What makes firms leave the neighbourhood?

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Abstract
Limited attention has been paid to how neighbourhood conditions affect firm relocation choices. Using a panel dataset (1999-2006) of actual firm relocations in the Netherlands, the effect of different neighbourhood conditions on the firm's propensity to relocate has been estimated. Results show that besides firm and regional characteristics neighbourhood conditions also affect firms' relocation choices, but which conditions matter depends on the firm's industrial activity and size. Especially the relocation decision of consumer services is affected by neighbourhood conditions, while the choice of manufacturing, wholesale and business services firms is affected more by increases in population density. Nevertheless, the number of shops, cafes and restaurants present in the neighbourhood affects the relocation decisions of all three types of firms, especially of those with more than one employee. This shows that besides distressing conditions, such as violent crime, differences in amenities within cities also affect the sorting of firms.

Keywords: firm relocation, neighbourhood characteristics, event history analysis

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1. Introduction

Firm relocation has important implications for both individual firms and spatial policy because it affects firm performance (Knoben and Oerlemans, 2008) and leads to a redistribution of firms and related employment (Van Dijk and Pellenbarg, 2000). Given these implications, there has been much interest in why firms decide to relocate, resulting in many studies examining the drivers of firm relocation (for reviews of this literature see Arauzo-Carod et al., 2010, and Pellenbarg et al., 2002). These studies have shown that most firm relocations are triggered by firm growth and the accompanying need of room for expansion. But, after controlling for these firm internal factors, regional characteristics have also been found to affect firm relocation decisions which shows that firms also move with the intention to improve their locational environment.

However, most studies only examined the relevance of regional characteristics as a driver of firm relocation, while limited attention has been paid to neighbourhood conditions (notable exceptions are Van Dijk and Pellenbarg, 2000 and Rosenthal and Ross, 2010). Neighbourhood conditions may matter as entrepreneurs are likely to be concerned about the socioeconomic status and general social climate of the neighbourhood as they prefer safe, well-maintained locations for their customers and employees (Iceland and Harris, 1998; Rosenthal and Ross, 2010). Consequently, differences in neighbourhood conditions may affect the sorting of firms into different parts of the city and, in this way, affect the patterns of urban development.

The current lack of insights in the effect of neighbourhood conditions on the location choice of firms may also impede the ability to design policies that effectively can change the liveability and safety of urban neighbourhoods. Most contemporary spatial policies consider a mixture of housing and commercial activities within a neighbourhood to be beneficial for the liveability and safety of an urban environment (Burton, 2000). Following this view, policymakers focused on stimulating and retaining economic activities within urban neighbourhoods. However, if firms are more likely to leave neighbourhoods with a lower liveability and safety, improving the situation in such a neighbourhood by stimulating entrepreneurship will be hard to accomplish.

Therefore, this paper aims to provide further insights in the relevance of neighbourhoods conditions as a driver of firm relocation and, in this way, enhance the understanding of firm mobility and the mechanisms causing the sorting of firms within cities. The contribution of this paper is twofold. First, instead of only examining the effect of a specific neighbourhood condition (Rosenthal and Ross, 2010) or using a generic indicator of neighbourhood conditions (Van Dijk and Pellenbarg, 2000), the effect of different types of neighbourhood conditions is measured simultaneously. This makes it possible to observe possible differences in the relevance of those characteristics. Second, building on the insights of the study by Rosenthal and Ross (2010), it is assumed that firms differ in their sensitivity to neighbourhood conditions. To examine whether this is correct the effect of neighbourhood conditions of firm relocation is tested for three types of activities (consumer services, business services and wholesale and manufacturing firms) and two size categories (one-man-business and businesses with more than one employee).

This paper is structured as follows. Section 2 gives a brief overview of the literature on firm relocation and formulates several hypotheses on the effect of neighbourhood conditions on firm relocation decisions. Subsequently, the data, method and measurement of the different variables is discussed in section 3. Section 4 describes the results of the regression analyses that estimate the effect of neighbourhood conditions on the firm's propensity to relocate. Finally, the results are discussed in section 5.

2. Theory and hypotheses

Similar to the classic view on residential mobility (e.g., Brown and Moore, 1970), the basic idea underlying models on firm mobility is that the decision to change location is a function of dissatisfaction with the current location. It is assumed that a firm has chosen its present location as the most optimal or satisfying location given the information available at that time (Cooke, 1983; Van Dijk and Pellenbarg, 2000). When the locational preferences of the firm change or when the location characteristics change, a mismatch between the locational preferences of the firm and the characteristics of the current location may develop, leading to locational stress. If that mismatch becomes too large and the entrepreneur has the necessary resources available and is willing to make the change, the firm moves to another location.

Firm internal factors change because a firm experiences different developmental processes during its life course which may affect the locational preferences of the firm. According to Stam (2007), relocation is most likely to occur in the new growth phase. Once young firms have survived the first few years after the start, they may start to grow if they are able to exploit new market opportunities or sell their products to a growing market. This growth not only provides access to the resources required for a relocation, but may also increase the willingness of the entrepreneur to relocate as it becomes clear that a new location is necessary to facilitate the firm's growth. In latter stages of the firm's life course, it becomes less likely that an entrepreneur chooses relocation to deal with locational stress. Although with the age and size of a firm the financial resources and information about other possibly more suitable locations increases, firms have also invested more in their current location and relationships with other local actors. Such investments function as sunk costs keeping firms from moving. Consequently, age and size of the firm have a negative effect on a firm's propensity to move (Brouwer et al., 2004; Knoben and Oerlemans, 2008).

Besides changes in firm internal factors, locational stress can also develop due to changes in the characteristics of the location. Changes in competition, real estate prices, wages or congestion may trigger firms to move to another location. However, a mismatch between the preferences of the firm and the locational characteristics may even occur without any changes to the location. Entrepreneurs are unlikely to choose the most optimal location as they do not have deal with imperfect information about alternative locations and limited cognitive abilities to process all information available (Pred, 1967). Furthermore, especially the initial location of a firm is often chosen for non-economic reasons such as familiarity with the location, proximity to family, friends and the former workplace (Figueiredo et al., 2002; Dahl and Sorenson, 2009). Consequently, many entrepreneurs may realize after some length of time that their current location does not fully match the firm's locational preferences, even when the locational characteristics did not change.

The locational environment of a firm consists of many different factors which play a role at different spatial scales. Certain factors such as competition and wages mainly differ between regions because most firms sell their products on the regional or national market and attract employees within labor market areas. Consequently, these factors affect the sorting of firms between regions. However, following the insights of the few studies that examined the relevance of neighbourhood conditions for firm location choices, three dimensions of neighbourhood conditions can be expected to affect the

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sorting of firms within regions or cities: the attractiveness of the physical environment, the neighbourhood's vibrancy and the neighbourhood's safety to customers and employees visiting the worksite (Gottlieb, 1995; Sivitanidou, 1995; Rodenburg, 2005; Rosenthal and Ross, 2010).

