A thick red vertical bar runs down the left side of the page. A red arrow points to the right from the top of this bar, containing the date '14-7-2021'. At the bottom of the red bar, several thin red lines curve upwards and to the right, resembling stylized grass or reeds.

14-7-2021

# The Spatial Preference of Dutch Firms

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## Abstract

The location of a firm is an important factor that determines the economic performance of the firm. The current literature suggests that firms do not have full rationality and that private and personal factors can influence the spatial preference of firms. This thesis will focus on the spatial preference of Dutch firms and explaining the factors that influence the pattern of spatial preference of Dutch firms. This will be done by creating a mental map of the spatial preference of Dutch firms. The factors that influence spatial preference can be divided into three categories. Firstly, firm-specific factors, such as size and sector. Secondly, locational characteristics, such as agglomerations and accessibility. And thirdly, personal factors, such as social cohesion and pride. Furthermore, special attention will be given to personal characteristics self-preference, and to stereotypes that can influence the perception of firms. The mental map in this thesis shows that firms prefer central locations like Utrecht and Rotterdam with ratings dropping as the distance from these centers increases. The results from an ordered logistic regression show that firm-specific characteristics, locational characteristics, and personal characteristics all influence how Dutch firms rate different places in the Netherlands. By including this broad set of factors, policymakers can use these results to better adjust local marketing strategies by enforcing factors that positively influence the spatial preference of Dutch firms and tackle the negative factors that influence the spatial preference of Dutch firms.

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# 1. Introduction

## 1.1 Problem definition

The location of a firm is an important factor that affects the economic performance of a firm. Firm location behavior and the spatial preference of firms can therefore be a relevant topic to explore for both researchers and policymakers in the field of economic geography. Uncovering the factors that influence this spatial preference can be useful for both researchers and policymakers in order to better cater to the needs of firms and to make the region more attractive for firms. Some of these factors, such as accessibility and agglomeration economies, come forward out of more traditional and established theories in economic geography which often assume full rationality and objectivity of firms. These factors can be characterized as locational characteristics, firms will choose the location where they can minimize the costs and where maximize their profits (Pike et al., 2017; McCann, 2013). However, these locational characteristics are not the only factors that can influence the spatial preference of firms. Based on a more behavioral approach, which is a well-established theory in the field of economics (Rabin, 2003), other factors can also influence the spatial preference of Dutch firms. These factors are based on the bounded rationality and subjectivity of firms and can be characterized as more personal factors that do not directly influence the economic performance of firms in contrast to locational characteristics. Firms nowadays operate in a complex, intertwined, and uncertain environment, therefore these firms do not always have full information of the market and the optimal location to locate (Armstrong & Huck, 2007). These personal and subjective factors can be characterized as personal factors. Research on spatial preference in the past has clearly shown that these personal factors, in addition to locational characteristics, also influence spatial preference, but that these factors are not always taken into account when researching firm location behavior or the spatial preference of firms (Spilková, 2007; Meester & Pellenbarg, 2004; Musolino et al., 2019). The last set of factors that influence spatial preference can be characterized as firm-specific characteristics, such as the size of the firm. Firm-specific characteristics are not always taken into account when studying the spatial preference of firms, even though firm-specific characteristics do influence the spatial preference of firms. For example, the current literature on firm location behavior and spatial preference is mainly focused on the location behavior of larger firms, while the firm landscape in the Netherlands is changing into smaller firms of which the spatial preference can be different (Koster & Pellenbarg, 2019). Due to the heterogenous character of the firm landscape in the Netherlands and the different spatial preferences of these firms, it is important to also account for firm-specific characteristics.

This thesis can be seen as a partly follow up to the research of Meester & Pellenbarg (2004). Meester & Pellenbarg (2004) also researched the spatial preference of Dutch entrepreneurs using mental maps to illustrate the pattern of spatial preference. This spatial preference has changed in the period between 1984 and 2004. This could be due to the complex and constantly changing firm landscape (Armstrong & Huck, 2007). Because of this changing landscape and considering the fact that the research by Meester & Pellenbarg (2004) dates back to 2004, it can be interesting to, again, look at the spatial preference of Dutch firms and provide an update to the mental maps. Mental maps are a widely used method to capture the subjectivity of firms (Gould & White, 1995). By using mental mapping a researcher can map and illustrate how people, or in this case firms, perceive places. This perception of firms both contains subjective or personal elements as well as objective elements. Mental mapping has been used previously by researchers to study the spatial cognition of firms or entrepreneurs (Meester & Pellenbarg, 2004; Musolino, 2019; Musolino et al., 2019). Following the research of Meester & Pellenbarg (2004), this thesis will provide an update to the mental map of firms in the Netherlands of the year 2020 and compare it to previous mental maps of firm location preferences in the Netherlands.

By using these Mental maps, this research can provide a clear picture of the location preference of firms. However, the maps themselves are rather descriptive, they do not explain the underlying factors that influence the spatial cognition of firms.

The current research on spatial preference indeed illustrates the importance and influence of locational characteristics, personal characteristics, and firm-specific characteristics (Meester & Pellenburg, 2004; Mussolini, 2019; Mussolini et al., 2019). The current literature touches upon the possible influence of these factors on the spatial preference of firms. However, current research does not go into depth when analyzing the influence of these relevant factors or they do not take into account all the relevant factors.

Given the descriptive function of mental maps and the limited research on the influence of personal characteristics on spatial preference, this thesis will aim to explain the image created by the mental maps of firm location preference by using a set of locational characteristics, personal characteristics, and firm-specific characteristics. Using these factors, the mental map, with the spatial preference of Dutch firms can be explained through a broad and inclusive set of factors. This will be done by taking a quantitative approach with both locational characteristics, based on current theories in economic geography, and personal characteristics, based on the literature of behavioral geography and economics. In addition, firm-specific characteristics will also be included. With this model, the relation between spatial preferences of firms and different factors becomes clear, which can be useful for regional institutions and policymakers. A policymaker can for example focus on improving factors in the region that positively impacts the spatial preference of firms in order to attract firms. Therefore, getting a deeper insight into these factors could prove to be relevant. A recent survey by Nationaal Programma Groningen in 2020 (Alsem et al., 2020) asked firms in the Netherlands to rate different locations in the Netherlands on a 1-5 scale. By using this data a new mental map of location preferences of firms can be created of the Netherlands which can be compared to the past mental maps of firm location preferences of Meester and Pellenburg (2004).

After creating and discussing the mental maps of location preferences of firms it is important to take into account the notion of self-preference. Firms might rate their own region higher than other regions, because of bounded rationality and personal factors. Self-preference in itself is not necessarily problematic, it is not an anomaly that firms that established themselves in a location will rate that location higher than other locations. However, it can be good to take it into account when using non-stratified sampling, like the data in Nationaal programma Groningen (Alsem et al., 2020). If lots of firms in the data are clustered in the agglomeration area, the spatial preference for this location might be inflated (Meester, 2000). Therefore, when dealing with mental maps and spatial cognition, it is also important to take self-preference into account and adjust the model and mental map for it, especially with unevenly distributed respondents. It would also be interesting to study how self-preference levels vary across the different provinces in the Netherlands and make use of this self-preference in place branding (Hospers, 2010). Regions with high self-preference can use firms as local ambassadors to spur economic activity in the region. Therefore, this thesis will also focus on the concept of self-preference as an important personal factor, and how it compares across different regions in the Netherlands.

As discussed, for researchers and policymakers, both regional and national, the concept of spatial preference and spatial cognition can be an interesting topic to explore. This is because policymakers are constantly trying to attract new firms to the region or country while preserving or strengthening the current economic activity. Policymakers often use more objective indicators as a base for their policy and decisions.

Despite the importance of these locational characteristics, including the subjective views of firms both inside and outside the region can give policymakers a broader and better image of the region. An example of the importance of including personal factors comes forward in the paper of Musolino (2018) about the spatial preference of entrepreneurs in Italy. The study found that personal factors like stereotypes and prejudice can negatively influence the economic image of a region. This is an example of why the topic of subjectivity and bounded rationality of firms is important and can reveal underlying economic mechanism which cannot be revealed by looking at locational and firm-specific characteristics only. This thesis will also look at how these personal factors that are harder to quantify, such as stereotypes, influence the spatial preference of firms using the same dataset of Nationaal programma Groningen (Alsem et al., 2020). This dataset contains data about firms in and outside Groningen and their spontaneous associations with the province Groningen. This data might give a better insight into the underlying mechanisms that influence the subjective views of firms in the Netherlands, moreover, this data can also give a better insight if stereotypes for example will impact self-preference.

## **1.2 Research goal and questions**

The main goal of this research is to explain what factors influence the spatial preference of Dutch firms. These factors, on the one hand, will be locational characteristics that are based on the current new economic geography theories, which are well-researched factors. On the other hand, this thesis will also take into account firm-specific and personal characteristics, especially because the research on these factors is still rather limited. The main research question this thesis tries to answer is: *Which factors influence the spatial preference of firms in the Netherlands and to which extent do personal factors influence the spatial preference of firms?*

This is a complex question that has no straightforward answers. To get a general descriptive image of how firms rate different locations in the Netherlands a mental map will be created as is done in the research by Meester & Pellenburg (2013). This map will not only give a descriptive image of location preferences of Dutch firms but also a comparison can be made with the previous mental maps of firm location preferences by Meester & Pellenburg (2004). So the question here is: *How does the mental map of Dutch firms on location preferences look and how has it changed compared to past research?*

To explain the pattern of location preferences of Dutch firms, an ordinal regression will be performed with locational characteristics, firm-specific characteristics, and personal characteristics which are derived from the current literature on economic geography. In this analysis, we can also test the influence of possible self-preference of firms on their spatial preference. The question, therefore, is: *Which factors influence the location preferences of Dutch firms, and what role does self-preference play in regional location preferences?.*

Lastly, this paper will zoom in on the province of Groningen, where more subjective and personal data is available on the location preference of firms such as spontaneous associations of firms outside Groningen of the business climate in Groningen. By using this personal factor, the influence of stereotypes and prejudices (Musolino, 2018) can be tested and used to explain the spatial preference of Dutch firms. The last sub-question this research tries to answer is: *To what extent do certain stereotypes and prejudices influence the rating of firms of places in Groningen.*

### **1.3 Approach**

This thesis will take a quantitative approach to the questions raised above using the questionnaire by Nationaal programma Groningen (Alsem et al., 2020) which contains data of 1100 firms in the Netherlands and their ratings of different places in the Netherlands. GIS will be used in order to create a mental map of firm location preferences. Furthermore, an ordered logistic regression will be used to create a model in Stata that shows the influence of the different factors on the rating of firms of different places in the Netherlands. The variables for this test will be derived from literature research.

This thesis will continue as follows, first, a literature review will be conducted on the current literature on firm location behavior and the spatial preference of firms. Using this literature in combination with different theories in economic geography, a different set of factors will emerge that could possibly influence the spatial preference of Dutch firms. As mentioned, these factors can be divided into locational characteristics, personal characteristics, and firm-specific characteristics. Special attention will be given to personal factors, self-preference, stereotypes, and prejudices. Following the literature review, the methodology section will explain which tools will be used to create the mental map, which data will be used, and which test will be performed in order to test if these factors influence the spatial preference of Dutch firms. The mental map and the results of the ordered logistic regression will be shown in the results section which is followed by a conclusion that provides an answer to the research questions.

This thesis will continue as follows, first, a literature review will be conducted on the current literature on how firm location behavior links with subjectivity and behavioral economics. Subsequently, the literature on these topics will be linked and compared to more established theories in economic geography to see how subjectivity and bounded rationality can fit in these theories. When a theoretical foundation has been established, the methodology of the thesis will be discussed. The data used for the analysis in this thesis will mainly come from the survey of the Nationaal Programma Groningen (Alsem et al., 2020). In the methodology section, the limitations of the data will be discussed as well as which method is used to make the mental map. In this section, a motivation will be given on why to use a quantitative approach and why this is the most suitable to answer the research question. Following the methodology, the results will be shown and discussed. Lastly, the answer to the main research question will be given in the conclusion. At the end of this thesis, the reader will have a better insight into which factors influence the spatial preference of Dutch firms.

## 2: Theoretical framework

This chapter will focus on the theoretical background behind bounded rationality and firm location behavior. Firstly, a short overview will be given about the dominant theories in economic geography and their relation to firm location and bounded rationality. Consequently, the phenomenon of firm location behavior will be studied in order to get a better understanding of the factors that influence the spatial preference of firms. These factors will be divided into both more objective factors, or locational characteristics, and personal factors. On top of that, conceptual input will also be given for firm-specific factors. This will result in a conceptual model with the relevant factors that influence the spatial preference of firms in the Netherlands.

