 0.18 |
| POLMUN3 | −0.08 | −0.52 | | | | | −0.13 | −0.88 |
| POLMUN4 | −0.26 | −1.36 | −0.24 | −1.44 | | | −0.36 | −1.86 |
| LogLikelihood | | 1598 | | 1603 | | 1609 | | 1661 |
| Restricted LL | | 1732 | | 1732 | | 1732 | | 1732 |
| Degr. Freedom | | 39 | | 21 | | 16 | | 37 |

with our expectations small firms with less than ten employees are much more likely to move than medium and large firms. There is no statistically significant difference between EMPLMED and EMPLBIG.

Previous migration turns out to be significant for firms who moved during the last ten years. Firms who moved to another location between 1986 and 1990 are now considering a new relocation much more often than firms who did not move before, whereas firms who moved after 1990 show a much lower propensity to move (coefficient significant at the 1% level). A possible explanation is that expanding/dynamic firms need a change of location after about five years to fulfil their new needs with regard to location.

### 4.4.2 Location factors (site and situation)

With regard to the type of area we found that firms located at the city border have a strong interest in moving to another location in all models compared to firms in the inner city or in the countryside. A possible explanation for this unexpected result is that locations at the city border become more and more congested. Another explanation is that especially firms located at the city border are firms that move to another stage in the life cycle. For firms located in residential areas we do not find a significant effect when LOCSTRESS is included in the model. However, if LOCSTRESS is left out of the model the variable RESIDENCE becomes significant at the 5% level. In a model with LOCSTRESS as the dependent variable RESIDENCE turns out to be one of the variables with a very high *t*-value. This implies that firms located in residential areas are often confronted with a high location stress and this increases their propensity to move. The coefficient for the inner-city variable (INNERC) is negative but not significant. Probably positive cluster effects offset the expected negative effect of congestion especially for firms in retail and horeca, which are highly over represented in the inner city. These firms show a very low mobility as expressed by the negative coefficient for the sector RETHOR.

For the type of enterprise zone only significant (negative) results are found for firms located at a site for heavy industry (ISHEAVY). Firms at this type of location are often rather capital intensive and this implies high cost of moving. Furthermore, for this type of firm the availability of alternative locations is often limited. Just as for residential areas in the previous subsection we found that firms on office locations (OFFICEL) show a significant (positive) coefficient when LOCSTRESS is left out of the model. In a model with LOCSTRESS as the dependent variable OFFICEL turns out to be one of the important explanatory variables. This implies that firms located at office locations are already facing a high location stress and this increases their propensity to move. The conditions at the other type of enterprise zones are probably less subject to change due to, for instance, increased congestion and/or the firms located at these sites or less dynamic.

None of the infrastructure variables, which reflect the nearness to roads and public transport, are significant at conventional levels. Also in the model without

LOCSTRESS the coefficients remain insignificant. Even in the case that the infrastructure variables are the only variables in the model none of the coefficients turned out to be significant. On the one hand, this is surprising because accessibility is considered to be an important location characteristic in many studies. The obtained result may also imply that the initially chosen location still serves the need of the firms and the conditions have not changed much. The insignificance of the public transport variables can also indicate that accessibility by public transport is not very important for most firms.

In accordance with our expectations we found that firms who are owner of the building show a lower propensity to relocate than firms who rent the building. Although the coefficient for only users of the building show the right sign (multi-users are more likely to move), the coefficient is not significant in either of the specifications.

The results for LOCSTRESS and REVI are all significant at the 1% level and this implies that the potential occurrence of location stress and a strong plea for revitalisation of the direct environment are important determinants of the propensity to move. As mentioned before, we also tried specifications of the model without LOCSTRESS and/or REVI. The results indicated that only the omittance of LOCSTRESS affected some of the other coefficients. We can conclude that at certain types of locations LOCSTRESS occurs more frequently than on other types. However, without LOCSTRESS the overall performance of the model strongly decreases and this implies that LOCSTRESS itself is a very important determinant of the propensity to move. Firms with a high score on LOCSTRESS are sensitive for various types of changes with regard to reconsidering the present location. The positive relation between the stated propensity to move and LOCSTRESS indicates that firms who face potential location stress expect that one or more of the hypothetically suggested changes will become reality in the near future. Because LOCSTRESS is a composite variable, in a later study we will try to include more disaggregated variables for location stress to unravel which stress factors are most important.