The sensitivity of firms to each of these neighbourhood dimensions is likely to depend on their economic activity and the size of the firm (Erickson and Wasylenko 1980; Rosenthal and Ross, 2010). Therefore, the relevance of each condition is subsequently discussed for different types of economic activities. Based on a literature review, four hypotheses are formulated.

The attractiveness of the physical environment in the firm's neighbourhood is mainly likely to affect relocation decisions by business services. Business services are regularly visited by (potential) customers, making it important to be located in a well-maintained environment. Previous research showed that the attractiveness of the direct surroundings of office buildings positively affects its rent (Weterings and Dammers, 2010), suggesting that firms consider the maintenance and attractiveness of the physical environment to be so important that they are willing to pay a higher rent for a location at a more attractive site.

Besides the attractiveness of the physical environment, the relocation behaviour of business services may also be affected by the vibrancy of the neighbourhood. Business services compete for highly educated and skilled employees as the success of most of these firms largely depends on the creativity and talent of their personnel. A location in an amenity-rich municipality may help these firms to attract such employees. While potential employees may mainly focus on differences between cities as for most amenities it is not necessary to live or work next to them as long as the amenities can be reached within commuting distances (Gottlieb, 1995), they may also appreciate the presence of certain amenities near their worksite. They may prefer to work at a location with many shops, cafes and restaurants within walking distance, enabling them to visit those during lunch time or after work. Consequently, business services may also prefer to be located in neighbourhoods with a higher number of such activities, as this may help them to attract and retain highly educated employees. Therefore, for business services, the following hypotheses are formulated:

Hypothesis 1a: *Business services are more likely to leave urban neighbourhoods when the physical environment is less attractive.*
Hypothesis 1b: *Business services are more likely to leave urban neighbourhoods when the number of shops, cafes and restaurants is lower.*

Rosenthal and Ross (2010) examined the effect of violent crime on the sorting of different kind of economic activities across four cities in the US. While property crime was found to affect the location choice of retailers and wholesalers, higher rates of violent crime only affected the sorting of retail firms. Following the insights of this study, it is expected that, while property crime could affect the relocation decision of all economic activities, problems with safety that may affect employees or customers, such as harassment, rape or even murder, are more likely to affect the relocation decision of consumer services. Contrary to business services, manufacturing and wholesale firms, shops, cafes and restaurant have a direct access to the street making them more vulnerable to those types of crime and violence. Furthermore, contrary to the other economic activities in urban neighbourhoods, these activities rely on customers walking to their doors and a shopper's sense of security when visiting a local store matters.

Finally, certain types of consumer services are also open at night when crime rates tend to be higher. This leads to the following hypothesis:

Hypothesis 2: *Consumer services are more likely to relocate from neighbourhoods with more safety issues.*

While business and consumer services depend on respectively attracting and retaining highly educated employees and customers walking to their doors, the relocation decision of manufacturing and wholesale firms is less likely to be affected by neighbourhood conditions. Wholesale and manufacturing firms often sell their products throughout the larger metropolitan area, regardless of where the firm is located, and bring their products themselves to their customers. Consequently, customers do not visit the firm at its location. Furthermore, these firms also do not depend on highly educated employees and most activities take place in firm buildings that are not directly accessible from the street. Therefore, the third hypothesis that will be tested is:

Hypothesis 3: *The relocation decisions of consumer and business services are more affected by neighbourhood conditions than the relocation decisions of manufacturing and wholesale firms.*

Finally, it is expected that the relocation decision of one-man-businesses is affected more by neighbourhood conditions than that of firms with more than one employee. In case of one-man-businesses, the locational preferences of the firm are likely to be highly intertwined with the residential preferences of the entrepreneur, because most one-man-businesses operate from the entrepreneur's home. Therefore, the relocation of a one-man-business often follows from or is accompanied by a change in the residential location of the entrepreneur. Previous studies have shown that neighbourhood conditions affect residential mobility (e.g., Van Ham and Feijten, 2008; Feijten and Van Ham, 2009) and, therefore, it can be expected that these conditions also affect the likelihood of relocation of one-man businesses. However, this raises the question whether such relocation choices are driven by the entrepreneur's dissatisfaction with the neighbourhood as a living environment or by dissatisfaction with the neighbourhood as a firm location. Therefore, the effect of neighbourhood conditions on firm mobility will also be tested for all firms except one-man-businesses. If a specific neighbourhood condition is found to only affect the relocation behaviour of one-man-businesses, this suggests that it mainly affects the residential preferences of entrepreneurs operating from their home and not the locational preferences of firms. This leads to the final hypothesis:

Hypothesis 4: *The relocation decision of firms with more than one employee is less affected by the neighbourhood quality than the relocation decision of one-man-businesses.*

3. Methods

3.1 Data

For the analysis a longitudinal version of the LISA database was combined with data on neighbourhood characteristics assembled from different sources. For all business establishments in the Netherlands, the LISA database contains information regarding the

location, amount of jobs, and industrial activity (NACE-codes) on a yearly basis. Using the unique identification number of each firm, a longitudinal version of the LISA-database was constructed for the period 1999-2006. Firm relocation is observed based on changes in the four-digit postal code of the firm from one year to another. As the LISA database provides information on the *establishment* level, firm relocation in this paper consists of the relocation of both single-site firms and single establishments of multi-site firms, and, consequently, relocations of chain restaurants and retailers are also included in the model.[2]

On the neighbourhood-level, the population was limited to all firm establishments located in urban neighbourhoods where at least 500 houses were present in 1999 and that are not located in the inner city. The focus on urban neighbourhoods was necessary because the firms' four-digit postal codes were used to link the neighbourhood-level data to individual firms. In urban areas, four-digit postal codes come close to what people may perceive as their neighbourhood, as urban postal codes are relatively small in size – one square kilometer or less (see Feijten and Van Ham, 2009). However, outside urban areas, there is not necessarily a one-to-one relationship between four-digit postal codes and neighbourhoods, because there postal codes are very large. Therefore, firms located in more sparsely populated areas where excluded by limiting the population to firms located in municipalities with at least 17,000 inhabitants and in four-digit postal codes with more than 1,000 addresses per square kilometer.

As explained in the introduction, the focus of the study is on neighbourhoods with a mixture of residential and commercial use because this is the focus of spatial policies aimed at improving the liveability and safety of urban neighbourhoods. For this reason, neighbourhoods located in the inner city have been excluded as shopping streets, cafes and restaurants dominate those areas and only neighbourhoods with at least 500 houses in 1999 were selected to exclude formal business locations such as business estates.