### 2.1: Bounded rationality and behavioral economics within economic geography

Historically speaking, theories and models within economic geography often assume full rationality of firms when it comes to making the optimal location choices for the firm. Examples are Weber's model (Weber, 1903) and the Von Thünen model (Von Thünen, 1910). The same is true for different lines of theories within economic geography, such as the neo-classical approach and the new economic geography approach (Pike et al., 2017). The assumption of full rationality and perfect information simplifies economic geography models and can provide a useful standard to compare firm locations for example (Simon, 1972). However, when it comes to studying firm location behavior, the assumption of full rationality does not always hold. First of all, firms operate in a complex, uncertain, and rapidly changing economic environment and thus firms do not always have perfect information on the optimal firm location (Armstrong & Huck, 2010). This is in line with Keynesian theories within economic geography which assume actors possess limited information and mobility in contrast to neo-classical theories (Pike et al., 2017). Secondly, firms do not always pursue profit maximization, some firms may, after realizing a satisfactory profit level, chose to raise wages or to expand their market share. Especially smaller firms or entrepreneurs do not have full knowledge and decision making is based on a subjective interpretation of reality (McCann, 2013). In order to get a better understanding of how the concept of rationality fits into economic geography, the current influential theories within economic geography will be shortly described and their relation with location characteristics, personal characteristics, and firm-specific characteristics will be discussed.

#### 2.1.1 Theories with full rationality

Neo-classical economic geography is one of the theories that assume full rationality. In a market with perfect information and equilibrium thinking, a firm will choose a location where it can minimize its costs and maximizes its profits. New economic geography builds upon some of these neo-classical assumptions such as full rationality and equilibrium thinking. However, it differs from neo-classical theories by rejecting the theory that regions will converge over time. In New Economic Geography, economic activities are not evenly distributed across space. Through the means of economies of scale and technological change localization economies and urbanization, economies emerge. In these economies, the competitiveness of firms will rise because of increasing returns of scale, spill-overs that occur, and positive externalities caused by these economies (Krugman, 1990). Under perfect information, a firm will still choose a location where it can maximize its profits, but following the new economic geography approach, this location is likely in an agglomeration. New Economic geography is often translated into a space-neutral approach by policymakers. Economic mechanisms are not influenced by regional differences. This people-based approach does not specifically target regions, it takes into account all the regions and localities in the national economy in contrast to only regions that are lagging behind (Pike et al., 2017). Within these theories, locational characteristics play a more prominent role.

These locational characteristics, such as agglomerations, can directly influence the economic performance of the firm and therefore influence the location behavior and the spatial preference of firms. Moreover, firm-specific characteristics also matter. Firms from the secondary sector might have different locational factors that influence their economic performance compared to firms in the tertiary sector and will therefore have a different location behavior and spatial preference.

### **2.1.2 Theories with bounded rationality**

The notion of bounded rationality and imperfect information comes back in different economic geography approaches. The behaviorist approach for example assumes firms have imperfect information on all available locations and their future potential (Pred, 1966). Each firm develops its firm-specific competencies which determine the firm's ability to use information. Pred (1966) argues that long-established firms have better access to information due to their experience and extensive networks that they build. These established firms can then use this information to locate in an area that falls within the spatial margin of probability, or in other words in a spatial area where the firm turns a profit. However, due to imperfect information and uncertainty (new) firms might by accident locate into this spatial margin of profitability and become very successful (Pred, 1966). This implies that due to imperfect information, the behaviorist approach spatial location behavior of firms are defined by probability and selection. The more information a firm has, the higher the probability that it will locate into a profitable area. This illustrates that locational factors are indeed important determinants for the economic performance of the firm. However, the information of a firm of these locational characteristics can depend on personal characteristics and firm-specific characteristics. The evolutionary approach, which is also characterized by chance and selection, also rejects the notion of the homo-economicus. The evolutionary approach illustrates how different regions can follow different paths depending on the characteristics of the population, region and the level of persistence, and the history of the region (Essletzbichler & Rigby, 2007). According to the evolutionary approach, firm locations are constrained by the past of the founder, or constrained by path dependency. New firms often start near the location of where the founder lives because of the limited information the founder has. The founder is likely to have social ties and networks in his or her hometown and therefore has the most information about this location while having limited information in other regions (Boschma & Frenken, 2007). This explains why spin-offs often occur near their parent companies (Klepper, 2002). This shows that based on these theories, locational characteristics matter but that personal characteristics, such as social ties and residential location, also matter. Pike et al. (2017) argue that formal and informal institutions can be seen as the causal actors in the evolutionary approach. The paths that a region or a firm will follow depend on these formal and informal institutions. Essletzbichler & Rigby (2007) state that these institutions are shaped by agents with bounded rationality rather than agents with full rationality. This influence of institutions, which is often neglected in neo-classical and new economic geography theories, comes forward in the institutional approach. Institutions shape the local or regional development and agents, such as firms, have limited information and rely on these institutions. These institutions can be formal institutions, such as laws & regulations, and informal institutions, such as norms & routines (Pike et al., 2017). Therefore, these institutions can be both locational characteristics, such as local taxes, and personal characteristics, such as norms and routines.

## **2.2 Relevant factors that influence spatial preference**

Now that the main approaches within economic geography regarding rationality and firm location are illustrated, it is important to take a deeper look into the factors that influence firm (re)location behavior/preferences. These factors can be divided into three categories and are derived from the theories above. Firstly there are endogenous factors of the firm, such as firm size, age, sector, and spatial orientation of the market secondly, there are exogenous objective factors or locational characteristics such as accessibility and finally, there are more personal factors such as quality of life.

### **2.2.1 Firm characteristics**

When discussing firm characteristics, it is firstly important to note that the firm landscape and dynamics have changed in the Netherlands compared to the past (Koster & Pellenburg, 2019). Entrepreneurial solo firms are on the rise compared to the past in the Netherlands. A change in the firm landscape goes together with a change in the location behavior and spatial preference of firms in general. The literature on firm location behavior largely focuses on larger firms, which base their location decision mainly on economic factors. However, Koster & Pellenburg (2019) state that location behavior and spatial preference of smaller or solo firms can also depend on more social and private factors. A study by Koster & Venhorst (2014) for example found a large share of the residential location of entrepreneurs corresponds with their residential location and that these firms' relocations tend to be the result of residential relocation, this also provides further evidence to include personal factors, such as residential location into the analysis. This can be explained through the dependency of these firms on their local networks as described in the institutional approach (Pike et al., 2017). Furthermore, a study by Brouwer et al. (2004) found that small and young firms are more mobile than larger and older firms. Another study by Brouwer (2010), specifically focused on firms in the Netherlands, underline these findings. Older firms are likely to be spatially embedded, these firms have built an extensive and reliable network with consumers and suppliers and are therefore less likely to relocate compared to new firms. Large firms have to deal with high sunk costs and are therefore also less likely to relocate compared to smaller firms. The study by Caves (1998) further underlines that smaller firms with less than 10 employees are more mobile. However, a study by Dej et al. (2019) in Poland contradicts these findings. Dej et al. (2019) found that larger companies tend to relocate more often than small companies. Furthermore, new firms were also less likely to relocate than older firms and that small firms tend to migrate over longer distances and not locally as found in the paper of Stam (2005). The study by Ferreira et al. (2016) shows that older firms prefer to locate in rural areas while younger firms prefer urbanized areas. With the changing firm dynamics in the Netherlands from bigger firms towards more smaller firms, the location behavior and spatial preference of firms also change. Size and age are therefore important determinants when studying firm location behavior and the spatial preference of firms. However, the question remains on how firm size and age influence the spatial preference map of firms as illustrated in this thesis and the study of Meester & Pellenburg (2004).

One could argue that older and larger firms have better knowledge of the market and are largely influenced by economic factors and are therefore more able to accurately rate other locations. Moreover, these firms also have low mobility and are spatially embedded and therefore might rate their own environment higher and thus have a higher self-preference. Smaller and newer firms have more bounded rationality about the market, locate near the place of residence of the owner (Koster & Venhorst, 2014), and are more influenced by private factors (Meester & Pellenburg, 2004).

In conclusion, it is important to take firm size and age into consideration when studying the mental maps of spatial preferences of firms in the Netherlands. Furthermore, the paper of Brouwer (2010) shows that the orientation of the firm also matters, large firms are often more internationally orientated and their regional location, therefore, does not matter as much as firms who are locally oriented. This does not necessarily mean that international-oriented markets are not locally embedded. The paper by Stam (2005) shows that smaller new firms only relocate over small distances, which supports the theory that new small firms are often locally oriented and make use of their local network. So, on top of firm size and age, the spatial orientation of the firm also can be an important determinant for spatial preferences of firms. Lastly, it can also be important to look at the sector of a firm when studying the location behavior of firms. Firms from different sectors have different location preferences and different mobility as comes forward in the studies of Ferreira et al. (2016) and Bodenmann & Axhausen (2012). This also comes forward in the studies about mental maps of spatial preference of Meester (2000), where firms related to office activities have a strong spatial preference towards agglomerations while firms in the manufacturing sector do not have a general preference.

### **2.2.2 Locational Characteristics**

There are several exogenous factors that can influence firm location behavior and the spatial preference of firms. Meester & Pellenbarg (2004) distinguish three factors that explain the spatial preference of firms in the Netherlands. The first factor is potency, which is related to the relative location of the firm. The second one is activity, which is related to the agglomeration size of the location. And the last factor is evaluation, this factor is a more personal one and is related to private factors such as the residential environment. These objective factors and personal factors can both help to explain the spatial preference mental maps of firms. It is important to make this distinguishment between more objective factors and personal factors to test if bounded rationality indeed plays a role in the spatial preference of firms in the Netherlands. Other research (Spilková, 2007; Musolino, 2018; Musolino et al., 2019; Musolino et al., 2020) on mental maps and the spatial preference of firms underline the importance of these objectives factors, such as relative location and agglomeration size, as explanatory variables and these studies indeed show that firms prefer central locations and agglomerations

One of these objective factors is if the location is in an agglomeration and what the size of this agglomeration is. The positive effect of agglomerations on the economic performance of the firm is a widely researched topic within the literature (Pike et al., 2017). Marshall (2009) distinguishes two types of agglomeration benefits, localization economies, and urbanization economies. Localization economies can be described as a specific cluster of one sector resulting in knowledge spill-overs and Jacobs externalities, which are externalities created by firms in the same industry. Urbanization economies, on the other hand, do not have one specific sector that is concentrated. However, there are still positive externalities that occur such as a large shared labor pool and infrastructure.

The existing literature on the spatial preference of firms indeed shows that agglomerations get on average a higher rating, which can be explained due to the better economic performance and externalities of these agglomerations. Firms are especially attracted if there more firms of the same sector in the agglomeration, so by localization economies (Targa et al., 2006). Furthermore, the study by Manjón et al. (2010) shows that proximity of partners of the firm is also seen as a pull factor for firms. The paper of Bodenmann and Axhausen (2012) also focuses on both localization economies and urbanization economies regarding firm location behavior and their spatial preferences.

Bodenmann and Axhausen (2012) found that localization economies have a less strong effect than urbanization economies in terms of firm location behavior but that both attract firms, this finding is underlined in the study of McCoy et al. (2018).

Devereux et al. (2007) also find that localization economies attract firms from the same sector and that firms, in general, prefer to locate in an urbanization economy. However, it is still important to take into account that firms might not have perfect information about these agglomerations as stated in the behavioral approach (Pred, 1966). Furthermore, the difference between localization and urbanization economies shows that it is important to take the degree of clustering of a sector into account when studying firm location behavior and spatial preference of firms, some sectors prefer to cluster in agglomerations while some sectors prefer a decentralized location as the study by De Bok & Sanders (2005) shows.

