A good neighbour is worth more than a distant friend – an analysis of neighbouring and house prices

A quantitative approach in the Netherlands

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Abstract

Neighbours affect our health and wellbeing, but do they also affect our wealth? This research tries to answer that question by looking at the effect of neighbouring, the social interaction between people living in close residential proximity, on house prices. In this research, house prices are represented by the WOZ value. By the use of the Dutch WoON database, this research finds that neighbouring has a positive effect on house prices. As neighbouring increases from its lowest (1) to its highest value (5), house prices increase by 3.67%, 8.55%, 10.30%, and 13.20%, respectively. Furthermore, it is shown that the absence of neighbouring has a more pronounced effect on house prices than the presence of neighbouring. This means that, looking from the premise of average neighbouring, property prices decrease faster as neighbouring decreases than these prices increase with additional neighbouring. Overall, the results indicate that neighbouring is valued, however, the absence of nuisance is valued more than neighbourly interactions.

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1. Introduction

House prices largely differ between places. In essence, when two houses would have the same properties, they should cost the same. This is not the case, however, because many (external) factors influence its price. Such (external) factors include its location with regards to amenities, regional economic conditions and many more (Zietz, Zietz & Sirmans, 2007; Abelson, Joyeux, Milunovich & Chung, 2005). As a consequence, regional price differences are large (Hypotheker, 2020). It is important to study these differences, as house prices directly affect homeowners' day to day life by affecting perceived wealth and borrowing constraints (Campbell & Cocco, 2005). Despite of this, the whole package which determines property prices has not been found yet. One of the factors this research proposes is the interaction between neighbours.

Neighbours are the people that are closest by to help in times of trouble or just to have a quick chat, and thus have a large influence on our lives (Wellman and Wortley, 1990; Plickert et al., 2007; Völker and Flap, 2007; van Eijk, 2011; van Eijk, 2012). How neighbours interact is referred to as neighbouring, the social interaction between people living in close residential proximity (Buenfido & Hilder, 2006). In research, several types of neighbouring have been identified; e.g. natural, fearful, detached, egalitarian neighbouring, but 'good' neighbouring in general is scientifically determined as helping each other, greeting and talking to each other, and borrowing from/to each other (Blokland, 2003; Wellman and Wortley, 1990; Plickert et al., 2007; Völker and Flap, 2007; van Eijk, 2011; van Eijk, 2012) and has been proven to improve child development, feeling of safety and belonging, wellbeing, and health (Buenfido & Hilder, 2006).

Therefore, it can be reasonably assumed that one is willing to pay more for a property with social neighbours than a similar property with less social neighbours. An idea that is also supported by surveys showing that one in four buyers are put off a property due to nightmare neighbours and calculations from the UK showing that bad neighbours reduce average UK property prices by 17,000 pound while good neighbours increase average UK house prices by around 20,000 pound (Moneywise, 2010; The Spectator, 2016).

Thus, the relationship could have large capital consequences for sellers. In case of 'bad' neighbours, realtors have an ethical duty to inform prospective buyers (huveradvocaten.nl, 2016). These prospective buyers will be put off the property and, due to a decrease in demand, the value of the property will decrease leaving these sellers with residual mortgage on the property or with decreased capital. Moreover, due to the decreasing interest in the property, it will also be harder to sell the property and sellers will be constrained in their flexibility. Since flexibility is important for job opportunities (Dohmen, 2005), it has an even larger effect on one's health and wealth. The opposite goes for 'good' neighbours, which would increase one's wealth and flexibility.

From a policy point of view, it is also important to study this relationship. The dynamics of neighbouring have changed over the years, however good interaction with neighbours is found to increase overall health and happiness (Buenfido & Hilder, 2006). Therefore, it is important to aid social interaction at the neighbourhood level. This study will shed more light on the benefits of neighbourhood interventions with relation to property appraisal, which might present an additional benefit.