With respect to firm activities, the population was limited to firms involved in activities that are allowed to take place within residential areas and of which most daily activities take place at the address of the establishment. Activities generating too much pollution or noise, such as chemical industries or logistics, were excluded because the larger distance between their locations and the nearest residential areas, which is required by law, makes it unlikely that the location choice of such firms is affected by neighbourhood conditions. The location choice of firms of which most daily activities do not take place at the address of the firm is also unlikely to be affected by the conditions in the neighbourhood where the firm is officially located and, therefore, these establishments were excluded as well. Appendix 1 provides an overview of all industrial activities included in the analysis. In total about 108,288 firms located in 686 neighbourhoods were selected.

To be able to identify the relocation of firm establishments in every year in the dataset, the year had to be dropped. For 1999, it was not possible to determine whether the location of the establishment had changed because the location of the establishment in the prior year was unknown. Due to the longitudinal structure of the LISA database, new firms may enter the database between 1999 and 2006. These firms were included in the year after the start, because in the year of entry, the event of relocation cannot occur. After one year, it is possible to determine whether the 4-digit postal code of the establishment has changed compared to the year of entry. Establishments who exit the

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[2] For practical reasons and because most firms have only one site, the term 'firm' is used in this paper, however, it is important to note that this may concern both single-site firms and establishments of multi-site firms.

LISA dataset have been excluded from the panel dataset from the year that it disappears onwards.

3.2 Empirical model

The empirical analysis examines the effects of neighbourhood conditions on the firm's propensity to relocate using a discrete time duration model. Such models are used to model time-to-event data when the event may take place at any point in time but no information is available on the exact moment of the event (Allison, 1982; Jenkins, 2005). As the LISA database reports establishment characteristics on a yearly basis, it is only possible to observe changes in the location from one year to another while the actual event could have taken place at any moment during that year.

   The dependent variable, the time spell from the first time that the establishment is observed in the database (1999 or the year of entry) to the time it moves to another four-digit postal code, is right censored at the end of 2006, the last year for which data from the LISA database is available. Many of the firm establishments included in the analysis did not relocate in the observed time period (87.7%). The dependent variable is also partly left-censored, because firms which were already established in the first year of observation may have relocated before entering the dataset. For data with such a structure, duration analysis is the most appropriate methodology (Guo, 1993).

   The particular methodology that was adopted to model the event of relocation is the complementary log-logistic (cloglog) function which is the most commonly-used discrete time representation of a continuous time proportional hazards model (Jenkins, 2005). The general form of this type of model is given below (equation 1):

$$h(j,X) = 1-\exp[-\exp(X'\beta+\gamma_j)] \qquad (1)$$

where $h(t,X_j)$ is the hazard rate of a firm establishment in interval 'j' given the scores of that establishment on all covariates in interval 'j', X is a matrix of covariates. This essentially tells you how likely an establishment is to relocate in interval tj, given that it has not experienced relocation so far. By specifying dummy variables to represent each year, the baseline hazard rate γ_j has been modeled as a step function that describes the evolution of the baseline hazard between censored intervals. Furthermore, time varying covariates have been included in the assumption that the independent variables (both establishment and neighbourhood specific) may vary throughout the time period of observation. For further technical details regarding discrete time duration models and, more specific, the complementary log-logistic function, see Jenkins (2005).

   The dataset consists of firm establishments spread over 686 neighbourhoods. Consequently, several establishments that are located in the same neighbourhood have the same score for the neighbourhood characteristics. To avoid a bias from estimating the effects of those aggregated explanatory variables on firm-specific response variables, all models were estimated with cluster-robust standard errors on the neighbourhood level (Steenbergen and Jones, 2002). Often in discrete-time models, the standard errors of coefficients are estimated while clustering on each year. However, as the central question of this paper is whether neighbourhood conditions affect the likelihood to relocate of firms, it was considered to be more important to cluster on neighbourhoods than on years.[3]

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[3] Tests with clustering on a combination of neighbourhood and year showed that such a control lead to more significant effects of the neighbourhood conditions than only clustering on neighbourhoods.

3.3 Independent variables

Neighbourhood conditions
In total seven variables are included in each model as an indicator of the three different neighbourhood conditions discussed in section 2: the attractiveness of the physical environment, the vibrancy and the safety of the neighbourhood. These indicators were assembled from different sources. Using information from Statistics Netherlands on the average household income in the neighbourhood, differences in income have been measured. This variable is included in the model for different reasons. The first is as an indicator of the physical attractiveness of the neighbourhood. Income was found to be highly related to the average housing prices in the neighbourhood, indicating that income can be viewed as an indicator of the attractiveness of the houses and the public space in the neighbourhood. However, income is also included to control for differences in the socioeconomic status of the neighbourhood and, specific for consumer services which often serve local markets, as an indicator of the customer base of the neighbourhood. In all three cases, a higher average household income is expected to lower the probability of firm relocation.

A higher number of cafes, restaurants and shops in the neighbourhood contributes to the vibrancy of the neighbourhood and in this way may function as an attraction factor for business services whose activities depend on highly educated employees. Using data from Locatus, the number of cafes, restaurants and shops per 1,000 inhabitants within each neighbourhood was measured. However, when a large share of the cafes, shops and restaurants in the neighbourhood are not in use this is likely to have the opposite effect. Therefore, using additional information from Locatus, this share was also calculated and added to the model.

The Police Population Monitor (PPM) - a nation-wide survey that takes place biannually - provided information on the residents' perception of neighbourhood disorder. Residents are asked to indicate whether certain disorder events occurred often, sometimes or almost never in their neighbourhood and their answers were recoded in such a manner that a higher score reflected a higher prevalence of disorder (almost never = 0, sometimes = 1 and often = 2). Using the answers to nine questions, two types of disorder were measured: physical and social disorder. Physical disorder provides an indication of the attractiveness of the physical environment in the neighbourhood and social disorder of the safety and attractiveness of the social environment.

Physical disorder was measured using the answers to the occurrence of the following items: litter on the street, dog feces on the streets and sidewalks, vandalism of phone boots, bus- or tram stops, and graffiti on walls or buildings. Social disorder consists of the resident's perception of the occurrence of the following events: drunken people on the street, women or men being bothered or hassled on the street, threatening behavior, acts of violence and drug problems. The answers to each of these items were summed into a score for each type of disorder (with a maximum of 8 for physical disorder and 10 for social disorder) and, next, a neighbourhood average was calculated by taking the mean of the disorder score across all individuals within each neighbourhood. As individual characteristics were found to affect the likelihood that a respondent reports more or less disorder in the same neighbourhood (see Steenbeek et al., 2011), the answers on all

included items were first corrected for differences between respondents in age and gender before aggregating the scores to the neighbourhood level.[4]

Prior studies that examined the effect of neighbourhood conditions on residential mobility showed that subjective measures of the neighbourhood situation may differ from objective measures (Lee et al., 1994). Therefore, besides social and physical disorder which provide an indication of residents' perception of the attractiveness of the physical environment and safety of the neighbourhood, also the actual number of reported violence incidents per inhabitant within the neighbourhood was added to the analysis. This variable has been measured by the 'Atlas voor Gemeenten' based on data provided by Statistics Netherlands (KLPD-HKS and KLPD-GIDS registrations, 1999-2005).