Besides agglomeration economies, relative location and accessibility can also be seen as important regional determinants that influence firm location behavior and preferences. Relative location, transportation cost, and accessibility form the core of traditional economic geography theories about firm location such as the Weber model (1913) and the Von Thünen model (1910). Accessibility can be seen as the distance to physical infrastructures, such as highways, railroads, and airports. Good accessibility to this infrastructure will improve the economic performance of firms as the paper by Tyga et al. (2006) finds. Therefore, firms prefer high accessibility. On top of that, Tyga et al. (2006) found that infrastructure with a higher functional form, such as a major highway or airport has the biggest influence on firm location preferences. However, the paper by Rossi (2019) shows that access to an airport has little to no influence on the location preferences of firms. Holguin-Veras et al. (2005) show that firms in New Jersey prefer good highway access but found no significant relationship between firm location preference and public transit systems. A study by De Bok & Sanders (2005) shows that access to a highway ramp or train station does increase the location preference of firms. Lastly, it is important to take into account that the amount of congestion, mainly a negative externality in agglomerations when studying accessibility since it increases transport costs and is considered not favorable for the accessibility of locations (Rossi, 2019). On top of that, digital infrastructure, such as broadband access also becomes increasingly important McCoy et al. (2018) find that a broadband internet connection can have a positive effect on the location preference of firms, however, it has to be noted that this is sector and region-specific, McCoy et al. (2018) found that firms in regions with high clustering of human capital would profit the most from a broadband connection. Related to agglomerations and accessibility is the relative location that influences the spatial preference of firms. Relative location refers to the distance of the location to the market (Meester & Pellenbarg, 2004). Studies on the mental maps of Meester & Pellenbarg (2004) and Musolino et al. (2019) show that relative location is an important factor when studying the spatial preference of firms.

As mentioned by McCoy et al. (2018), human capital can also be an important factor when looking at the spatial preference of firms. Audretsch & Lehmann (2005) study the relationship between human capital and firm location behavior and found that proximity to human capital generated through universities is an important factor for the location decision of firms. However, as Audretsch & Lehmann (2005) also underline is that this is sector-specific and even dependent on the specialization of the university.

Universities with a focus on natural sciences tend to attract firms from high-tech sectors and knowledge-intensive industries. The paper of Alamá-Sabater et al. (2010) studies the effect of human capital on firm location preference and found that a highly educated labor force is one of the main driving factors in attracting firms, or in other words, firms prefer a location with a high percentage of human capital.

Rossi (2019) states that most firms will profit from increasing human capital, however, the research by Kronenberg (2013) shows that some less knowledge-intensive firms with low to middle-skilled workers tend to relocate out of areas with high salaries and human capital since they are more focused on saving costs.

Human capital and accessibility are seen as the main positive externalities that occur in agglomerations in the new economic geography approach and thus will be included in the analysis (Pike et al., 2017). Besides these externalities, other classical production inputs can influence firm location behavior (Rossi, 2019), such as space availability, real estate prices, and taxes. Risseleda et al. (2013) found that real estate prices and property ownership are linked to firm location behavior in the Netherlands, this link between real-estate prices and firm location is not only related to the cost-saving aspect of the firm but also to private factors (Risseleda et al., 2013). Additionally, the industrial land availability can also be a driver for firm (re)location. The paper of Alamá-Sabater et al. (2010) found that after agglomeration effects and human capital, the availability of industrial space is the most important driver for firm location behavior. Lastly, the study by Bodenmann & Axhausen (2012) shows that taxes also influence the spatial preference of firms, favorable regional taxes creates a more favorable region for firms due to the reduction in costs in which firms can operate.

Taxes are being regulated by institutions. They play an important role in the institutional and evolutionary approach within economic geography. As mentioned in section 2.1 institutions can both be hard institutions, such as taxes, and soft institutions, such as norms and values. Both hard and soft institutions can influence firm location behavior and preferences, the difference however is that hard institutions are easier to quantify and are more objective factors, such as taxes. The personal factors of mainly soft institutions will be discussed in the next section. As the literature shows, the institutional environment has a significant impact on firm location behavior (Rossi, 2019) and is important in the economic development of a region (Pike et al., 2017). Besides taxes and educational institutes, which were already discussed, political stability, a modest amount of bureaucracy, and an efficient legal system can create a favorable institutional environment for firms. Despite the importance of institutions in the literature, research by van Dijk & Pellenberg (2000) in the Netherlands and from Ferreira et al. (2016) in Portugal, shows that these institutions sometimes only play a limited role on a national scale in the location choice of a firm. Ferreira et al. (2016) argue that this can be attributed to the lack of strategic vision and imperfect information of firms. Firms may fail to recognize the possible importance of institutions or other factors due to bounded rationality which influences spatial preference. However, a qualitative study by Kapitsinis (2019) shows that failing institutions such as the tax system, high bureaucracy, and corruption can cause firms to move out of the region to a region with more favorable institutions.

### 2.2.3 Personal factors & Self-Preference

The relevant factors which are described until now are rather objective factors that only take the firm and locational characteristics into account. However, Meester & Pellenburg (2004) and Musolino (2018) state that the spatial preference of firms is also influenced by subjective factors or so-called personal factors. These factors are harder to quantify and measure but as different studies have shown, firm owners are influenced by these personal factors. Ferreira et al. (2016) underline that the characteristics of an entrepreneur indeed influence where this entrepreneur chooses to locate, or in other words, individual characteristics influence the spatial preference of firms. One major personal factor is the place of residence of the entrepreneur/employee.

A study by van Oort et al. (2003) shows that ICT firms have a low need to live near the workplace and therefore are largely influenced by residential areas, thus van Oort (2003) argue that ICT firms should have a high spatial preference for areas with a good residential situation. The study of Koster & Venhorst (2014) also underlines the importance of residential location in relation to the firms' location.

Koster & Venhorst (2014) state that the location of the firm is adjusted to the residential location of the owner, especially for small firms. For larger firms, this residential location is of less importance. The place of residence has been increasingly importance when studying firm location behavior and spatial preference, considering the rising number of firms established in residential neighborhoods (Risselda et al., 2013). Schutjens et al. (2006) show that home-based entrepreneurs are strongly locally embedded in the neighborhood.

The study by Stam (2007) also shows that especially entrepreneurs and start-ups often decide against relocating outside of the residential region due to the local personal relations, once firms grow and expand their reach and consequently their network the propensity to relocate becomes higher. This is largely in line with the institutional and evolutionary approach within economic geography, stating that firms have limited information and rely on their networks and institutions to make firm location decisions. These networks and informal institutions can be established through the firm but also on a personal level. This intertwining of the firm's network and the personal network especially apply if the place of residence of the owner corresponds with the location of the firm. Cooke et al. (2005) use the term social capital in order to capture these informal networks and institutions, however, Westlund & Adam (2010) argue that this social capital is hard to accurately measure. Coming back to the relevance of place of residence and local networks, the study by Dahl & Sorenson (2009) also shows that new firms are likely to locate locally because of personal relations with friends and family which is further evidence that personal factors such as place of residence matter when looking at the spatial preference maps of firms. Furthermore, a study by Weng et al. (2018) shows that firm owners with high place attachment are less likely willing to relocate their place of residence and their firm location. This is not only true for firm owners but also for its employees. All these studies have shown that especially small firms and locally embedded firms are influenced by private factors when studying firm location behavior or when studying the spatial preference of firms. Especially place of residence and place attachment can influence the spatial preference of firms. So besides looking only at the economic characteristics of a region, one could also look at quality of life, real estate prices, pride levels, and social capital. A study by Avery et al. (2021) points out that rural areas are often characterized by high social cohesion and pride as opposed to urban areas. These peripheral areas are also perceived as more close-knitted communities which could influence the spatial preference of firms outside these areas. (Avery et al., 2021).

Lastly, in the paper of Musolino et al. (2019) it comes forward that regional culture also matters when looking at the spatial preference of firms, following the institutional approach, this culture is embedded in both formal and informal institutions. However, Musolino et al. (2019) also found that stereotypes of this regional culture can impact the spatial preference and perception of the region of firms outside this region.

Taking these private factors into account when studying spatial preference of firms in combination with the notion that firms have limited information and function in networks (Pred, 1966) an interesting phenomenon can arise, called self-preference. When studying the spatial preference of firms, firms tend to rate their own location or locations close to them higher (Meester, 2000).

This so-called self-preference is presented as noise and distorts the mental map of firms in the paper of Meester (2000). By adjusting location ratings of firms by distance, results in a different mental map. Adjusting for this self-preference can better explain the variance in how locational characteristics like accessibility and agglomeration economies explain the spatial preference of firms in the Netherlands (Meester, 2000). However, Hospers (2010) shows that self-preference can play an important role in place marketing. Hospers (2010) argues that the notion of self-preference can be an important argument in favor of warm place marketing of regions.

Warm place marketing is a regional marketing strategy focused on people that already live in the region with place attachment and local networks. This is in contrast with cold place marketing that focuses on trying to attract companies outside the region. Hospers (2010) argues that regions with strong self-preference should focus on this warm place marketing strategy. So the notion of self-preference can be problematic in the sense that it distorts the mental maps of firms, but on the other hand it can be interesting to study and see how it varies in space in order to better adjust regional marketing strategies.

### 2.3 Conceptual model:

Figure 1 highlights all relevant factors that were discussed that influence the spatial preference of firms. All on top are endogenous factors, or firm characteristics which are important determinants for both locational characteristics and personal characteristics. The locational characteristics are mostly based on neo-classical and new economic geography theories, while the personal factors are mostly based on institutional and behavioral factors and build on the notion that firms only have limited information. As a result of these personal factors and limited information, the phenomenon of self-preference arises which influences, together with personal and locational characteristics, how the mental map of spatial preference of firms in the Netherlands will look like. With these explanatory variables, the underlying mechanisms that determine the spatial preferences of firms will become clear. Policymakers can use these mental maps and their underlying explanatory variables to more accurately adjust regional marketing strategies to fit the preferences of firms both within and outside the region. Some factors from the literature like taxes and industrial land availability are not included since data is not available for these variables on a municipal or provincial level.

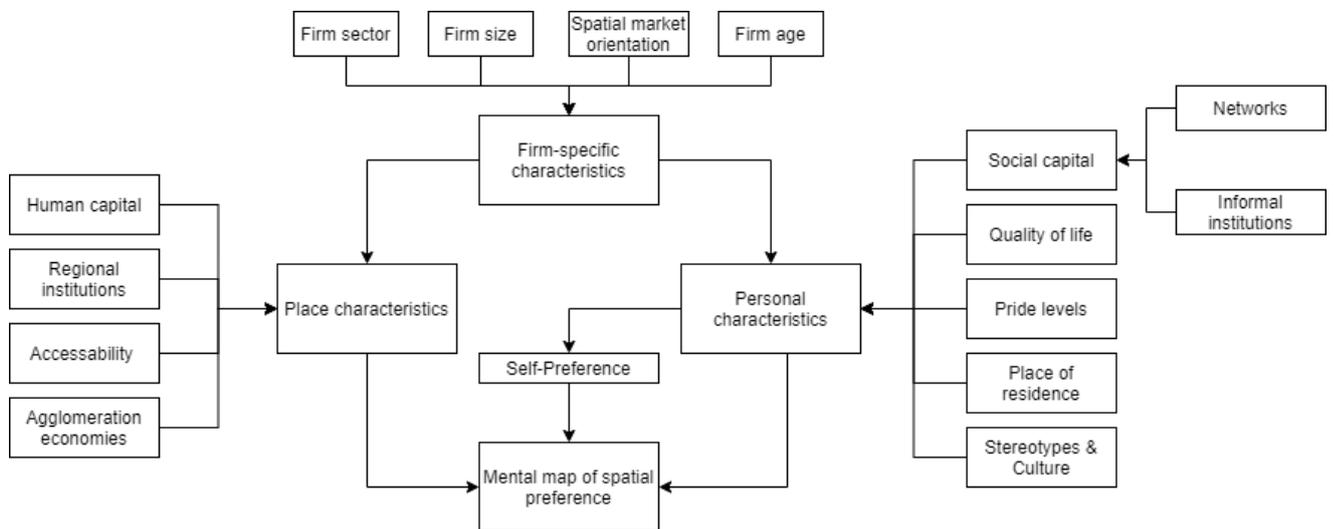


Figure 1: Conceptual model

### 3. Methodology

Now that the relevant factors that influence the spatial preference of firms have come forward in the literature a mental map can be created of the spatial preference of Dutch firms. After creating the mental map of the spatial preference of Dutch firms, the variables will be quantified to test if they influence the spatial preference of firms in the Netherlands. This chapter will focus on which data will be used and how this data will be used to explain the spatial preference of firms in the Netherlands. Moreover, this chapter will explain how self-preference can be tested and how stereotypes and culture can influence the spatial preference of firms.