As mentioned before, there are large price differences between properties, based on buyer's appraisal of the property and its surroundings (Visser, Dam & Hooijmeier, 2008). Much research has been done into this topic and researchers have, among others, found that parks, open spaces, and water are the primary amenities that affect house prices (Visser & Van Dam, 2006). Also, property characteristics such as age, size, square footages highly influence house prices. In general, most of these studies have focused on the effect of physical, functional, and/or socio-economical characteristics of the neighbourhood, not on neighbour interactions (Visser & Van Dam, 2006). Thus, although ample research has been done, research has not been able to determine all the variables which cause these large price differences. By studying how neighbour interactions affects house prices, another piece of this puzzle why such large differences exist can be solved.

The following research has looked at the effect of neighbour satisfaction on house prices and found a positive relationship in Istanbul (Keskin, 2008). However, neighbour satisfaction is subjective and valued neighbour characteristics seem to have changed over the years, e.g. people may be very satisfied with distant neighbours (Buenfido & Hilder, 2006). This means neighbour interaction may not have the same relation to neighbour satisfaction now as decades ago. Therefore, a scientific study focusing on the effect of neighbour interaction on house prices is still missing and this study aims to fill this gap by looking at neighbouring, the social interaction between people living in close residential proximity (Buenfido & Hilder, 2006), and house prices. This leads to the following research question:

"How does neighbouring affect house prices?"

This research intends on answering this question scientifically by looking at previous literature and recent data.

The data used in this research is from the WoON dataset, which is distributed by the Dutch government. The most recent version from 2018 is the only one that holds the variable "helpful and social neighbourhood" which is crucial for this research and therefore, this version will be used. Additional data needed for this research can also all be found in this database and therefore, this database from the Netherlands is very suitable and allows this research to show the independent effect of neighbouring on house prices.

Given that neighbours can have such a big influence on your wealth and limited research is available regarding this topic, this research aims to uncover the effect good neighbouring has on house prices. Moreover, since the Netherlands knows large differences in house prices (Visser, Dam & Hooijmeier, 2008) and has a large database regarding neighbourhood interactions available, the study will be done in the Netherlands.

The remainder of this paper is organized as follows. Section 2 describes the conceptual model and section 3 the empirical approach. Section 4 describes the data and the exploratory analysis. Section 5 presents the results, and section 6 concludes.

2. Theory & literature review and hypothesis development

In the following chapter, the independent variable, neighbouring, will first be identified and discussed based on prior literature. Next, the same will be done for the dependent variable, house prices. Finally, hypotheses will be formed based on the prior findings.

2.1. Neighbouring

As mentioned before, neighbouring is the social interaction between people living in close residential proximity (Buenfido & Hilder, 2006). 'Good' neighbouring entails actions such as offering help when needed, being polite and friendly to one another, includes small exchanges including greetings and short chats, and borrowing to one another (Blokland, 2003; Wellman and Wortley, 1990; Plickert et al., 2007; Völker and Flap, 2007; van Eijk, 2011; van Eijk, 2012). Furthermore, research finds that seeing someone as a good neighbour is often based on low expectations and neighbours are often identified as "trusted" when they help each other out with the children, plants, and can have nice small chats instead of needing large gestures and intimate relationships (van Eijk, 2012). Moreover, being a good neighbour also entails finding the right balance between proximity and privacy, meaning that keeping oneself to oneself is important (Abrams & Bulmer, 1986; Blokland, 2003; Kusenbach, 2008). As can be seen, the main characteristics coming forward from prior research are helping each other out and interacting nicely, therefore these characteristics will also be used to define neighbouring in this research.

Neighbouring can also be divided up by several 'types'. Buenfido and Hilder (2006) identify four psycho-social contexts for neighbouring: 'natural' neighbouring, 'fearful' neighbouring, 'detached' neighbouring, and 'egalitarian' neighbouring. First, natural neighbouring is rooted in family, identity and a dense network of strong ties in the local area. Second, in fearful neighbouring, public order is vulnerable and neighbours suffer from negative behaviour, which is based more on the individual. Third, with detached neighbouring people do not suffer from neighbours, but rather have little interaction with them and people keep to themselves. Fourth, egalitarian neighbouring is based on respect, and a common interest. Comparing natural and egalitarian neighbouring, the large difference

lies in the fact that with natural neighbouring, people are brought together by “faith” whereas with egalitarian neighbouring, people live in close proximity to certain people by choice. Both these types are based on community values and interactions rather than individuality. These different types highlight the different dimensions and levels of neighbouring.