Finally, the number of burglaries divided by the total number of firm establishments was added as an indicator of property crime. Contrary to social and physical disorder and violent crime, firms' sensitivity to property crime is unlikely to be related to its economic activity as this is unrelated to the access of a firm to the street. Nevertheless, high property crime is still included in the model as it may trigger firms in general to leave a neighbourhood.

Control variables
To avoid any disturbance of the effect of the neighbourhood characteristics on firm relocation by differences in firm internal characteristics, four firm-level indicators were included in all models: size, growth rate in employment, age and economic activity. All variables were measured using information from the longitudinal LISA database. The size of the firm was measured as the number of employees of an establishment and the growth rate based on relative changes in number of employees from one year to another. The LISA dataset does not provide exact information on the age of the firm. Consequently, only the age of firms that were established between 2000 and 2005 could be measured. As a result, the maximum age that is observed is five years. In the analysis, five dummy-coded variables for the age (in years) of the firm were included. The reference category is all establishments that were already in existence at the start of the database in 1999. The control for differences in economic activity, six dummy variables have been composed that measure whether a firm is active in business services, manufacturing, wholesale, retail, catering or consumer services (see Appendix 1 for the definition).

Besides firm internal characteristics, accessibility was also found in previous studies to affect a firm's propensity to relocate (Cooke, 1983; Holl, 2004). The accessibility of a firm's site is important because employees, clients (especially in services), and suppliers/buyers (especially in manufacturing) are better able to reach firms at highly accessible locations. As a result, firms at highly accessible locations may perform better, as compared to their counterparts in harder to reach locations. To measure the accessibility of the site, the exact location of each train station and each entry or exit of the highway has been determined. For each 6-digit postal code, the distance as the crow flies between the centroid of that postal code and the location of the nearest train station or entry/exit of the highway has been calculated. Empirical research has shown that these are the most applicable ways of measuring accessibility in the context of firm relocation (De Bok and Sanders, 2005).

The lack of space for expansion is an important driver of firm relocation and neighbourhoods tend to differ in whether it is possible to extend the firm at its current

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[4] Corrections have been made for eight groups of individuals: men in the age categories younger than 24, 25-49, 50-69 and older than 70 years and women in the same age categories.

location. Due to a lack of data that directly measures these differences, the population density of each neighbourhood was added in all analyses to control for this effect (comparable to Rosenthal and Ross, 2010). The total number of residents is also included to account for differences in neighbourhood size. Finally, in all models, dummy-coded variables for each NUTS III region were included to control for regional fixed effects. As the central topic of this paper is the effect of neighbourhood characteristics on firm mobility, those regional characteristics are not further specified.

Appendix 2 gives an overview of how each indicator has been measured and which datasets have been used to do so. Table 1 presents the summary statistics. The variance inflation factors show that multicollinearity did not pose a problem.

Table 1. Summary statistics

	Min.	Max.	Mean	Std. Dev.	VIF total	VIF > 1 empl
Firm internal characteristics						
Moved	0	1	0.05	0.18	-	-
Growth (% of jobs)	-98.26	22,775	5.94	103.23	1.01	1.01
Size	0.67	3,458.67	7.52	41.96	1.12	1.07
One year old	0	0.83	0.09	0.25	1.46	1.29
Two years old	0	0.67	0.05	0.18	1.33	1.21
Three years old	0	0.5	0.03	0.12	1.23	1.15
Four years old	0	0.33	0.02	0.08	1.14	1.10
Five years old	0	0.17	0.01	0.036	1.07	1.05
Manufacturing	0	1	0.04	0.20	n.a.	n.a.
Wholesale	0	1	0.13	0.34	3.57	3.10
Business services	0	1	0.37	0.48	6.20	5.00
Retail	0	1	0.26	0.44	5.28	5.48
Catering industry	0	1	0.10	0.30	3.07	3.44
Consumer services	0	1	0.10	0.29	2.96	2.39
Distance to train station	0.35	41.16	4.41	6.04	5.38	5.50
Distance to highway	0.41	30.00	2.41	2.65	5.79	6.24
Neighbourhood characteristics - no inner cities (N = 686)						
Average household income	17.70	45.96	27.21	5.18	2.24	2.20
Number of cafes, restaurants and shops per 1,000 inhabitants	0.00	179.40	19.94	29.68	3.76	4.18
Share of shops, restaurants and cafes not in use	0.00	0.48	0.04	0.04	1.42	1.50
Number of burglaries per establishment	0.00	2.92	0.47	0.38	2.09	2.13
Physical disorder	0.94	6.81	3.77	0.84	2.05	2.11
Social disorder	0.00	7.06	1.66	1.00	2.60	2.63
Number of violence incidents per inhabitant	0.00	0.10	0.01	0.01	4.50	4.78
Population density	4.27	290.68	88.39	51.78	2.60	2.60
Number of inhabitants	885	22,965	9,375.55	3,953.96	1.68	1.75

4. Results

Table 2 shows the results of the discrete time duration model with complementary log-logistic function used to estimate the effect of neighbourhood characteristics on the firm's propensity to leave the neighbourhood, while controlling for firm internal characteristics. As explained in section 2, the effect of the neighbourhood conditions is expected to differ between industries, because economic activities differ in their sensitivity to the different dimensions of neighbourhood quality. To examine whether this is correct and to test the hypotheses formulated in section 2, the dataset is split in three groups: firms active in business services, consumer services and manufacturing and wholesale firms. In each of these industries, the model is estimated twice. The first model includes all firms, while in the second model one-man businesses are excluded to test whether the effect of neighbourhood conditions on relocation decisions of firms with more than one employee is different, as assumed in hypothesis 4.

  As shown by the base hazard rates in Table 2, the likelihood of relocation indeed largely differs between industrial activities: the average percentage of consumer services that relocated to another neighbourhood is much lower than that of manufacturing and wholesale firms (respectively 1.49% and 4.37%), while business services are most likely to move (5.52%). Firms with more employees are less likely to move, shown by the lower percentage of movers when one-man-businesses are excluded. This is the case for all three industries, but in business services the difference is very small.

Neighbourhood conditions
The model results show that neighbourhood conditions indeed affect the relocation decision of firms and that the effect of those conditions differs between industries and firms of different sizes (see Table 2). In all models, several neighbourhood conditions have a statistically significant effect on the firm's propensity to relocate. The number of shops, cafes and restaurants per 1,000 inhabitants is significant in all models; the effect of all other neighbourhood characteristics differs between the three industries or the two size categories.