#### 3.1 Mental maps and dependent variable

A survey, recently, carried out by Nationaal programma Groningen (Alsem et al., 2020) will form the base of the quantitative analysis and mental maps. In this survey, 1100 firms across the Netherlands were asked to rate different cities across the country, on a Likert scale, as a business location. These ratings of places by firms in the Netherlands will form the base for our mental maps and will also act as the dependent variable in the analysis. A mental map can have different meanings and functions but in this thesis, the definition of Tuan (1975) is used. Tuan (1975) states that a mental map captures the cartographic representation of both attitudes and preferences that people, or in this case firms, have about certain places. By using this definition, a mental map or preference map of firms in the Netherlands can be created, which consequently can be compared to previously created mental maps by Meester & Pellenbarg (2004). The mental maps will be created in the GIS program ArcMap using the average rating of locations and the kriging interpolation tool.

#### 3.2 Quantifying the conceptual model

##### 3.2.1 Firm characteristics

Chapter 2 has shown that both location characteristics and personal factors influence the spatial preference of firms on top of internal factors such as the size and sector of the firm. As mentioned, the rating of firms of different places in the Netherlands as a business location will be used as the dependent variable in the model. The survey by Nationaal programma Groningen (Alsem et al., 2020) also provides details about the sector of the firm, the size of the firm, and the spatial orientation of the firm. Information about the age of the firm is not provided, therefore the influence of firm age on the spatial preference of firms cannot be measured. The sector variable will be divided into firms that belong to the secondary sector and firms that belong to the tertiary sector. Firms that belong to the primary sector are purposely left out due to their limited ability to relocate. The sectors are divided using the International Standard Industrial Classification (United Nations, 2008). The secondary sector contains the numbers 3-8 and the primary sector contains the numbers 9-21. The size of the company is divided according to the classification of small and medium enterprises (SME) by the European Commission (2012). A slight adjustment had to be made to companies that are classified as large companies, the European Commission identifies large companies as firms with over 250 employees. However, in the dataset by Nationaal programma Groningen (Alsem et al., 2020) there is not a matching category. That is why a large firm is classified in this research as a firm with over 200 employees, which is a matching category in the dataset.

### 3.2.2 Locational Characteristics

The locational characteristics can be measured using data from the statistical office Netherlands (CBS). Human capital can be measured by looking at the degree of persons with tertiary education on a municipal level, as is done in the paper of Alamá-Sabater et al. (2010). The CBS has data available of the level of education on municipal and even on the neighborhood level (CBS Statline, 2020). However, considering the independent variables are on the municipal level, the dependent variables will also be measured on the municipal level if possible. The reason for converting the dependent variable from cities into municipalities is because of the fact that CBS and other data are not as widely available on a city level. Using a municipality as an administrative unit provides this thesis with more data. Another variable to measure the influence of human capital is to test if a municipality has a university, by including this variable both the influence of human capital and institutions can be measured on the spatial preference (Ferreira et al 2016). Proximity to an administrative center is also a way to measure the influence of institutions on the spatial preference of firms (Ferreira et al., 2016), a simple way to measure this, is to look if a place is the capital of the province or not, since the administrative unit of the province is located in the capital of the province. Besides looking at capital cities of provinces, institutions are hard to quantify on the municipal and provincial level and are more prevalent on the national level. This limitation will be further discussed in the data limitations section.

Another locational characteristic that may influence the spatial preference of firms is accessibility. It can be measured through distance to a highway ramp or nearest train station (De Bok & Sanders, 2005; CBS Statline, 2021a), the proximity of a harbor or airport might also be of importance to some firms (Rossi, 2019). Furthermore, in terms of accessibility, one can also look at the road density of the province. Lastly, it is important to look at and include congestion which can negatively affect the accessibility of a region (Rossi, 2019). Besides accessibility, the effect of agglomerations also needs to be measured. As previously mentioned, agglomerations economies can be divided into urbanization economies and localization economies. Urbanization economies can be measured through the population density of a municipality and economic activity in terms of total revenue and localization economies can be measured by looking at the number of firms that belong to the same sector (Rossi, 2019). The sectors in this analysis are divided into the primary sector, the secondary sector, and the tertiary sector. However, firms that belong to the primary sector are intentionally left out of the database. This data can also be obtained at the national office of statistics (CBS Statline, 2021b; CBS Statline, 2021c). Lastly, Meester & Pellenbarg (2004) argue that the relative location of a place compared to the center is also an important determinant of the spatial preference of firms. Therefore, the distance from each place to the center, which is Utrecht in this analysis, will be measured using GIS

### 3.2.3 Personal factors

The regional personal factors that influence the spatial preference of firms are in contrast to locational characteristics not easy to quantify. Especially social capital can be hard to measure with the limited regional data that is available. The OECD regional well-being tool (OECD, 2016) can provide some useful data on the regional level. Especially the community and civic engagement indicators, which are respectively measured through the perceived social support network and voter turnout, of which the last one will be retrieved from de Kiesraad (2021) which is the committee that keeps track of voting records. Quality of life can be measured through life satisfaction through the OECD regional well-being tool, however only measuring life satisfaction does not fully capture all personal factors that might influence spatial preference. Therefore, to measure the effect of the residential environment, the livability dataset of the Dutch government of each municipality will be included. This dataset is based on 6 dimensions which are population structure, housing stock, safety, public spaces, services, and social cohesion. Together these 6 dimensions contain over 100 variables that can be used to accurately measure and quantify the residential location of the owner of the firm (Leidelmeijer et al., 2014).

The survey Nationaal programma Groningen (Alsem et al., 2020) both contains the postal code of the location of the firm as the residential location. Besides surveying firms, Nationaal programma Groningen (Alsem et al., 2020) also asked individuals across different provinces in another survey about how proud they are of their place of residence and province which will be included in the model.

### 3.3 Self-preference:

To test for self-preference and its extent, the distance in kilometers between the firm of the respondent and the place that the respondent is rating will be calculated using GIS. Furthermore, the distance between the residential location of the respondent and the place that the respondent is rating will also be calculated. The effect of self-preference can be tested by including these distances in the dataset. To test if self-preference varies over different regions, an interaction variable between province and distance will be included in the analysis. The postal codes of the firms and residential places of the respondents are converted to their respective municipalities. However, some respondents did not fill in a valid postal code or filled in a post-office box as their residential place. Some respondents even filled in only 3 digits instead of 4. The cases with no valid postal code are being dropped from the dataset. An additional binary variable will be created that tests if the respondent lives in the same province as the place that the respondent is rating. The same will be done for the residential location of the respondent and the place that the respondent is rating to test if residential location also influences the rating. This way, some variables measure self-preference in a functional form and variables which measure self-preference in a more administrative and institutional form.

### 3.4 Stereotypes and culture

stereotypes and regional culture can also influence the spatial preference of firms. A qualitative approach might be better to measure the influence and underlying mechanisms of these factors (Musolino, 2018). However, the survey by Nationaal programma Groningen (Alsem et al., 2020) contains data about the spontaneous associations firms have with Groningen. Moreover, the survey (Alsem et al., 2020) also contains data about cultural aspects and if firms believe these aspects fit the province of Groningen or not. By including these aspects, the analysis will give a more complete image of how stereotypes and culture might influence the ratings of Groningen. Lastly, the survey also contains data about the image of Groningen and how this image developed over the past years and will develop in the future.

Table 1: Variables for the Ordered logistic regression

<b>Spatial preference</b>			
	<b>Dependent variable</b>	<b>Scale</b>	
	1-5 rating of cities in the Netherlands	Municipal	
<b>Firm-specific characteristics</b>			
	<b>Independent Variables</b>	<b>Scale</b>	<b>Factor</b>
	size of firm	firm	internal
	spatial market orientation	firm	internal
	Sector of firm	firm	Internal
<b>Location Characteristics</b>			
	% of the population with tertiary education	Municipal	Human capital
	City has university	Municipal	Human capital & institution
	City is capital of the province	province	formal institution
	Distance to nearest highway ramp	Municipal	accessibility
	Distance to nearest train station	Municipal	accessibility
	Distance to nearest major train station	Municipal	accessibility
	Road density	province	accessibility
	Population density	Municipal	Agglomerations
	Presence of firms of same sector in %	Municipal	Agglomerations
	Distance to center	Municipal	Agglomerations/Self Preference
<b>Personal factors</b>			
	Perceived social support	Province	Social capital
	Voter turnout	Municipal	Social capital
	Social cohesion	Province	Social capital
	Life Satisfaction	Province	Quality of life
	Pride ratings	Province & Municipal	Pride
	Livability	Municipal	Place of residence
	Place of residence owner	Municipal	Place of residence
<b>Self-Preference</b>			
	Distance between place that is being rated and location of firm & residential location	Municipal	Self-Preference/Place of residence
	Firm of respondent is located in same province as the place that the respondent is rating	Provincial	Self-prefence/Place of residence
<b>Stereotypes and culture</b>			
	Statements about Groningen	Groningen	Culture & Stereotypes
	Word associations	Groningen	Culture & Stereotypes

### **3.5 The model**

The statistical model that will be used for the analysis will be an ordinal regression model since the independent variable is an ordinal variable. The dataset contains 1100 cases with ratings of 70 different places in the Netherlands. As discussed above, some cases had to be dropped because the postal code was not valid, resulting in 1023 cases being left over. Moreover, the places that were rated by respondents were also converted to municipalities. The issue here is that two of the places are within the same municipality. Both Rotterdam and De Maasvlakte belong to the Municipality Rotterdam. To prevent a duplicate variable, the Maasvlakte is being dropped as a variable in the dataset. As can be seen in table 1, some variables, such as firm size and residential place, are attributable to the respondent in the dataset. Other variables, such as agglomeration size, are attributable to the places that are being rated in the dataset. This results in two datasets, one specific to the respondent and one specific to the places that are being rated. To converge these two datasets, each rating of a place by the respondent is considered a separate case. This will result in a factor analysis with 70 586 cases, each representing a respondent rating a specific place. This final created dataset will be used to perform an ordered logistic regression to test which factors influence the spatial preference of firms in the Netherlands. The variable 'province' will be added, with the corresponding province of the place that is being rated. The advantage of this variable is that it can absorb unobserved characteristics and factors that influence the spatial preference of Dutch firms. Moreover, interaction variables can be created to test for example how self-preference varies across provinces. The disadvantage is that it causes multicollinearity issues with variables that are measured on a provincial level, to solve this a separate model will be created that only includes these variables on a provincial level. This issue will be discussed and reflected on in the data limitations section, the results, and the conclusion. Lastly, a model will be created just for the province of Groningen with the word-associations, the rating of the image of Groningen and its development, and lastly the statements about Groningen. This model will also contain a province variable that contains the province that matches the location of the respondent that is rating places in Groningen. With the use of this variable, the model can also test the effect of self-preference of Groningen and neighboring provinces.

### **3.6 Data limitations**

The data that is being used is not perfect, for example, it is important to note that the survey by Nationaal programma Groningen (Alsem et al., 2020) was designed for another purpose, mainly to study the image of Groningen. The survey still provides important information for this thesis but the advantage of setting up an own survey is that firms could be asked about industrial land availability, social capital, firm age, and institutional factors of which the literature has shown that these factors influence the spatial preference of firms. These factors are now not present in the analysis or can only be tested to a limited extent. Moreover, the spatial scale of the variables varies from postal code level to province level, especially data on the province level might have less explanatory power. Furthermore, by including the variable 'Province' issues of multicollinearity emerge with variables that are measured at a provincial level. In order to measure the effects of these variables on the rating of different places, a separate ordered logistic regression is performed. This separate logistic model will have less explanatory power but it can illustrate the role of these variables. Despite all the disadvantages, using the data of the survey of Nationaal programma Groningen also has advantages. An individual researcher has not the network and distributive power to collect such extensive data of 1100 firms across the country in contrast to the survey of Nationaal programma Groningen. Therefore, the survey and extensive data of Nationaal programma Groningen, despite its limitations, is used as the main data source in this thesis.

## 4. Results

This chapter will focus on the results of the mental map of the Spatial preference of firms in the Netherlands. With the use of an ordered logistic regression, the effect of different factors on the spatial preference of firms in the Netherlands will be tested. This section will first focus on the mental map and compare it to the past mental maps from the research of Meester & Pellenburg (2004). Following this, the results from the ordered logistic regression will be presented in 3 parts. A part with the internal firm-specific factors, a part with the locational characteristic factors, and lastly the part with personal factors. Following this analysis, the influence of self-preference will be discussed and new mental maps will be presented to illustrate the effect of self-preference on the Spatial preference of firms in the Netherlands. Lastly, a section will be dedicated to the influence of stereotypes and culture on the spatial preference of Dutch firms for the province of Groningen.