These different dimensions of neighbouring have all been primary at different moments in time, because the dynamics of neighbouring have changed over the years. In the 1950s, people’s personal lives took place in a much smaller area than now and neighbouring was primarily ‘natural’. Then, due to the industrial revolution, social relations changed from being based on a homogeneous identity and collectivism to being based on the specialism and division of labour, leading to individualism and the delocalization of leisure activities, work, and community (Durkheim, 1947; Durkheim, 1951). Such changes have happened before and seem to be due to mobility shifts, commuting times and working hours, wider access to transport, possibility for much wider social interactions, more private facilities, more diverse neighbourhoods, living by oneself, and availability of public spaces for interaction (Buenfido & Hilder, 2006). These changes have led to a decrease in neighbouring, going from ‘natural’ neighbouring to a more ‘detached’ type of neighbouring. On the other hand, it seems that neighbours have become increasingly important. Trust in others, in general, has decreased significantly from 44% in 1980s to 29% in 2002 (Halpern & Donovan, 2002), but trust in neighbours is still high and this trend seems to be increasing. This indicates that although neighbouring is decreasing, it’s slowly becoming more important again, which could be due to an increasing need for belonging and roots in this globalized world (Amin, 2001; Amin, 2002).

Although the dynamics of neighbouring have changed, the factors which influence neighbouring have not changed much. Research has shown that there are many factors that influence how much people interact and support each other, such as firstly, the design of the built environment. Well maintained and safe public spaces, multi-use parks, (local) shops, cafés and other social facilities facilitate human interactions (Buenfido & Hilder, 2006; Cattell & Evans, 1999). Also, the accessibility and easiness to navigate around affect neighbouring, because pedestrian streets and car-free or low speed areas contribute to a sense of community among inhabitants. Second, the social capital, including the absence of crime, level of trust, and satisfaction with the local area motivate interaction. When residents are able to improve the area together or when the local area is nice to spend time in, people will go out and interact with others, hence increasing neighbouring. However, when the local area is not taken care of by the municipality, neighbours might give up on looking after the area. And finally, the demography in the area. People tend to be more neighbourly in areas where there are children, nurseries or primary schools, elderly people, households with long-term residency or a large proportion of homeowners. This is due to the fact that these groups spend significant time in their local area and are, therefore, more open to their neighbours. The relationship between social status is less distinct and based on little research but indicates that higher income people/areas are happier with their

neighbours but interact with them less, while the lower income people/areas engage more with their neighbours but trust them less. On the other hand, factors such as crime, litter, poor neighbourhood governance, recent migration, and language barriers might inhibit neighbourliness (Buenfido & Hilder, 2006). So, the built environment, social capital and demography in the area affect the level of neighbouring. However, research shows that one's opinion about a neighbour does not change easily when interactions endure (Van Eijk, 2012). This means that as long as neighbours keep interacting with each other in the way they did, possible negative information about the neighbour will not change this interaction. Therefore, neighbouring is quite stable after initial establishment.

Other research has focused on the effects caused by neighbouring and found that neighbouring is part of the human need for connections and that it can have a positive influence on one's health and wellbeing, and can be important for child development, social efficacy, the reduction of crime and for a feeling of safety, belonging and protection (Buonfido & Hilder, 2006). Neighbours are also found to provide important assistance and support which contribute to well-being and independence at an old age in Wales (Wenger, 1990). In sum, neighbouring seems to have ample positive benefits, primarily related to health and (feeling of) wellbeing. Related to good neighbouring, neighbourhood satisfaction is also found to mediate the relationship between perceived environmental characteristics and mental health in adults (Leslie & Cerin, 2008) and positively affects (self-rated) health (Oshio & Urakawa, 2012).