  Model 1 shows the results for business services. Business services located in a neighbourhood with more physical disorder are more likely to move, while a higher average household income lowers these firms' propensity to move. This confirms hypothesis 1a that a lower physical attractiveness of the neighbourhood can trigger business services to leave a neighbourhood. The negative effect of the number of shops, cafes and restaurants in the neighbourhood confirms hypothesis 1b: business services are less likely to leave the neighbourhood which have a higher concentration of such activities. The positive effect of the share of shops, cafes and restaurants not in use further confirms this pattern, as this indicates that such problems can trigger business services to leave the neighbourhood. In general, the results show that business services prefer vibrant neighbourhoods with an attractive physical environment. In addition to these results, problems with social safety can also trigger business services to relocate, as shown by the positive effect of the number of violence incidents in model 1.

  To compare the effect of the different neighbourhood conditions, Table 3 shows, for those neighbourhood conditions that have a statistically significant effect, with which percentage the base hazard rate will increase or decrease moving from the 25th percentile to the 75th percentile of a certain neighbourhood condition. The effect of firm size is also included to enable a comparison of the strength of the effect of neighbourhood conditions with that of a firm internal factor. In business services, the effect of the two indicators of the attractiveness of the physical environment is the strongest: an increase in average income in an urban neighbourhood from the 25th tot the 75th percentile lowers the base likelihood that a business services firm leaves the

neighbourhood by 6% and a similar increase of the level of physical disorder increases the base rate of business services' relocation by almost 7% (see Table 3, Model 1). Similar changes in the number of shops, cafes and restaurants and the share of those activities not in use lead to respectively an decrease and increase of the base hazard rate by about 3%. The number of violence incidents has a slightly stronger effect of a bit more than 4%. The effects of the neighbourhood conditions are higher than that of firm size – which has no statistically significant effect in model 1, but considerably lower than that of the more generic neighbourhood condition population density. This shows that an increase in population density is more likely to make business services to leave the neighbourhood than a decreasing attractiveness of the physical environment, vibrancy or social safety in the neighbourhood.

Table 2. Results of complementary log-log model for all firms in urban neighbourhoods (robust standard errors in parentheses)

	All firms			Excl. One-man-businesses		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
VARIABLES	Business services	Consumer services	Manufacturing & wholesale	Business services	Consumer services	Manufacturing & wholesale
Average income	-0.010***	0.010*	0.004	0.002	0.015*	0.011*
	(0.004)	(0.006)	(0.005)	(0.004)	(0.008)	(0.006)
# shops, cafes, restaurants	-0.003**	-0.009***	-0.004**	-0.004***	-0.009***	-0.006**
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.003)
- not in use	0.582**	1.427***	0.723*	0.553	1.565***	1.005
	(0.283)	(0.368)	(0.399)	(0.397)	(0.559)	(0.651)
Burglaries	0.0201	-0.184**	0.181***	0.055	-0.210**	0.204**
	(0.049)	(0.073)	(0.061)	(0.071)	(0.100)	(0.095)
Physical disorder	0.052***	0.015	0.023	0.023	0.014	0.011
	(0.018)	(0.027)	(0.030)	(0.023)	(0.037)	(0.038)
Social disorder	-0.012	0.028	-0.015	-0.002	0.044	-0.004
	(0.017)	(0.025)	(0.026)	(0.023)	(0.035)	(0.036)
Violence incidents	5.446*	12.64***	-0.086	6.675*	10.590***	-0.591
	(3.163)	(2.939)	(5.152)	(3.832)	(3.657)	(6.175)
Population density	0.002***	-0.001	0.003***	0.004***	0.000	0.003***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ln(# inhabitants)	-0.103***	-0.106**	-0.073	-0.103**	-0.148**	-0.078
	(0.034)	(0.052)	(0.050)	(0.043)	(0.071)	(0.068)
One year old	0.199***	0.587***	0.181***	0.120**	0.519***	0.217***
	(0.034)	(0.062)	(0.061)	(0.051)	(0.096)	(0.082)
Two years old	0.297***	0.496***	0.333***	0.227***	0.288**	0.363***
	(0.042)	(0.078)	(0.069)	(0.064)	(0.124)	(0.102)
Three years old	0.309***	0.540***	0.196**	0.369***	0.378***	0.259**
	(0.046)	(0.088)	(0.083)	(0.070)	(0.132)	(0.120)
Four years old	0.278***	0.475***	0.263**	0.0968	0.639***	0.426***
	(0.063)	(0.110)	(0.111)	(0.104)	(0.167)	(0.160)
Five years old	0.302***	0.243	0.0394	0.284*	-0.164	0.235
	(0.096)	(0.176)	(0.193)	(0.159)	(0.310)	(0.261)

Incumbent	-	-	-	-	-	-
Ln(Size)	-0.018	-0.458***	-0.109***	-0.081***	-0.247***	-0.158***
	(0.014)	(0.034)	(0.023)	(0.017)	(0.042)	(0.030)
% Job growth	0.000***	0.000***	0.000**	0.000***	0.000***	0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Retail		-0.372***			-0.412***	
		(0.039)			(0.057)	
Catering industry		-0.699***			-0.766***	
		(0.050)			(0.070)	
Wholesale			0.437***			0.502***
			(0.040)			(0.0535)
Distance to train station	-0.008	0.003	-0.005	-0.005	-0.005	-0.010
	(0.005)	(0.006)	(0.006)	(0.006)	(0.009)	(0.011)
Distance to highway exit	0.002	-0.032*	0.011	-0.000	-0.039	0.010
	(0.011)	(0.017)	(0.018)	(0.014)	(0.024)	(0.026)
Base hazard rate	5.52	1.49	4.37	5.53	1.05	4.01
LL	-48,909.60	-21,137.91	-19,602.49	-22,318.49	-11,722.15	-10,602.79
-2 LL	97,819.20	42,275.82	39,204.98	44,636.96	23,444.30	21,205.58
Sig (Chi^2)	965.78***	1771.20***	774.22***	672.23***	710.43***	621.34***
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	231,914	286,390	110,853	105,525	206,956	64,136
Number of subjects	70,422	68,417	32,582	32,758	49,214	18,447
Number of nonzero outcomes	12,797	4,274	4,869	5,863	2,168	2,600

*** significant at the 1% level (p<0.01); ** significant at the 5% level (p<0.05); * significant at the 10% level (p<0.10)

Ref.: reference category

Table 3. Differences in hazard rates* moving from the 25th to the 75th percentile

All firms					
	25th percentile		75th percentile		Difference
	Value.	Hazard rate	Value	Hazard rate	
Business services – Model 1					
Ln Size	0.69	0.99	1.39	0.98	-1.23%
Income	24.24	0.78	32.04	0.72	-6.05%
Presence shops	4.34	0.99	17.17	0.96	-3.19%
Shops not in use	0.00	1.00	0.05	1.03	3.01%
Physical disorder	3.11	1.17	4.21	1.24	6.88%
Violence incidents	0.00	1.02	0.01	1.07	4.16%
Population density	53.50	1.13	102.21	1.27	13.61%
Ln # inhabitants	8.81	0.40	9.37	0.38	-2.27%
Consumer services – Model 2					
Ln Size	0.69	0.73	1.79	0.44	-28.78%
Income	22.61	1.25	28.57	1.33	7.60%
Presence shops	6.58	0.94	25.83	0.79	-15.27%