### 4.4.3 Firm external factors

Compared to the reference group consisting of firms located in Utrecht and North-Holland we find that firms in the southern provinces (significant at the 10% level) are less likely to move to another location. This is in accordance with our expectations. For the northern provinces this effect is less outspoken (coefficient almost significant at the 10% level in the full model only). Given that in the northern provinces plenty of space is available, the larger distance to the central part of the country might be a reason to consider relocation. This is in line with the finding in Table 2 that the province of Groningen shows a negative net migration balance. More generally we find that firms located in provinces with a negative net migration balance in the central part of the country show the highest propensity to move. When we combine the southern and northern

provinces in one category and use all other provinces as the reference category we find a significant (at almost the 5% level) negative effect on the propensity to move for the northern and southern provinces compared to the rest of the country.

With regard to the opinion of firms about government policy no significant results are obtained. Only the group of firms who did not answer the question about government policy shows a significant (at the 10% level) negative coefficient in the model without LOCSTRESS. In the regression with LOCSTRESS as dependent variable the same result is found with a higher level of significance (1% level). This probably implies that these firms are quite happy at their present location and, therefore, are not very much interested in government policy or not affected by it.

## 5 Conclusions

The main aim of this article is to get insight in the process of firm migration and the explanatory variables determining this decision. In Sect. 2 a theoretical framework for the firms migration decision is developed which serves as the basis for the empirical explanatory model for firm migration. The model is estimated on micro data for about 1300 Dutch firms. The stated propensity to move is related to a set of explanatory variables by means of an ordered logit model. The results show that with regard to the firm internal factors small firms show a much higher propensity to migrate than firms with 10 or more employees. Firms in the retail and horeca sector show a very low interest in moving, but for the other economic sectors no significant differences are found. Previous migration turns out to be a very important variable. Firms who moved between 5 and 10 years ago show a very high interest in moving whereas firms who moved more recently show a very low propensity to move. In general we can conclude that the results for the firm internal factors indicate that going through the various stages in the life cycle is an important explanatory variable for the decision to relocate.

The characteristics of the present location, which can hardly be influenced by the firm, seem to play only a limited role in the explanation of the propensity to migrate with the exception of a location at the city border and the need for revitalisation. This does not permit the conclusion that these factors are not important for the decision to relocate, because it is also possible that these factors have not changed very much since the firm located at the present site and still fit with the needs of the firm. The latter opinion is supported by the results for the variable LOCSTRESS, which reflects the effect of hypothetical changes, including location factors, on the relocation decision. An increasing risk of location stress goes together with a higher stated propensity to move within the next two years. Probably firms think that the hypothetical changes will at least partly become reality in the near future. When a firm owns the building this clearly reduces the probability of relocation. Although this variable is classified as a location factor

because it is tight to the present location, the firm itself can much more easily influence this factor than the other location factors.

With regard to the firm external factors our results indicate a clear partition of the country in two parts. The wish to move to another location is significantly less in the three northern and the three southern provinces than in the rest of the country. This implies in general that the business environment in the periphery is such that relocation is often not necessary. The opinion of a firm about the government policy ranging from EU-policy to the policy of the municipality turns out hardly to affect the propensity to move. We hesitate to conclude that external factors are not very important, because we did not include variables that reflect more specific factors like the labour market situation for certain skills, distance to subcontractor's, etc.

Although on the basis of the present analysis we can only draw tentative conclusions, our results support the view that the migration decision of a firm is mainly determined by firm internal factors and to a lesser extent by site related factors. The importance of the variables firm size, retail and horeca and previous migration support this view. The results that the location stress indicator and the need for revitalisation are very important factors seem to contradict with this outcome. However, in the composite variable location stress, questions related to internal factors also play prominent roles. The location factor ownership of the building can also be seen as a firm internal factor if it is interpreted as an investment in fixed capital.

When firm migration is indeed mainly determined by firm internal factors, especially the firm life cycle, this implies that the translation to policy might be much more difficult than when the main determinants should be related to specific types of locations or firm external factors. On the other hand, life-cycle oriented firm demographic research should be advocated as a basis for future-oriented spatial planning. In the meantime, the rising numbers of migrant firms cannot be neglected as a sign of shortage of space and appropriate locations in especially the central regions of The Netherlands. To avoid congestion problems, environmental pollution and conflicting use of land for residential, recreational and economic purposes the government may adopt a policy aiming to reach a more equal spread of economic activities over space by means of stimulating firm migration. This may facilitate regional economic growth in lagging regions, reduce congestion costs and also may increase national economic growth. Although firm migration may lead to a substantial spatial redistribution of employment, a government policy to stimulate firm relocation will only be successful if this is specifically targeted to firms that consider relocation due to changes in internal firm factors. However, before we can draw this conclusion a more in depth analysis is necessary.