When looking at prior research concerning neighbours' relation with house prices, neighbour satisfaction – not neighbouring – is found to positively affect house prices in the Istanbul market (Keskin, 2008). In this research neighbour satisfaction, a subjective measure of neighbours' feelings towards each other, is used. Neighbouring is a more objective measure, where social interactions and helpfulness is present regardless of the respondents' feelings towards it. Since good neighbouring is related to what is expected in society, it should be related to neighbour satisfaction. However, as dynamics of neighbouring have changed and a more individualistic society which seems to focus less on neighbouring has established, the direct relationship between neighbouring and neighbour satisfaction is uncertain.

Therefore, the results of the study by Keskin (2008) indicate a positive relationship between neighbour satisfaction and house prices, but additional research is needed to draw the same conclusion for neighbouring.

2.2. House prices

House prices can be defined as the price at which a property is sold or offered for sale. The law of supply and demand sets the equilibrium price, meaning that different combinations of high/low supply and demand results in different prices. For example, if demand is high and supply is low, prices will be highest, whereas when demand is low and supply is high, prices will be lowest.

House prices have been studied extensively due to its importance in our economy and every-day life, as house prices have been found to affect consumption decisions of households. These households respond to changes in house prices, since it affects their perceived wealth and relaxed borrowing constraints. This effect is largest for older homeowners and smallest for young renters. Moreover, regional house prices also affect regional consumption. This is mainly due to its effect on perceived wealth as the effect of relaxed borrowing constraints works mainly through national house prices (Campbell & Cocco, 2005).

House prices can differ significantly between residential areas and therefore, the relationship between neighbourhoods or surrounding environments and house prices has been studied extensively. Looking at the Netherlands alone, the average house price in the cheapest municipality is €141,000 and in the most expensive municipality €776,000 (CBS, 2019a). Moreover, these differences have been increasing over time and not all of these differences can be explained by differences in house properties. Not surprising therefore, that the effect of neighbourhoods has been studied elaborately. Neighbourhood effects are always controlled for in house price research and researchers are continuously looking for ways to improve these models and separate neighbourhood effects from the random disturbance (Tse, 2002). However, most research focuses on macro-level characteristics and characteristics of the property rather than the neighbours. When the neighbour(hood)(s) are studied in relation to house prices, they are primarily assessed by socio-economic factors, functional characteristics, and physical characteristics which are objectively measurable. Concerning the physical characteristics of the residential environment, ‘green’ and ‘blue’ are the main amenities affecting house prices. Based on a hedonic price model, Visser and Van Dam (2006) find that the most important factors are parks, open spaces, and water. They all have a positive effect on house prices and account for a premium. Further, social-economic characteristics of the neighbourhood which are studied in relation to house prices include – among others – density, social status of the inhabitants, percentage of certain homes [single-family dwellings, owner occupied dwellings], and the number of immigrants. Functional characteristics of the neighbourhood relate to subjects such as distance to nearest motorway, city centre, nearest bus station, or nearest elementary school (Visser & Van Dam, 2006). Finally, the social characteristics of the residential environment include the percentage of single-family dwellings, percentage of owner-occupied dwellings, share of non-western immigrants, social status of the neighbourhood, and population density. Earlier research also finds that these social characteristics of the neighbourhood have a larger effect on house prices than the physical characteristics, with social status (employment, income, education) playing a primary and positive role. However, in all of this research regarding house prices, the level of neighbouring is not taken into account.

Therefore, although many socio-economic factors, functional, and physical characteristics are taken into account, neighbouring seems to have been overlooked in previous house price research.

2.3. Hypothesis development

Data regarding neighbouring has been scarcely taken into account in prior research towards house prices. However, research does indicate that social characteristics of the neighbourhood – percentage of owner-occupied dwellings, share of non-western immigrants – have a primary influence on house prices (Visser & Van Dam, 2006). These social characteristics are also found to affect neighbouring. Because these factors all seem to have a positive effect on both house prices and neighbouring, a positive relationship between neighbouring and house prices can also be expected.