Shops not in use	0.01	1.02	0.07	1.11	8.67%
Burglaries	0.25	0.95	0.75	0.87	-8.39%
Violence incidents	0.01	1.07	0.02	1.21	14.02%
Population density	56.29	0.96	115.18	0.92	-4.07%
Ln # inhabitants	8.79	0.39	9.37	0.37	-2.35%
Manufacturing and wholesale – Model 3					
Ln Size	0.69	0.84	1.79	0.64	-20.03%
Income	23.33	1.10	29.93	1.13	2.91%
Presence shops	4.52	0.96	15.28	0.87	-9.28%
Shops not in use	0.00	1.00	0.06	1.04	4.43%
Burglaries	0.20	1.04	0.53	1.10	6.38%
Population density	46.75	1.13	93.25	1.27	14.51%
Ln # inhabitants	8.78	0.53	9.37	0.51	-2.20%
Excluding one-man-businesses					
Business services – Model 4					
Ln Size	1.10	0.92	2.30	0.83	-8.48%
Income	23.91	1.06	31.58	1.08	2.04%
Presence shops	5.05	0.98	19.25	0.92	-5.69%
Shops not in use	0.00	1.00	0.05	1.03	2.95%
Physical disorder	3.11	1.07	4.22	1.10	2.77%
Violence incidents	0.00	1.03	0.01	1.09	5.38%
Population density	50.19	1.20	96.65	1.43	22.35%
Ln # inhabitants	8.77	0.41	9.35	0.38	-2.34%
Consumer services – Model 5					
Ln Size	1.10	0.76	2.08	0.60	-16.40%
Income	22.57	1.39	28.26	1.52	12.15%
Presence shops	7.22	0.93	28.48	0.76	-17.03%
Shops not in use	0.01	1.02	0.07	1.12	9.50%
Burglaries	0.27	0.95	0.80	0.85	-9.93%
Violence incidents	0.01	1.06	0.02	1.19	12.70%
Population density	54.69	1.01	111.90	1.02	1.16%
Ln # inhabitants	8.76	0.27	9.37	0.25	-2.33%
Manufacturing and wholesale – Model 6					
Ln Size	1.10	0.84	2.48	0.68	-16.54%
Income	23.17	1.28	29.76	1.38	9.48%
Presence shops	5.09	0.97	15.84	0.91	-5.91%
Shops not in use	0.00	1.00	0.06	1.06	5.77%
Burglaries	0.22	1.05	0.54	1.12	7.17%
Population density	41.64	1.12	85.46	1.26	14.18%
Ln # inhabitants	8.69	0.51	9.33	0.48	-2.45%

* Hazard rates: $exp^{[coefficient*percentilevalue]}$ and non-significant effects are light grey

Five neighbourhood conditions have a statistically significant effect on the relocation decisions of consumer services (see model 2 in Table 2). As explained in section 2, consumer services were expected to be more likely to leave neighbourhoods with more safety issues. Both indicators of safety issues – social disorder and the number of violence incidents – have a positive effect on the consumer services firm's propensity to relocate, however, only the effect of the number of violence incidents is also statistically significant. This suggests that these firms are only more likely to leave the

neighbourhood when the actual number of incidents of violence is higher, only a higher perception of social disorder is not enough. Consumer services also prefer to be located in neighbourhood where similar types of activities are concentrated, shown by the negative and significant effect of the number of shops, cafes and restaurants and the positive effect the share of those activities not in use.

The effects for these three indicators of neighbourhood conditions are the same for business services and consumer services. However, the effect sizes mentioned in Table 3 show that the effects of violence incidents and the presence of shops, cafes and restaurants are considerably stronger for consumer services than for business services. Moving from the 25th percentile to the 75th percentile in the number of violence incidents in the firm's neighbourhood increases the base relocation likelihood of consumer services with 14% compared to an increase of 4% for business services. This confirms the assumption formulated in section 2 that especially consumer services are sensitive to safety issues.

An increase in the number of shops, cafes and restaurants lowers the base relocation likelihood of consumer services by 15.3% compared to a decrease of only 3% for business services. Furthermore, the effect of the share of shops, cafes and restaurants not in use is more than twice as high in consumer services. Probably, the difference in the strength of the effect of the presence of shops, cafes and restaurants is due to the fact that for consumer services this neighbourhood condition may directly affect their performance, while for business services it is more a 'would-like' location factor. Consumer services benefit from being located near other shops, cafes and restaurants because the buyers of their products and services prefer to discover and evaluate a variety of options available from multiple firms. Consequently, demand is often higher in neighbourhoods where consumer services are concentrated (McCann and Folta, 2008). In business services, the presence of shops, cafes and restaurants in the neighbourhood may help attracting and retaining highly educated employees and, in this way, indirectly increases the performance of these firms. However, it is only a relevant factor when all other more essential factors are similar across two or more locations (Salvesen and Renski, 2003).

The other two neighbourhood conditions which affect a consumer services firm's propensity to leave the neighbourhood are income and the number of burglaries per establishment (see Table 2, Model 2). The effect of income is positive, which suggests that consumer services are more likely to leave a neighbourhood when the average income is higher. Generally it is assumed that a higher income level implies a stronger local consumer base, making the neighbourhood a more attractive location for consumer services. However, it seems that other factors related to income push these firms from high-income neighbourhoods. Real estate prices are likely to be considerably higher in those neighbourhoods and consumer services may not be able to compete with other activities that can afford the higher prices of such areas (e.g., housing or business services attracted by the image of such a location such as specialised lawyer firms). Possibly, it is more attractive for owners of consumer services firms to sell their building and in this way benefit from the high real estate prices.

The number of burglaries in the neighbourhood has a negative effect, that is, consumer services are less likely to leave neighbourhoods with a higher property crime rate. A possible explanation for this effect may be that the likelihood of property crime also increases with a higher concentration of consumer services. The presence of multiple potential targets may attract more offenders to such neighbourhoods. In this way, the co-location of consumer services creates economic benefits to these firms through attracting more customers, but may also lead to diseconomies such as a higher number

of burglaries. The effect sizes shown in Table 3 suggest that for consumer services the disadvantages of co-location do not outweigh the positive effects, as an increase in the number of shops, cafes and restaurants has a stronger effect than an increase in the number of burglaries (-15.27% compared to -8.39%).