### 4.1 The mental map

Figure 2 shows a mental map of the spatial preference of Dutch entrepreneurs, which is created by using the ratings of 69 different places in the Netherlands and the Kriging extrapolation tool in ArcMap. The mental map in figure 2 clearly shows a strong preference towards central locations like Utrecht which is a clear dome of the Netherlands from which the ratings, in a general sense, gradually drop. However, multiple other peaks appear in the Netherlands at for example Rotterdam. It also shows the preference of firms towards the 's Hertogenbosch-Eindhoven corridor. It is also interesting to note that the Assen-Groningen corridor is also rated higher than the surrounding areas. The spatial pattern of locational preference of Firms in the Netherlands in 2019 is largely in line with the spatial preference of firms in 1983 and 2003 in the paper of Meester & Pellenburg (2004), which also portrays Utrecht as a central dome with ratings gradually declining with distance from this dome. The increased spatial preference of firms for the Groningen-Assen corridor and the 's Hertogenbosch-Eindhoven corridor is less prevalent in the paper of Pellenburg and Meester (2004). There could be many explanations for this new increased preference for these corridors. For example, from an institutional point of view, one could argue that these corridors contain many important institutes such as a university and government institutions and thus receive a higher rating. Another perspective could be that these regions are more economically attractive compared to the surrounding area because of their agglomeration size and the presence of human capital. The factor analysis of the ratings, using an ordered logistic regression, should give more insight into the factors that influence the spatial preference of Dutch firms. All in all, the mental map of spatial preference of Dutch firms in 2019 is largely similar to the mental maps in 1983 and 2003. Utrecht still forms a dome, however, this dome is flattening as Pellenburg and Meester (2004) argue. Although the averages of this survey cannot be compared to the averages of the Survey of Pellenburg & Meester (2004), a case can still be made that this trend is continuing by the increasing preference for corridors outside of central locations. In addition to the mental map in figure 2, table 2 provides an overview of scores per province.

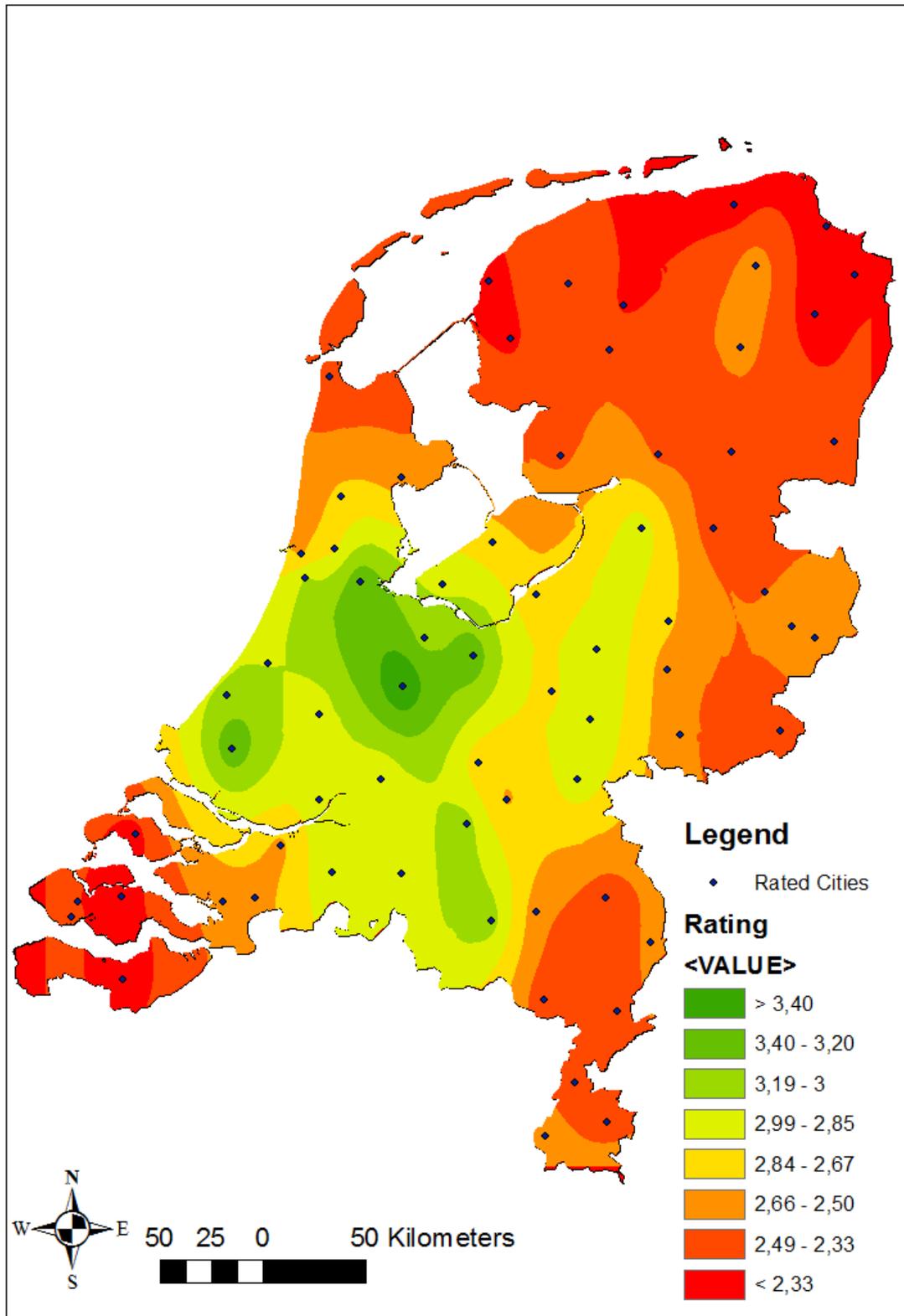


Figure 2: The spatial preference of Dutch firms.

Table 2: The ratings of places in each province by Dutch firms.

<b>How do you rate the following places as a firm location</b>					
<b>%</b>	<b>Very favorable</b>	<b>Favorable</b>	<b>Neutral</b>	<b>Unfavorable</b>	<b>Very unfavorable</b>
<b>Drenthe</b>	4,28	15,92	24,66	27,31	27,83
<b>Flevoland</b>	6,66	20,98	27,97	25,51	18,89
<b>Friesland</b>	5,14	14,58	22,24	24,60	33,45
<b>Gelderland</b>	6,17	21,92	29,22	24,85	17,84
<b>Groningen</b>	4,63	12,52	19,93	26,21	36,72
<b>Limburg</b>	5,34	17,81	22,58	22,85	31,42
<b>Noord-Brabant</b>	7,63	24,21	26,90	22,29	18,97
<b>Noord-Holland</b>	9,27	22,90	25,07	23,63	19,14
<b>Overijssel</b>	5,59	19,84	25,69	25,09	23,97
<b>Utrecht</b>	19,90	36,45	23,45	10,64	9,56
<b>Zeeland</b>	4,33	12,96	22,46	24,80	35,44
<b>Zuid-Holland</b>	11,32	28,23	26,65	19,67	14,12

### **4.3 The ordered logistic regression**

By including all variables and interaction variables the Loglikelihood ratio was significant meaning that the independent variables in the model have a significant effect on the dependent variable, the rating of places in this case. Firstly the influence of firm-specific factors will be discussed. Secondly, the influence of locational characteristics will be discussed. Thirdly, the influence of personal factors will be discussed which will be followed by the influence of self-preference. Lastly, this section will shed light on the influence of culture and stereotypes on the spatial preference of Dutch firms. If a coefficient is significant and positive then it positively influences the rating. If the coefficient is negative and significant then this variable negatively influences the rating. The entire model is included in Appendix A.

#### **4.3.1 The effect of Firm-specific factors**

The first part of the entire model is related to the effect of Firm-specific factors on the spatial preference of Dutch firms. Table 3 shows the effect of the sector, firm size, and the market area of the firm. Each of these factors also has an interaction variable with the province of places that are being rated to see how the spatial preference pattern varies when accounting for firm-specific characteristics. The results show that firms that belong to the secondary sector give in general lower ratings than firms that belong to the tertiary sector. This can mean that firms in the secondary sector have less of a preference towards cities than firms in the tertiary sector. In addition to this, an interaction variable is used between the province of the place that is being rated and the sector. The reference category is the Province of Utrecht which has the highest average ratings. This interaction variable shows that firms that belong to the secondary sector tend to give places outside of Utrecht higher ratings than firms in the tertiary sector. This effect is visible for all provinces and especially the provinces of Groningen, Limburg, and Overijssel tend to get a higher rating by firms in the secondary sector than firms in the tertiary sector. This effect can possibly be explained through the localization of firms in the same sector. The dominance of the secondary sector in the province of Utrecht is the lowest of all provinces, thus localization effects are likely to be rather low in this province compared to the other provinces. Other explanations could be that land prices and wages, important factors for firms that belong to the secondary sector, are high in Utrecht which causes that these firms prefer to locate outside of the center with cheaper land and wages but more transport costs. This line of reasoning can be traced back to the traditional neo-classical theories of the bid rents of Von Thünen, The Moses Location-Production model, and the Weber location model (McCann, 2013).

Another internal firm factor that is analyzed, is the size of the firm. For this variable, an interaction variable is also created with the province of the place that is being rated. The results can be seen in table 3. The results show that micro-companies with 1-9 employees rate provinces outside of Utrecht higher compared to large companies with over 200 employees. The rating of places of micro-companies in the provinces of North-Holland, South-Holland, and Flevoland do not show a significant difference compared to Utrecht. What is also an interesting result is that small and middle-sized firms with 10-49 and 50-200 employees rate the provinces of Zeeland and Noord-Brabant higher than the province of Utrecht compared to large companies. A possible explanation for this effect is that large companies have more information available to them according to the behavioral theory and can therefore make better location decisions and prefer central locations such as Utrecht (Pred, 1966).

One could argue that large firms can more objectively rate different locations in the Netherlands and therefore prefer central provinces such as Utrecht and Zuid-Holland while small firms are more influenced by personal factors and are embedded in the region and therefore give higher ratings to provinces outside Utrecht (Koster & Venhorst, 2014). Why small and medium-sized firms prefer the provinces Noord-Brabant and Zeeland more than other provinces is still unclear.

The last internal firm factor in the analysis is the market area of a firm, which is divided into local, regional, national, and international. As well as the previous variables, an interaction variable is created with the province of the place that is being rated. The results can be seen in table 3. As can be observed, the interaction between local market reach and the province is significant for all provinces except for Zuid-Holland. This means that firms with a local market area rate every province, besides Utrecht, higher compared to firms with a national market orientation. This effect is especially strong for Limburg, Zeeland, Friesland and Groningen. This effect remains present for firms with a regional market area but the coefficients are lower and still not significant for Zuid-Holland. This suggests that the effect weakens when the market area expands. An interesting result can be observed for firms with an international market area compared to firms with a national market area. Firms with an international market orientation tend to rate some provinces outside of Utrecht significantly higher compared to firms with a national market orientation. Firms with a national market orientation tend to prefer central locations, such as Utrecht, in the Netherlands because these firms need to cater to the whole national market in contrast to firms with a local or regional orientation who are less influenced by the centrality of a location. Take for example a local-oriented clothing shop, Utrecht might be a good location for this shop but due to its local orientation, the city of Groningen might also be a sufficient location for the shop. Due to its limited market reach, the locally oriented shop is not bound to the central location of the Netherlands. On the other hand, A large national-oriented clothing shop is more influenced by the centrality of the location. Due to its national orientation, Utrecht or the Randstad area might be a good location for this shop because it minimizes the distance customers need to travel to get to the shop. Lastly, internationally oriented firms are less bound by their regional location in the Netherlands as Brouwer (2010) argues. This could be an explanation why internationally oriented firms have a lower preference towards central locations in the Randstad area than national firms. Moreover, Brouwer (2010) argues that firms with a local and regional market orientation are more locally embedded and are more influenced by personal factors. Additionally, one could argue from a behavioral point of view (Pred, 1966) that firms with a local or regional orientation have less objective information about the national market and are therefore also influenced by private factors when rating different places.

All in all, when looking at the role of internal firm characteristics one can conclude that large firms in the tertiary sector with a national market orientation seem to prefer central locations such as Utrecht and Zuid Holland. Smaller firms, firms that belong to the secondary sector, and firms that have a local, regional, and in some cases international market orientation have a less strong preference towards central locations such as Utrecht. Small and local firms still rate Utrecht the highest of all places but to a lesser extent than firms that belong to the tertiary sector, are larger in size, or have a national market area. These results are largely in line with the literature (Brouwer, 2010; Koster & Venhorst, 2014; Koster & Pellenbarg, 2019).