Second, house prices are built up of supply and demand. Prior research shows that there are contextual neighbourhood effects with regards to housing demand (Loannides & Zabel, 2003), meaning that an individual's housing demand is influenced by the neighbours' characteristics. It can be reasonably assumed that houses with helpful and social neighbours are in higher demand than houses with bad neighbours. This can be expected since it increases overall happiness and well-being and neighbouring seems to slowly become increasingly important again due to globalization and a consequent need for a feeling of belonging and roots (Amin, 2001; Amin, 2002). Given the supply, increases and decreases in demand will lead to increases and decreases in property prices, e.g. houses with good neighbours will be in higher demand and thus lead to a higher price than bad neighbours. This is especially true in the Dutch market, where realtors have the ethical duty to inform prospective buyers about such things (huveradvocaten.nl, 2016).

The value of neighbouring increasing due to globalization and a need for roots and belonging is another reason to expect a positive effect between neighbouring and house prices (Amin, 2001; Amin, 2002). Since neighbouring is less present currently, but increasingly valued, the willingness to pay for this rare good will go up.

Finally, based on Keskin (2008) who finds that neighbour satisfaction is positively related to house prices, it can also be expected that neighbouring is positively related to house prices. Neighbouring characteristics are fundamentals which were always expected in society from good neighbours, therefore neighbour satisfaction and neighbouring should be highly correlated. However, since neighbouring dynamics have changed and a more individualistic society has formed, people might not value neighbouring characteristics the way people used to (Buenfido & Hilder, 2006). For example, very attentive neighbours who keep an eye on your house might have been very appreciated historically but could be considered intrusive in the current society. Consequently, the relationship between neighbour satisfaction and house prices and neighbouring and house prices might be different and needs further investigation. However, assuming considerate neighbours who help out and like to have a quick chat are still valued and assuming the value of neighbouring is increasing again due to globalization (Amin, 2001; Amin, 2002), the same positive effect is expected while using

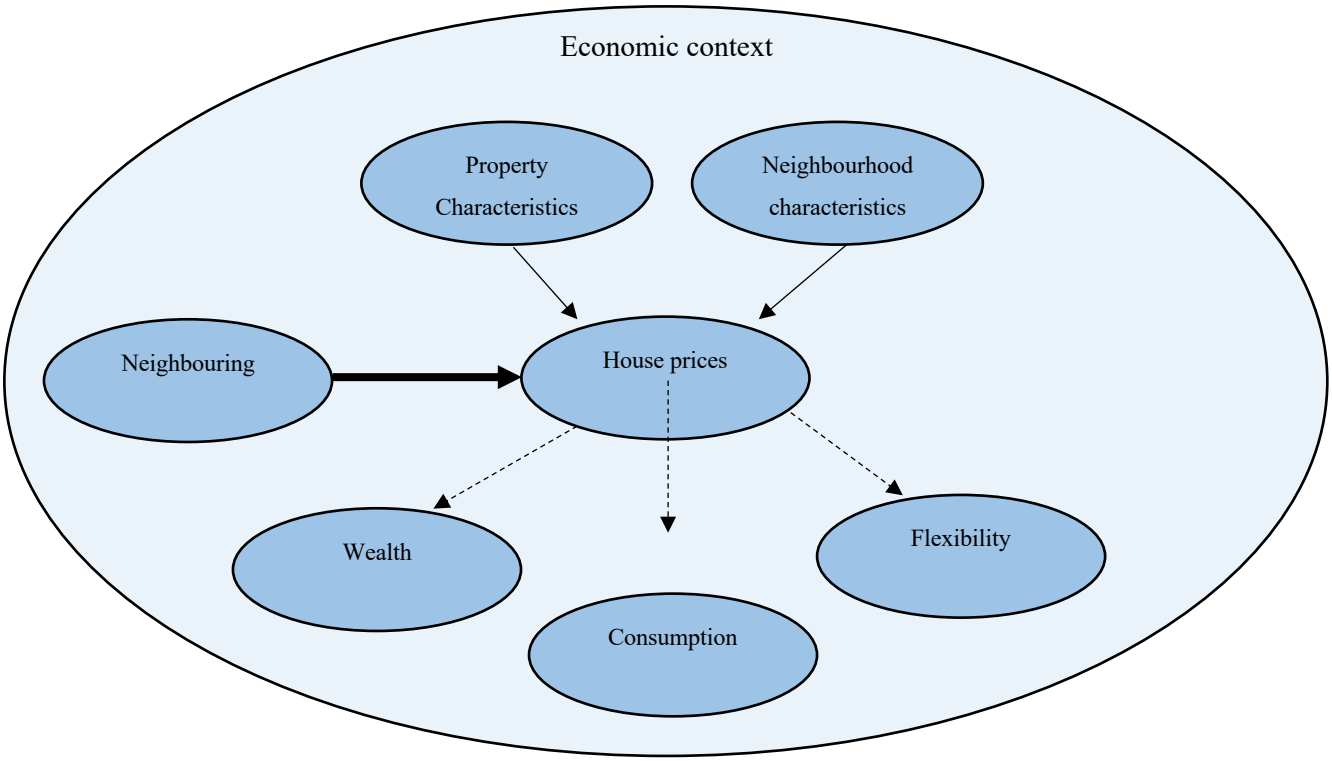
neighbouring as found by Keskin while using neighbour satisfaction (2008). Therefore, the first hypothesis states that neighbouring will have a positive effect on house prices.