Confirming hypothesis 3, the relocation likelihood of manufacturing and wholesale firms is less affected by neighbourhood conditions than that of business and consumer services, as fewer neighbourhood conditions have a statistically significant effect on the propensity of manufacturing and wholesale firms to relocate (see model 3 in Table 2). Nevertheless, three neighbourhood conditions still affect the relocation decisions of these firms: the number of shops, cafes and restaurants, the share of shops, cafes and restaurants not in use and the number of burglaries. Similar as business and consumer services, wholesale and manufacturing firms also prefer a location in a more vibrant neighbourhood shown by the negative effect of the higher number of shops, cafes and the positive effect of the share of these activities not in use. Entrepreneurs in urban neighbourhoods seem to prefer a more vibrant location, irrespective of their activity.

Contrary to what was found for consumer services, wholesale and manufacturing firms are more likely to move when the number of burglaries in their neighbourhood is higher. Property crime functions as a push factor for these firms, probably because this type of criminality directly affects the performance of these firms (see Rosenthal and Ross 2010).

Similar as the results of business services, population density has a stronger effect on the likelihood that a manufacturing or wholesale firm leaves the neighbourhood than the indicators of neighbourhood quality than the other three neighbourhood conditions (see Table 3). This suggests that for these firms room for expansion or parking areas are likely to be more important as a location factor than the liveability and safety of the neighbourhood, although neighbourhood conditions do matter.

The final hypothesis formulated in section 2 is that neighbourhood conditions affect the relocation behaviour of firms with more than one employee less than that of one-man-businesses. To examine whether this assumption is correct, all models have been estimated again excluding the one-man-businesses. Model 4, 5 and 6 in Table 2 show the results. In the models of business services and manufacturing and wholesale (model 4 and 6) this indeed leads to different results, while the results for consumer services stay the same (model 5).

The relocation decisions of business services with more than one employee are clearly less affected by neighbourhood conditions (compare model 1 and 4). The effects of the two indicators of the attractiveness of the physical environment - average income and physical disorder – both turn insignificant when one-man-businesses are excluded. As especially in business services, one-man-businesses often operate from the entrepreneur's home, it seems that the preference for a well-maintained physical environment in the neighbourhood mainly reflects the residential preferences of the entrepreneur instead of preferences towards the firm location. The effects of the number of shops, cafes and restaurants, violence incidents and population density, on the contrary, become stronger when one-man-businesses are excluded (see Table 3). The fact that these conditions affect the relocation decisions of firms with employees more than those of one-man-businesses is in line with the assumption formulated in section 2 that both the vibrancy of the neighbourhood and safety issues to matter for attracting employees.

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Excluding one-man-businesses does not lead to major changes in the model for consumer services (compare model 2 and 5 and see Table 3). Partly this may be due to the fact that in consumer services much fewer one-man-businesses are active than in business services (respectively 25% and 52%). But besides that, in consumer services, one-man-businesses and firms with more than one employee are much more alike than in business services. Most consumer services with only one employee do not operate from their home, but also from a building with direct access to the street making them similarly vulnerable to neighbourhood conditions as larger consumer services. Consequently, in this industry, the relevance of neighbourhood conditions may depend much less on the size of the firm.

A comparison between the models for manufacturing and wholesale firms in Table 2 shows that the effect of the share of cafes, shops and restaurants not in use is no longer significant when one-man-businesses are excluded, while the positive effect of income becomes significant. Similar as for consumer services, larger manufacturing and wholesale firms are more likely to leave high-income neighbourhoods. The effect of the other neighbourhood conditions stays significant and the strength of the effects largely stays the same (see Table 3).

In sum, hypothesis 4 can be confirmed for business services, while the effect of neighbourhood conditions on the relocation decision of consumer services and manufacturing and wholesale firms does not depend that much on size.

Control variables
The effects of the firm internal characteristics - size, growth and age - on the likelihood of firm relocation are in line with those of earlier research (e.g. Brouwer et al., 2004; Van Dijk and Pellenbarg, 2000; Knoben and Oerlemans, 2008). The negative coefficient of size shows that smaller firms are more likely to relocate than larger firms, while the positive sign of relative growth shows that faster growing firms are more likely to move. All three industries show the same effects. Only in business services, the effect of size is not significant when one-man-businesses are included (model 1) which suggests that the large share of one-man-businesses in this industry decreases the effect of size. With respect to age, results show that younger firms are more likely to relocate than older firms, but, in consumer services and manufacturing and wholesale, this effect is limited to firms of four years old as the effect of the dummy for five years is insignificant.

Accessibility of the firm site hardly affects a firm's propensity to move to another neighbourhood. The only significant effect is in model 2 and shows that consumer services are less likely to move when the distance to the nearest highway exit becomes higher. This effect may actually represent the effect of the distance to the city centre. In the Netherlands, consumer services are concentrated near the city centre, while most highway exits are situated at the city border. The limited effect of the other indicators of accessibility may be due to the limited differences in accessibility between urban neighbourhoods within Dutch cities. Previous studies on firm relocation behavior did find significant effects of accessibility, but those studies measured differences in accessibility at the regional scale (Holl, 2004).

The positive and significant effect of population density on the likelihood to relocate of both business services and manufacturing and wholesale firms shows that with increasing density, these firms are more likely to leave the neighbourhood. In such areas, firms have fewer options for expansion and have to deal with increasing congestion which may trigger them to leave. The relocation decision of consumer services, on the contrary, does not depend on the neighbourhood's population density (see model 2 and 5). In this industry, a higher population density may imply more potential customers and this

beneficial effect may exceed the negative effect of less room for expansion and more congestion.

5. Discussion and conclusions

This paper investigated the effects of neighbourhood conditions on the firm's propensity to relocate for all Dutch firms located in urban neighbourhoods outside the inner city between 1999 and 2006. In general, the results show that besides the traditional drivers of firm relocation such as firm growth and the related need for expansion space, neighbourhood conditions should also be taken into account as potential drivers of firm relocation. This study confirms the previous findings of Gottlieb (1995) and Rosenthal and Ross (2010) that violent crime affects the sorting of firms within cities. But other neighbourhood conditions also matter. Especially the vibrancy of the neighbourhood, indicated by the presence of shops, cafes and restaurants, is found to be an important keep factor for all types of firms. While a few previous studies already showed that such amenities affect the location choice of firms (Gottlieb, 1995; Love and Crompton, 1999), these studies suggested that the presence of amenities only matters at the metropolitan or regional level. Employees can choose to live nearly anywhere within commuting distance from the worksite to satisfy their lifestyle preferences and, therefore, firms would only focus on the quality of life attributes of the larger region (Salvesen and Renski 2003). This study shows that besides the amenities on the regional level, differences in the presence of amenities within cities also matter for firms' relocation choices.