## Appendix A. Descriptive statistics (1338 cases)

| Variable | Mean | Std. Dev. | Skew. | Kurt. | Min. | Max. |
|---|---|---|---|---|---|---|
| PMOVE | 0.98 | 1.70 | 2.3 | 7.6 | 0 | 7 |
| | | | | | | |
| INDU | 0.28 | 0.45 | 1.0 | 1.9 | 0 | 1 |
| CONS | 0.08 | 0.27 | 3.1 | 10.5 | 0 | 1 |
| WHOLE | 0.15 | 0.35 | 2.0 | 5.0 | 0 | 1 |
| RETHOR | 0.15 | 0.36 | 2.0 | 4.9 | 0 | 1 |
| TRANS | 0.06 | 0.25 | 3.6 | 13.6 | 0 | 1 |
| COMSERV | 0.23 | 0.42 | 1.3 | 2.6 | 0 | 1 |
| NCSERV | 0.04 | 0.20 | 4.5 | 21.5 | 0 | 1 |
| EMPLSMA | 0.08 | 0.27 | 3.1 | 10.5 | 0 | 1 |
| EMPLBIG | 0.08 | 0.27 | 3.1 | 10.8 | 0 | 1 |
| EMPLMED | 0.84 | 0.37 | −1.8 | 4.3 | 0 | 1 |
| M80 | 0.23 | 0.42 | 1.3 | 2.7 | 0 | 1 |
| M8185 | 0.09 | 0.28 | 3.0 | 9.7 | 0 | 1 |
| M8690 | 0.12 | 0.32 | 2.4 | 6.7 | 0 | 1 |
| M9195 | 0.14 | 0.34 | 2.1 | 5.4 | 0 | 1 |
| | | | | | | |
| INNERC | 0.16 | 0.37 | 1.8 | 4.4 | 0 | 1 |
| BO RDERC | 0.22 | 0.41 | 1.4 | 2.9 | 0 | 1 |
| MAINROAD | 0.26 | 0.44 | 1.1 | 2.2 | 0 | 1 |
| RESIDENCE | 0.11 | 0.32 | 2.4 | 6.9 | 0 | 1 |
| OFFICEL | 0.07 | 0.25 | 3.4 | 12.5 | 0 | 1 |
| ISTRANS | 0.16 | 0.37 | 1.8 | 4.4 | 0 | 1 |
| ISHEAVY | 0.08 | 0.27 | 3.2 | 10.9 | 0 | 1 |
| ISLIGHT | 0.35 | 0.48 | 0.6 | 1.4 | 0 | 1 |
| HIGHWAY | 0.29 | 0.46 | 0.9 | 1.8 | 0 | 1 |
| MOTORWAY | 0.14 | 0.34 | 2.1 | 5.5 | 0 | 1 |
| RAILWAYST | 0.11 | 0.32 | 2.4 | 6.9 | 0 | 1 |
| PUBTRHUB | 0.10 | 0.29 | 2.7 | 8.6 | 0 | 1 |
| RURAL | 0.11 | 0.32 | 2.4 | 6.9 | 0 | 1 |
| ONLYUSER | 0.78 | 0.42 | −1.3 | 2.8 | 0 | 1 |
| OWNERB | 0.68 | 0.47 | −0.8 | 1.6 | 0 | 1 |
| REVI1 | 0.30 | 0.46 | 0.9 | 1.8 | 0 | 1 |
| REVI2 | 0.41 | 0.49 | 0.4 | 1.1 | 0 | 1 |
| REVI3 | 0.22 | 0.42 | 1.3 | 2.8 | 0 | 1 |
| REVI4 | 0.07 | 0.25 | 3.4 | 12.8 | 0 | 1 |
| LOCSTRESS | 16.61 | 17.02 | 1.4 | 5.3 | 0 | 100 |
| LOCSTRESSL | 0.47 | 0.50 | 0.1 | 1.0 | 0 | 1 |
| LOCSTRESSM | 0.18 | 0.39 | 1.6 | 3.7 | 0 | 1 |
| LOCSTRESSH | 0.34 | 0.47 | 0.7 | 1.4 | 0 | 1 |
| | | | | | | |
| NORTH | 0.22 | 0.42 | 1.3 | 2.7 | 0 | 1 |
| EAST | 0.21 | 0.41 | 1.4 | 3.0 | 0 | 1 |
| CENTRALNO | 0.19 | 0.40 | 1.5 | 3.4 | 0 | 1 |
| CENTRALSO | 0.15 | 0.36 | 1.9 | 4.6 | 0 | 1 |
| SOUTH | 0.22 | 0.41 | 1.4 | 2.9 | 0 | 1 |
| POLMUN1 | 0.28 | 0.45 | 1.0 | 2.0 | 0 | 1 |
| POLMUN2 | 0.27 | 0.44 | 1.0 | 2.1 | 0 | 1 |
| POLMUN3 | 0.31 | 0.46 | 0.8 | 1.7 | 0 | 1 |
| POLMUN4 | 0.14 | 0.35 | 2.0 | 5.1 | 0 | 1 |

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