Table 3: The influence of firm characteristics on the spatial preference of Dutch firms

<b>Firm-specific characteristics</b>							
	<b>Size (ref= 200&gt; employees)</b>			<b>Sector (Ref = tertiary secotr)</b>	<b>Market area (Ref=National)</b>		
<b>Rating (Independent variable)</b>	0-9 employees	10-49 employees	50-199 employees	Secondary sector	Local	Regional	international
National	-0,621***	-0,500***	-0,267***	-0,423***	-0,499***	0,034	-0,365***
<b>Interaction with the province that is being rated</b>							
Drenthe	0,473***	0,279	0,155	0,669***	0,894***	0,597***	0,283***
Flevoland	0,298*	0,406**	0,238*	0,591***	0,607***	0,407***	0,197
Friesland	0,327**	0,215	0,067	0,693***	0,921***	0,614***	0,103
Gelderland	0,451***	0,374**	0,189*	0,659***	0,525***	0,416***	0,247**
Groningen	0,344**	0,224	0,151	0,703***	0,991***	0,588***	0,328***
Limburg	0,407***	0,230	0,103	0,710**	1,025***	0,651***	0,247**
Noord-Brabant	0,431***	0,368**	0,246**	0,698***	0,597***	0,373***	0,227**
Noord-Holland	0,267*	0,271	0,092	0,465***	0,731***	0,481***	0,208*
Overijssel	0,339**	0,327*	0,114	0,754	0,783***	0,510***	0,149
Utrecht (Reference)	0	0	0	0	0	0	0
Zeeland	0,570***	0,371**	0,309***	0,668***	1,152***	0,636***	0,396***
Zuid-Holland	0,254*	0,265	0,072	0,668***	0,179	0,260	0,152
<b>Significance level</b>	<b>* 0,10&lt;</b>	<b>**0,05&lt;</b>	<b>*** 0,01&lt;</b>				

### 4.3.2 The effect of Locational characteristics

Table 4 shows the descriptive statistics of the relevant locational factors. Table 5 shows the results of the entire model that are related to locational characteristics. First of all, it is important to note that the variable road density will be included in an additional model which will be discussed in section 4.3.3. This is because of multicollinearity issues with the province variable. This is because data of the road density is only available on the province level, hence the province variable can predict the road density perfectly causing multicollinearity. This multicollinearity issue will be further discussed in the discussion session of this thesis.

*Tabel 4: descriptive statistics locational characteristics*

Variable	Mean	Std. Dev.	Min	Max
% With tertiary education	30,23188	8,084763	16,7	57,4
Distance to nearest highwayramp	1,747826	0,44351	0,9	2,9
Distance to nearest trainstation	4,011594	5,543662	1,4	33,4
Distance to nearest major trainstation	18,47536	19,32279	2,1	86,6
totale bevolking	120419,8	139454,9	15722	872793
Bevolkingdichtheid	1415,783	1384,616	98	6288
Localisation percentage	60,22311	27,80575	13,01317	84,80706
Distance to centre	87,50790	43	0	185,52

The variable human capital which includes the percentage of people with tertiary education is also shown in table 5. It can be observed that this effect is significant and impacts the rating of a place positively. So if the percentage of people with tertiary education increases, the rating of the place will also increase. This is in line with the theory. The second variable is whether a city has a university or not. This variable is related to human capital and the institutional theory (McCoy et al., 2018). This variable is not significant as can be seen in table 5 and therefore it is not likely that cities get higher or lower ratings if the city has a university. Following this variable, it can be observed that the variable whether a city is a capital city or not is significant. Consequently, this means that capital cities are likely to get a higher rating than cities which are not a capital city. This is in line with the institutional theory, assuming capital cities have more government institutions and are therefore more attractive to firms (McCoy et al., 2018). The next three variables are related to accessibility, as can be observed in table 5. The theory states that accessibility is an important determinant for the attractiveness of a place as a business location (Tyga et al., 2006; Holguin-Veras et al., 2005). The distance to a major train station is not a significant variable and has likely no effect on the spatial preference of Dutch firms. However, the variables distance to a highway ramp and a train station are significant. The sign of these variables suggests that ratings of places drop when the distance to a highway ramp increases and when the distance to a train station increases which is in line with the research of Bok & Sanders (2005). Looking at the coefficients the distance to a highway ramp is a more important factor than the distance to a train station which is in line with the research of Holguin-Veras et al. (2005). This shows that the accessibility of roads is important to the spatial preference of Dutch firms.

Both accessibility and human capital can be seen as spill-overs from agglomeration economies (Pike et al., 2017), thus the results already indirectly show the preference of Dutch firms towards agglomeration economies. Besides human capital and accessibility table 5 also contains variables that can directly measure agglomeration sizes such as population size, population density, and localization percentage. The variable population density turned out to be insignificant while population size and localization percentage turned out to be significant with a positive sign, meaning that if the population and localization percentage increase, the rating of the place is also likely to increase. These results both support the evidence of the preference of firms towards both urbanization economies and localization economies (Marshall, 2009; Targa et al., 2006). The last variable in this section is the distance to the center which is also significant, this was to be expected when looking at the mental map in figure 2 which shows clearly a decline in rating with increasing distance from the center. Nevertheless, this result underlines that the relative location of a place to the center also influences the spatial preference of Dutch firms. This is in line with previous research on the spatial preference of Dutch firms by Meester & Pellenbarg (2004). Lastly, the variable of the province of the place that is being rated is shown in table 5. This variable can absorb regional unobserved characteristics which are not prevalent in the model.

As can be seen, all provinces are being significantly rated higher than Utrecht which is to be expected when looking at the mental map in figure 2 where Utrecht gets the highest ratings of all places.

These results provide evidence that agglomerations, human capital, and accessibility of a place indeed influence the spatial preference of firms. This further underlines the importance of these factors when studying the spatial preference of firms. The evidence of the influence of institutions is limited, the presence of a university had no significant impact on the spatial preference and whether a city is a capital city or not, only indirectly supports the influence of institutions.

Table 5: locational characteristics

<b>Location characteristics coefficients for the rating of places</b>	
<b>National</b>	
% with tertiary education	0,021***
City has university	-0,063*
City is capital city of province	0,063**
Distance to highway ramp	-0,042**
Distance to train station	-0,005**
Distance to major trainstation	0,0004
Population size (LOG)	0,141***
Population density (LOG)	-0,0201
localisation percentage	0,030***
Distance to center in KM	-0,0013**
<b>Province of place that is being rated</b>	
Drenthe	-0,761***
Flevoland	-0,798***
Friesland	-0,741***
Gelderland	-0,748***
Groningen	-1,016***
Limburg	-1,071***
Noord-Brabant	-0,744***
Noord-Holland	-1,041***
Overijssel	-0,718***
Utrecht (Reference)	0
Zeeland	-1,052***
Zuid-Holland	-0,590***
<b>Significance levels</b>	<b>*P&lt;0,1</b> <b>** P&lt;0,05</b> <b>*** P&lt;0,01</b>

### 4.3.3 The effect of personal factors

This section focuses on the personal factors in the model. As mentioned in the methodology, some variables are only available on the provincial level which causes multicollinearity issues in the model because of the province variable. A separate regression with the omitted variables was performed to measure the effect of these personal factors on the spatial preference of Dutch firms. The results of this second model need to be treated with caution since it has even less explanatory than the complete model. The results of the personal factors from the main model are included in table 6 while the results of the separate model are included in table 7. The results of table 6 show that the effect of social cohesion and livability on the spatial preference of Dutch firms is significant. However, the effect on the ratings is negative. This means that when social cohesion and livability increase, the rating of that place drops. This is in slight contrast with current literature, which suggests that private residential factors also matter in the spatial preference of firms. Table 7 shows the results for the omitted variables, here it can be seen that higher life satisfaction leads to a higher rating. The variables perceived social support and proudness of municipality both turned out insignificant. The Proudness of the province variable turned out to be significant, but similar to the social cohesion variable and the livability variable the effect on the rating of a place is also negative. An explanation for these negative coefficients is that regions with high social capital and pride are generally located in the periphery. Avery et al. (2021) describe that these regions are often perceived and stereotyped as closed tight-knit communities. It could be the case that firms outside of these closed communities perceive this as a negative factor because of the restrictive information these firms have about the region. All in all, evidence on the influence of personal factors is very limited. This will be discussed in the discussion session of this thesis.

Table 6: personal factors (from the complete model)

<b>Coefficients of personal factors on the rating of places (complete model)</b>	
Social cohesion	-0,197***
Voterturnout	0,007
<b>Livability rating of a municipality</b>	
insufficient	0,432***
6 Sufficient(Ref)	0
7 Ample	-0,025
8 Good	-0,064
Significance level	*P<0,1 **P<0,05 ***P<0,01

Table 7: Personal characteristics (separate model)

<b>Coefficient of personal factors &amp; road density on the rating of places (separate model)</b>	
Prob > chi2	0,000***
Pseudo R2	0,0108
<b>Variables</b>	
Life satisfaction	0,060***
Perceived social support	-0,003
Pride (province)	-0,668***
Pride (place)	-0,101*
Road Density	0,147***
<b>Significance level</b>	<b>*P&lt;0,1</b> <b>**P&lt;0,05</b> <b>***P&lt;0,01</b>

#### 4.4 Self-Preference

The notion of self-preference will be discussed in this section. There are different variables that measure this self-preference effect, which can influence the rating of places as discussed in the paper of Meester (2000). Table 8 shows the variables that are related to self-preference. The first variable is the distance between the location of the firm and the place that the respondent is rating, this functional variable is significant and negative. This means that if the distance between the location of the firm and the place that is being rated increases, the rating will likely decrease. The same variable was made for the distance of the residential location of the respondent and the place that is being rated. This variable is also significant, meaning that if the distance between the residential location and the place that is being rated increases, the rating is likely to decrease. These results indirectly show that firms have bounded rationality, rely on local networks & institutions, and are influenced by private factors (Pred, 1966; Meester, 2000). However, the personal factors in this model did not show significant results to support these statements, it could be the case that there are other variables, which could not be measured, that are more important personal factors. To see how self-preference varies among different provinces, an interaction variable is also added which can also be seen in table 9. The province of Utrecht is the reference category and the results show that self-preference in Gelderland and Flevoland is not significantly different from Utrecht. The other provinces all have negative signs, meaning that firms in these provinces have less self-preference compared to firms in Utrecht. Especially firms in the provinces Zeeland and Limburg tend to give higher ratings over longer distances than firms in Utrecht. An explanation for the high self-preference of firms in Utrecht is that it is in terms of centrality and locational characteristics already a very attractive location for firms, as the mental shows in figure 2. Due to all these regional advantages, the self-preference in Utrecht is higher than in other provinces except for Flevoland and Gelderland.

Other variables were created to measure self-preference across the provinces. These are binary variables that check whether the location of the firm and the residential location correspond with the municipality and province of the city that is being rated. Or in other words, these variables have an institutional and administrative form instead of a functional form. This results in 4 different variables as can be seen in table 8. The results show that firms that are located in the same province as the province of the place that is being rated are significant and positive. This means that firms give a higher rating to their own province compared to other provinces. The same is true if the respondent lives in the same province as the province of the place that the respondent is rating.

These results show that the self-preference effect is present on a provincial level. Moreover, It again shows that the residential location does influence the spatial preference of firms.

An interaction variable between the province of the place that is being rated and the self-preference variable of the firm location. The results paint a slightly different picture, self-preference in Flevoland and Gelderland still does not significantly differ from Utrecht but also self-preference of firms in Zeeland and Limburg does not significantly differ from self-preference in Utrecht. This is a remarkable result considering self-preference was the lowest in these provinces compared to Utrecht in the previous interaction variable. A possible explanation for this is that the average distance in Limburg and Zeeland to other places is on average already higher than provinces like Flevoland, Utrecht, and Flevoland and thus the effect of distance on the spatial preference of firms is less strong in these provinces. Moreover, it could also be the case that the attractiveness of the Randstad or other areas outweighs the self-preference in these provinces.

Despite, this contradictory result, the provinces Groningen, Friesland, and Zuid-Holland are the only provinces of which the self-preference differs from the self-preference of Utrecht. Firms in all these provinces have a lower self-preference. Lastly, an interaction variable is created that measures the self-preference of the residential location of the respondent and the province. Table 9 shows remarkable results with the provinces Friesland, Limburg, and Zuid-Holland rating places in their respective provinces higher compared to respondents who live in Utrecht. This furthermore underlines the importance of residential location in the spatial preference of firms.