The results of this paper also clearly showed that the relocation decision of most firms are affected by neighbourhood conditions but to what extent and which conditions matter largely depends on the industrial activity of the firm and, to a lesser extent, on the size of the firm. Especially the relocation choice of consumer services is affected by neighbourhood conditions. These firms are more likely to leave neighbourhoods where less similar types of activities are present, more shops and cafes are not in use, and the number of violent incidents per inhabitant is higher. While the relocation decisions of business services and manufacturing and wholesale firms are also affected by neighbourhood conditions, increasing population density has a stronger effect on these firms decision to leave the neighbourhood than the vibrancy or safety of the neighbourhood. Furthermore, in business services, neighbourhood conditions also mainly matter because they affect the residential preferences of entrepreneurs who in this sector often operate from their home. From a policy perspective, it is important to be aware of these differences between industries as they show that which neighbourhood conditions should be improved to keep firms from moving out of distressed neighbourhoods largely depends on which firms one wants to keep.

For two reasons it can be expected that the results in this paper underestimate the effect of neighbourhood conditions on the likelihood that firms relocate to another neighbourhood. First, the results show that the likelihood that firms leave the neighbourhood depends on firm characteristics such as industry and size which implies that firms selectively move out of the neighbourhood. In particular in consumer services, this may lead to further changes in neighbourhood conditions over the longer term. The more consumer services leave the neighbourhood, the lower the number of active consumer services in the neighbourhood will become, increasing the share of shops, cafes and restaurants not in use. Such a negative spiral may make that neighbourhood increasingly less attractive as a location for consumer services.

Secondly, firm's sorting into neighbourhoods is not based on a random process as firms select themselves into neighbourhoods based on the presence of certain neighbourhood conditions. Therefore, those firms that are most likely to be affected by certain conditions were not located in such a neighbourhood in the first place. Although this selection process is unlikely to be perfect as especially new start-ups do not make a very rational location choice, it can still be expected that especially for well-established firms the process of self-selection will lead to an underestimation of the effects of neighbourhood quality as most of these firms may be already located in the neighbourhood of their preference (see Manjón-Antolín and Arauzo-Carod, 2011).

This study has shown that neighbourhood conditions can trigger firms to leave the neighbourhood, but there are several interesting options for future research. An important underlying assumption of this study is that if neighbourhood conditions can trigger firms to leave a neighbourhood this is an indication that entrepreneurs consider these factors to be relevant. However, it is not known to what extent neighbourhood conditions also affect the performance of firms. Another question that deserves further attention is to what extent entrepreneurs would be willing to contribute to improving neighbourhood conditions. If so, policymakers could involve both households and entrepreneurs in distressed neighbourhoods in programmes aimed at improving the situation in such a way that this stops residents and entrepreneurs from leaving.

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Appendix 1. Six industries based on 2 and 3-digit NACE codes

Number and percentage of firms included in the population per 3-digit NACE (rev. 1.1)

		All firms	Size > 1
		%	%
Industry			
Manufacturing		4.60	5.09
15	Manufacture of food products and beverages		
16	Manufacture of tobacco products		
17	Manufacture of textile		
18	Manufacture of clothes		
19	Manufacture of leather products		
20	Manufacture of wood and of products of wood and cork, except furniture		
21	Manufacture of pulp, paper and paperboard		
26	Manufacture of glass and ceramics		
28	Manufacture of metal products (not machinery or transportation)		
29	Manufacture of machinery		
30	Manufacture of office machinery and computers		
31	Manufacture of electrical equipment		
Wholesale		14.37	12.86
51	Wholesale		
Business services		35.05	28.18
22	Publishing and printing		
65	Monetary and financial intermediation		
66	Insurance and pension funding, except compulsory social security		
67	Activities auxiliary to financial intermediation, insurance and pension funding		
72	Computing services		
73	Research and experimental development		
74.1	Legal, accounting, book-keeping and auditing activities; tax consultancy; market research; business and management consultancy; holdings		
74.2	Architectural and engineering activities and related technical consultancy		
74.3	Technical testing and analysis		
74.4	Advertising		
Retail		26.56	33.55
52	Retail		
Catering industry		10.21	13.34
55	Hotels, camping sites, restaurants, bars, catering		
Consumer services		9.21	6.98
63.3	Activities of travel agencies and tour operators; tourist assistance activities n.e.c.		
93	Other service activities (washing, dry-cleaning, hairdressing, other beauty treatment, funeral and related activities, physical well-being activities		
Total %		100.00	100.00
Total N		171,421	100,419

Appendix 2. Operationalisation of independent variables

Name of the variable	Operationalisation	Source
Firm internal characteristics		
Size	Number of employees, log transformed	LISA 1999-2006
Growth (% of jobs)	Number of employees year t+1 / number of employees year t	LISA 1999-2006
Age	The number of years after entry, divided into 5 categories (one year old, two years old, three years old, four years old, five years old)	LISA 1999-2006
Incumbent	All firms in existence at the start of the database	LISA 1999-2006
Industry	The industry in which the firm is active based on NACE code	LISA 1999-2006
Site characteristics		
Distance to train station	The distance to the nearest train station from the 6-digit postal code where the firm is located	Computation by Netherlands Environmental Assessment Agency (2006) based on the National Road Database, 2002
Distance to highway	The distance to the nearest entry- or exit of the highway from the 6-digit postal code where the firm is located	Computation by Netherlands Environmental Assessment Agency (2006) based on the National Road Database, 2002
Neighbourhood characteristics		
Average household income	Average household income of all inhabitants in the 4-digit postal code	Statistics Netherlands, 1999-2002
Number of shops, cafes and restaurants per 1,000 inhabitants	Number of shops, cafes and restaurants divided by the total number of inhabitants	Locatus, 2000-2004
Share of shops, cafes and restaurants not in use	Number of shops, cafes and restaurants that are not in use divided by the total number of shops, cafes and restaurants	Locatus, 2000-2004
Number of burglaries per firm establishment	Number of burglaries per firm establishment	Computation of the 'Atlas voor Gemeenten' based on Police Population Monitor 1999-2005
Physical disorder	Percentage of inhabitants that has reported incidents of littering, dog feces, vandalism, graffiti	Computation of the 'Atlas voor Gemeenten' based on Police Population Monitor 1999-2005
Social disorder	Percentage of inhabitants that has reported incidents of threatening behavior, drunk people on the street, drug problems, women and men being bothered or hassled on the street	Computation of the 'Atlas voor Gemeenten' based on Police Population Monitor 1999-2005
Number of reported violence incidents per inhabitant	Number of violence incidents that have been reported in the	Computation of the 'Atlas voor Gemeenten' based on Statistics

	neighbourhood divided by number of inhabitants	Netherlands, KLPD-HKS and KLPD-GIDS registrations, 1999-2005
Population density	Number of inhabitants per square kilometer in each 4-digit postal code	Statistics Netherlands, 1999-2002
Number of inhabitants	Number of inhabitants (log transformed)	Statistics Netherlands, 1999-2005
Regional characteristics		
Labour market region	The Nuts III region in which the firm is located	