The last two variables test whether the location of the firm or residential location of the respondent corresponds with the municipality that is being rated. Both variables are significant but the location of the firm has a stronger positive effect on the rating of a place than the residential location. The self-preference effect on a municipal level is stronger than the self-preference effect on a provincial level.

Table 8: Self-preference variables.

<b>Coefficients of Self-Preference variables on the rating of places</b>	
<b>National</b>	
Distance between location firm & location rated place (DistanceF)	-0,0066***
Distance between residential location & location rated place (DistanceR)	-0,0025***
<b>Province firm = Province place being rated (SelfProvF)</b>	
Yes	0,475***
No (Ref)	0
<b>Province residential location= province of place being rated (SelfRes)</b>	
Yes	0,364***
No (Ref)	0
<b>Municipality firm = municipality of place being rated (SelfMunF)</b>	
Yes	1,413***
No (Ref)	0
<b>Municipality residential location = municipality of place being rated (SelfMunRes)</b>	
Yes	0,774***
No (Ref)	0
<b>Significance level</b>	*P<0,1 **P<0,05 ***P<0,001

Table 9: Self-preference variables interacted with the province.

Interaction coefficients of Self-Preference variables			
	DistanceF	SelfProvF=1	SelfProvRes=1
<b>Province of Firm/Respondent</b>			
Drenthe	0,0035***		
Flevoland	0,0007		
Friesland	0,0041***		
Gelderland	0,0013		
Groningen	0,0052***		
Limburg	0,0095***		
Noord-Brabant	0,0034***		
Noord-Holland	0,0031***		
Overijssel	0,0043***		
Utrecht (Ref)	0		
Zeeland	0,0077***		
Zuid-Holland	0,0051***		
<b>Province that is being rated by the firm</b>			
Drenthe		-0,261	-,0414
Flevoland		-0,326	0,469*
Friesland		-0,950***	0,943***
Gelderland		-0,362*	-0,103
Groningen		-0,980***	0,082
Limburg		-0,538*	0,750**
Noord-Brabant		-0,599***	0,260
Noord-Holland		-0,599***	0,059
Overijssel		-0,623**	0,311
Utrecht (Ref)		0	0
Zeeland		0,428	0,215
Zuid-Holland		-0,746***	0,519**
<b>Significance level</b>	P<0,1 P<0,05 P<0,01		

The mental map in figure 3 illustrates the spatial preference of entrepreneurs which includes the self-preference of firms. In order to illustrate how self-preference impacts spatial preference, two more maps are created. Figure 3 shows a mental map of the spatial preference adjusted for self-preference on a local level by excluding all respondents of which the municipality corresponds with the municipality that was being rated. The same classification of classes was used as in figure 2 and as can be seen, the corridors which were present in figure 2 are being rated slightly lower. Figure 4 shows the spatial preference corrected by the self-preference on the provincial level by excluding cases where the residential or the firm’s location corresponds with the province of the place that was being rated. A drop in ratings across all provinces can be observed and the domes around Utrecht and Rotterdam flatten out. Moreover, The Assen-Groningen corridor is not visible anymore.

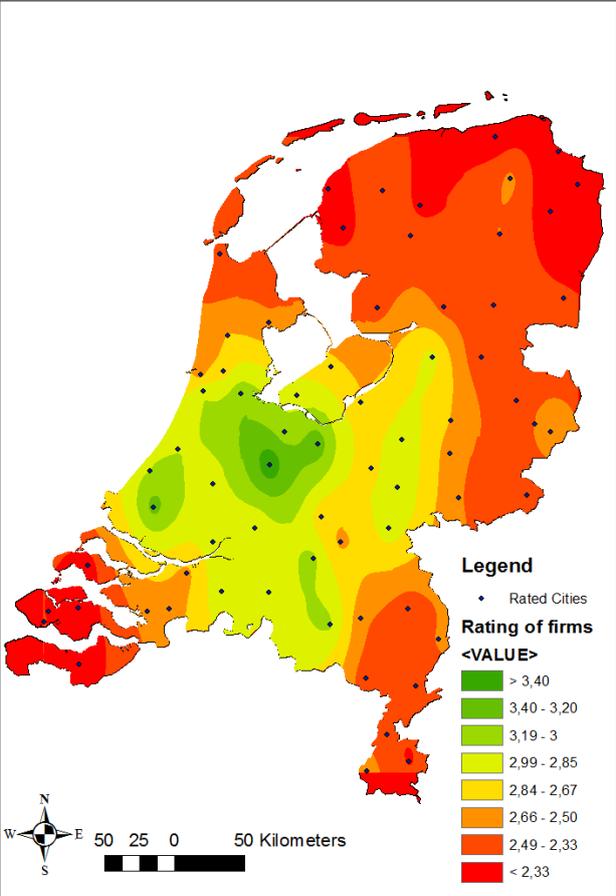


Figure 3: Mental map corrected for residential self-preference.

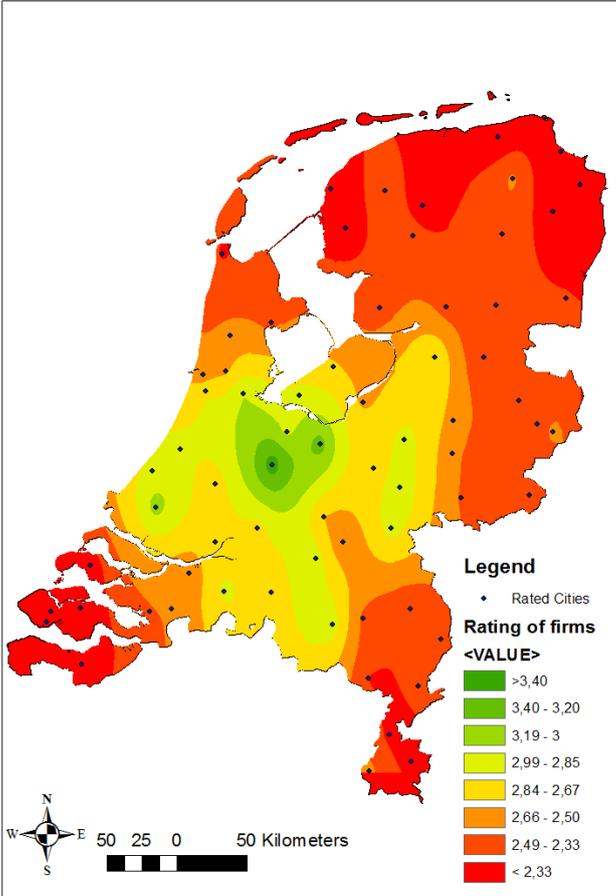


Figure 4: Mental map corrected for provincial self-preference

All in all, the model has shown that respondents are influenced by self-preference with all variables being significant and positive. The results have shown that not only the self-preference of firms matters but also the self-preference caused by the residential location of the respondents. It also shows that firms are regionally embedded as argued in the paper of Koster & Venhorst (2014). Self-preference was measured on a national level with the distance between points variable, on a provincial level and a municipal level. Some regional differences in self-preference were observed, but the main conclusion is that the self-preference of firms in the province of Utrecht is generally the highest in the Netherlands.

#### 4.5 Stereotypes and culture

The last part of the analysis is the influence of cultural aspects, stereotypes, and prejudices on the spatial preference of Dutch firms. The data for the variables are only available for the province of Groningen. This is the reason why a separate model is created specifically for the province Groningen with the variables about culture and stereotypes. In addition, other objective and personal variables on a municipal level are added to give the model more explanatory power. The results can be seen in table 10, 11 & 12.

Table 10 shows the Rating of places in Groningen of firms from several provinces. It can be seen that the provinces of Drenthe and Friesland, which are close to Groningen, give significantly higher ratings than Utrecht and for example Zeeland and Limburg. Another result that jumps out is that firms in Groningen do not rate places in Groningen significantly higher than firms in Utrecht. This indicates that firms in Groningen have a limited self-preference, while firms of the neighboring provinces, Friesland and Drenthe experience a strong neighborhood effect. This result itself, from a separate model, shows once more that self-preference can play a big role in the spatial preference of firms. Moreover, it shows that self-preference or the neighborhood effect also goes beyond provincial boundaries.

Table 10: The rating of firms of places in Groningen

Coefficients of Rating of places in Groningen by firms by province	
Drenthe	1,506***
Flevoland	0,537***
Friesland	1,458***
Gelderland	0,619***
Groningen	0,093*
Limburg	-0,0004
Noord-Brabant	0,200
Noord-Holland	0,423***
Overijssel	0,768***
Zeeland	0,231
Zuid-Holland	-0,065
Significance	*P<0,1 **P<0,05 ***P<0,01

Moving on, table 11 shows the rating respondents give to certain statements, such as: “Is Groningen a place to recreate”. The coefficients show that respondents who give a higher rating to the statements: Groningen is a place to recreate, do business, to grow, and to find a job, also give higher ratings to places in Groningen. The opposite is true for the statements: Groningen is a place to study and to experience culture. Respondents who give these statements a higher rating tend to give places in Groningen a lower Rating. The statements: Groningen is a place to live and a place to grow old, turned out to be non-significant. The average ratings also have been added in table 11 which shows that the Rating for the statements if Groningen is a good place to do business or to find a job is relatively low.

This suggests that the stereotype of Groningen is that it is not a good place to do business or find a job. Due to the positive impact on the spatial preference of these aspects, the province of Groningen could focus on making the province more attractive on these aspects. This will be discussed further in the discussion and conclusion section of this thesis.

Table 11: Stereotypes that influence the rating.

<b>Coefficients of stereotypes and culture</b>		
<b>Ratings about certain aspects in Groningen (1-10)</b>		
<b>Statement</b>	<b>Coefficient</b>	<b>Mean rating of statement</b>
<b>A place to recreate</b>	0,047**	6,2
<b>A place to do business</b>	0,211***	4,9
<b>A place to live</b>	0,034	5,0
<b>A place to grow</b>	0,082***	5,4
<b>A place to study</b>	-0,069***	6,7
<b>A place to grow old</b>	-0,032	5,5
<b>A place to find a job</b>	0,106***	4,7
<b>A place to experience culture</b>	-0,113***	5,9
<b>Significance</b>	*P<0,1 **P<0,05 ***P<0,01	

Lastly, Table 12 shows words that are associated with Groningen, the respondent had to fill in if these words did fit the image of Groningen or not. As can be observed, respondents who thought that the words smooth, sustainable, safe, innovative, international, and well-connected fitted the province of Groningen, also gave higher ratings to places in Groningen. The opposite is true for the words pioneer spirit, sober, green, and quality of life. The percentage of people who thought a certain word fitted the province of Groningen has also been added. What jumps out here is that words which have a positive effect on the Rating, such as international and innovative, have a relatively low percentage of respondent who thought this word fits the province of Groningen. So these words could be in general considered not to be stereotypes of the province, but they do have a positive impact. On the other hand, the words that negatively impact the rating do have a high percentage of respondents who think this word fits the region. Due to the high percentage, these words can be considered stereotypes about the culture in Groningen which negatively impacts the rating. Another observation from these results is that firms in this survey generally value objective factors, such as innovative and well-connected, more than personal factors, such as quality of life. An explanation by Meester & Pellenbarg (2004) is that firms are reluctant to show that they are influenced by private factors and that qualitative research is needed to uncover these factors.

Table 12: Words that influence the rating of firms in Groningen.

<b>Coefficients of stereotypes and culture</b>					
<b>Do these word associations fit Groningen? (No= ref)</b>					
<b>Word</b>	<b>Coefficient</b>	<b>% yes</b>	<b>Word</b>	<b>Coefficient</b>	<b>% yes</b>
<b>Spacious</b>	0,023	86,97	<b>Growth</b>	0,006	56,12
<b>Sober (nuchter)</b>	-0,457***	85,47	<b>Talent</b>	0,066	53,98
<b>Safe</b>	0,239***	80,08	<b>Pioneer spirit</b>	-0,143**	52,77
<b>Healthy</b>	-0,0002	79,68	<b>Creative</b>	-0,004	52,14
<b>Green</b>	-0,188**	79,38	<b>Digital</b>	-0,139*	51,20
<b>Authentic</b>	0,063	78,49	<b>young</b>	-0,091	47,96
<b>Quality of life</b>	-0,358***	74,83	<b>Innovative</b>	0,187**	46,56
<b>Quirky</b>	0,104	70,82	<b>Sparkling</b>	0,048	45,46
<b>Sociable</b>	-0,095	69,19	<b>Transition</b>	0,099	42,71
<b>Happy</b>	-0,101	65,77	<b>Smooth (vlot)</b>	0,150**	41,38
<b>A go-getter mentality</b>	-0,065	65,67	<b>Well-connected</b>	0,306***	41,18
<b>Sustainable</b>	0,376***	60,62	<b>International</b>	0,352***	29,51
<b>Significance</b>	*P<0,1 **P<0,05 ***P<0,01				

All in all, this section showed how stereotypes can influence spatial preference. This section has shown that bounded rationality, caused by for example distance, can form stereotypes of regions. In this example Groningen. This section has also shown that administrative self-preference for Groningen is also prevalent for firms in the provinces Drenthe and Friesland, but surprisingly not for firms in Groningen. As the results show, the negative impact of some statements is characterized by high mean ratings while the positive impact of some statements is characterized by low mean ratings. These high ratings of the negative statements can be seen as possible stereotypes of the province Groningen, while the low mean ratings of the statements that have a positive impact suggest that firms believe that these statements, in general, do not fit the province of Groningen. This suggests that these positive stereotypes are not prevalent among firms in the Netherlands. The same narrative goes for the word associations that fit the province of Groningen. Words with a negative impact have a high percentage of respondents who think these words fit the province, suggesting this is a negative stereotype of the region. Words with a positive impact have a relatively low percentage of respondents who think this word fits the region. This also suggests that this positive stereotype is not shared among firms in the Netherlands. Using the results from Tables 11 and 12, we see that marketing Groningen as a green, sober, and as student city does not translate into a better perception of firms of places in the province of Groningen. A policymaker could instead choose for a marketing strategy that enforces the international or sustainable aspects of Groningen to improve the perceptions of firms in the Netherlands of places in Groningen. With stereotypes being the last part of the model it can be concluded that firm characteristics, locational characteristics, personal factors, self-preference, and stereotypes all influence the spatial preference of firms in the Netherlands.

## 5. Conclusion

In this final chapter, an answer will be given on the main research question and its sub-questions from the introduction. This chapter will also focus on the implications, limitations, and relevance of this research and give recommendations for future research. This thesis started with the discussion of which factors influence the spatial preference of firms in the Netherlands. Using literature research the relevant factors that influence spatial preference became clear. These factors were categorized into locational characteristics, personal characteristics, and firm-specific characteristics. The research on the influence of personal factors on spatial preference is rather limited, especially in combination with locational and firm-specific characteristics. This led to the following research question: Which factors influence the spatial preference of firms in the Netherlands, and to which extent do personal factors influence the spatial preference of firms? To answer this question, this thesis has used a literature review based on the past research on spatial preference in the Netherlands by Meester & Pellenburg (2004) in combination with a recent dataset of Nationaal Programma Groningen (Alsem et al., 2020). The mental maps of the spatial preference of Dutch firms show a clear dome in Utrecht with ratings gradually dropping if the distance from Utrecht increases. The mental map from this research corresponds largely with the past spatial preference mental maps of Meester & Pellenburg (2004). This shows that the spatial preference of Dutch firms has not radically changed over the past few years. Locational characteristics, personal characteristics, and firm-specific characteristics were used to explain the spatial preference of Dutch firms.

Evidence in this thesis was found for all these factors. Internal firm factors such as size, sector, and market area all turned out to affect how firms rate places across the Netherlands. Small firms, local firms, and firms that belong to the secondary sector have a less strong preference for the Randstad area and rate provinces outside of Utrecht higher than large firms, national firms, and firms that belong to the tertiary sector, who strongly prefer the Randstad area. In addition to internal firm factors, locational factors also influence the spatial preference of firms. This thesis has shown that firms indeed prefer agglomeration economies, good accessibility, places with a high degree of human capital, and to some extent, institutions. Besides these locational characteristics, personal factors also influenced the spatial preference of Dutch firms. It turns out that high degrees of social cohesion, livability, and pride of province all had a negative impact on the rating of places in the Netherlands. The explanation for this could be that places with high degrees of these factors are often located in rural areas and are more closed communities and that firms rate give these closed communities a lower rating due to the limited information they have about these places (Avery et al. 2021). Another important personal factor turned out to be the notion of self-preference (Meester, 2000). This thesis also shows that Dutch firms indeed have self-preference. When correcting for this self-preference. Ratings across all places drop in the Netherlands. Evidence was found that if the distance of the location of the firm and the place that the firm is rating increases, the rating decreases. This also is true if the distance between the residential location and the place that is being rated increases. This means that residential location indeed influences location behavior and spatial preference of firms and that researchers need to take the notion of self-preference into account in future research on firm location behavior or when studying the spatial preference of firms or even persons.

Furthermore, the self-preference effect was also measured on a provincial and municipal level showing that firms who are located or have their residential location in a province or municipality rate that province or municipality significantly higher than firms outside that province or municipality. The amount of self-preference varies for each place and province but in general, firms in the Randstad area have the highest self-preference.

This indeed proves that firms have bounded rationality, are subjective, and are often locally or regionally embedded (Brouwer, 2010) and that this self-preference effect can vary locally.

Lastly, this thesis has tested the influence of certain stereotypes and cultures (Musolino, 2018) in the case of the province of Groningen. This thesis has shown that stereotypes can influence the perception firms to have of places and therefore influence the spatial preference. By including a very diverse set of different variables, this thesis has shown that the spatial preference of firms is influenced by a broad spectrum of factors. Especially by including personal factors, in combination with locational characteristics and firm-specific characteristics, this thesis has contributed to the limited evidence that personal factors indeed matter for firms and that they vary locally. Researchers and policymakers can use these personal factors, such as self-preference and stereotypes, to finetune regional marketing strategies.

Besides these results, this thesis also has some limitations. The personal factors that were identified in the literature were hard to quantify and were mainly only available on a provincial level, causing multicollinearity issues in the model. Despite these limitations, this research still managed to produce some viable results concerning personal factors. However, a qualitative approach can be taken in future research to study the influence of subjective factors and stereotypes on the spatial preference of firms more in-depth. Another limitation of this research is that secondary data is used. The disadvantage is that the survey by Nationaal Programma Groningen (Alsem et al., 2020) is designed for a different purpose than the goal of this research. Due to this, this research could not test for all internal firm factors such as age or the influence of stereotypes in other regions than Groningen. However, it also has to be noted that this secondary data has over 1000 cases which proved to be useful for this research. A single researcher often does not have the distributive power to spread that many surveys. Future research could focus on designing a survey that specifically focuses on explaining the factors behind the spatial preference of Dutch firms. This may lead to a research with a model that has more explanatory power than this research. Another research venture could be a mixed-method approach with both a quantitative analysis as a qualitative analysis. With this mixed-method approach, both internal factors and locational characteristics as personal factors and stereotypes can be analyzed more in-depth.

All in all, this thesis has shown that different theories in economic geography can be combined to help to explain a phenomenon such as firm location behavior and spatial preference of firms. This thesis has shown that both locational characteristics, derived from literature about new economic geography, as personal factors, derived from literature about behavioral and institutional theories, can both be important determinants for the spatial preference of firms. By including these factors, researchers now do not only know how the spatial preference map looks of the Netherlands but they also know how this spatial preference can be explained. This thesis could also be interesting for policymakers that want to attract firms to the region. On the one hand, a policymaker could change the locational characteristics to make the region more attractive, however, changing these locational characteristics can take a long time. On the other hand, policymakers could try to change personal factors in the region and change the perception of firms of the region. This could be done by enforcing positive stereotypes in place branding strategies, in the case of Groningen this thesis has shown how different word associations and statements about the province influence the spatial preference of firms. Using Groningen as an example, policymakers should for example focus on enforcing the international and sustainable character of Groningen in order to attract firms rather than marketing Groningen as a green student city which negatively influences the spatial preference of firms. Furthermore, policymakers could also take into account the amount of self-preference in their marketing strategies. For example, A cold-marketing or warm-marketing strategy can be chosen depending on the amount of self-preference of the region. If self-preference is high, a policymaker could choose a warm marketing strategy. If self-preference is low, a policymaker could choose to opt for a cold-marketing strategy (Hosper, 2010).

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## Appendix A: Main model

Dependent variable: 1-5 Rating of a place							
Firm-specific characteristics							
	Size (ref= 200> employees)			Sector (Ref = tertiary sector)	Market area (Ref=National)		
Rating (Independent variable)	0-9 employees	10-49 employees	50-199 employees	Secondary sector	Local	Regional	international
National	-0,621***	-0,500***	-0,267***	-0,423***	-0,499***	0,034	-0,365***
Interaction with province that is being rated							
Drenthe	0,473***	0,279	0,155	0,669***	0,894***	0,597***	0,283***
Flevoland	0,298*	0,406**	0,238*	0,591***	0,607***	0,407***	0,197
Friesland	0,327**	0,215	0,067	0,693***	0,921***	0,614***	0,103
Gelderland	0,451***	0,374**	0,189*	0,659***	0,525***	0,416***	0,247**
Groningen	0,344**	0,224	0,151	0,703***	0,991***	0,588***	0,328***
Limburg	0,407***	0,230	0,103	0,710**	1,025***	0,651***	0,247**
Noord-Brabant	0,431***	0,368**	0,246**	0,698***	0,597***	0,373***	0,227**
Noord-Holland	0,267*	0,271	0,092	0,465***	0,731***	0,481***	0,208*
Overijssel	0,339**	0,327*	0,114	0,754	0,783***	0,510***	0,149
Utrecht (Reference)	0	0	0	0	0	0	0
Zeeland	0,570***	0,371**	0,309***	0,668***	1,152***	0,636***	0,396***
Zuid-Holland	0,254*	0,265	0,072	0,668***	0,179	0,260	0,152
Location characteristics coefficients for the rating of places							
National							
% with tertiary education	0,021***						
City has university	-0,063*						
City is capital city of province	0,063**						
Distance to highway ramp	-0,042**						
Distance to train station	-0,005**						
Distance to major trainstation	0,0004						
Population size (LOG)	0,141***						
Population density (LOG)	-0,0201						
localisation percentage	0,030***						
Distance to center in KM	-0,0013**						
Province of place that is being rated							
Drenthe	-0,761***						

Flevoland	-0,798***						
Friesland	-0,741***						
Gelderland	-0,748***						
Groningen	-1,016***						
Limburg	-1,071***						
Noord-Brabant	-0,744***						
Noord-Holland	-1,041***						
Overijssel	-0,718***						
Utrecht (Reference)	0						
Zeeland	-1,052***						
Zuid-Holland	-0,590***						

**Coefficients of personal factors on the rating of places**

Social cohesion	-0,197***						
Voterturnout	0,007						
<b>Liveability rating of a municipality</b>							
insufficient	0,432***						
6 Sufficient(Ref)	0						
7 Ample	-0,025						
8 Good	-0,064						

**Coefficients of Self-Preference variables on the rating of places**

Distance between location firm & location rated place (DistanceF)	-0,0066***						
Distance between residential location & location rated place (DistanceR)	-0,0025***						
<b>Province firm = Province place being rated (SelfProvF)</b>							
Yes	0,475***						
No (Ref)	0						
<b>Province residential location= province of place being rated (SelfRes)</b>							
Yes	0,364***						
No (Ref)	0						
<b>Municipality firm = municipality of</b>							

<b>place being rated (SelfMunF)</b>							
Yes	1,413***						
No (Ref)	0						
<b>Municipality residential location = municipality of place being rated (SelfMunRes)</b>							
Yes	0,774***						
No (Ref)	0						
<b>Interaction coefficients of Self-Preference variables</b>							
	<b>DistanceF</b>	<b>SelfProvF=1</b>	<b>SelfProvRes=1</b>				
<b>Province of Firm/Respondent</b>							
Drenthe	0,0035***						
Flevoland	0,0007						
Friesland	0,0041***						
Gelderland	0,0013						
Groningen	0,0052***						
Limburg	0,0095***						
Noord-Brabant	0,0034***						
Noord-Holland	0,0031***						
Overijssel	0,0043***						
Utrecht (Ref)	0						
Zeeland	0,0077***						
Zuid-Holland	0,0051***						
<b>Province that is being rated by firm</b>							
Drenthe		-0,261	-,0414				
Flevoland		-0,326	0,469*				
Friesland		-0,950***	0,943***				
Gelderland		-0,362*	-0,103				
Groningen		-0,980***	0,082				
Limburg		-0,538*	0,750**				
Noord-Brabant		-0,599***	0,260				
Noord-Holland		-0,599***	0,059				
Overijssel		-0,623**	0,311				
Utrecht (Ref)		0	0				
Zeeland		0,428	0,215				
Zuid-Holland		-0,746***	0,519**				
<b>Significance level</b>	P<0,1						
	P<0,05						
	P<0,01						