Hypothesis 1: Neighbouring has a positive effect on house prices

However, this effect is expected to differ depending on its direction. Since we live in a more independent society currently, people ask for help less and interact with friends rather than neighbours. First, this could lead to the expectation that neighbouring will not be valued as high. However, that bad neighbouring will still be experienced negatively due to the nuisance experienced, leading to a larger effect on house prices with negative neighbouring compared to positive neighbouring. On the other hand, neighbouring is based on low expectations (Van Eijk, 2012). Therefore, not much might be expected from neighbours and a small increase in neighbouring might lead to a large increase in the willingness to pay. This leads to the following two hypotheses.

Hypothesis 2: The effect of neighbouring on house prices is asymmetric, e.g. positive [negative] neighbouring will have a larger effect on house prices than negative [positive] neighbouring

Figure 1 Conceptual model



3. Method

To answer these hypotheses, quantitative analysis will be done. Quantitative analysis is chosen because, first of all, limited research exists with regards to the relationship and therefore, reliable conclusions can't be made. Second, data needed to study this relationship is available for statistical analysis. Therefore, this part of the thesis explains the choice and use of the data source used to answer the above hypotheses.

3.1. Sample

The data for this research is drawn from the 2018 WoON survey. This survey is done by the Dutch government every three years, as a way of gaining insight into developments in the current housing market (woononderzoek.nl, 2019). This database is chosen because it is a very recent database with substantial observations. Furthermore, the Netherlands offer a viable research location, since large price differences exist spatially (Visser, Dam & Hooijmeier, 2008). These price differences have not been completely explained yet, and neighbouring could be one of the missing variables needed.

3.2. Sample construction

The process was started by asking permission for several versions of the WoON database, e.g. 2012, 2015 and 2018. Initially, the addition of the 2012 and 2015 WoON survey was expected to add explanatory power and additional insights. However, crucial variables – such as the main explanatory variable – were missing. Therefore, the 2012 and 2015 WoON databases were deleted. Consequently, the database now holds the 67,523 observations from the 2018 version. These observations are collected randomly, therefore, the dataset is assumed to be unbiased and representative of the Dutch housing market.

3.3. Regression methods

Four hedonic models, which estimates the extent to which each factor determines the price of the property (Investopedia, 2019), will be run in different settings to analyse the effect of neighbouring on house prices. The models used to analyse the relationship are specified in section 4.5. below. These models will be run in STATA using ordinary least squares (OLS) and fixed-effects (FE) regressions.

4. Data

The fourth section first explains the variables that are used in the analysis, why these variables were chosen, and how they will be included in the regressions. Here, the focus is first on the dependent variable, house price, and the independent variable, neighbouring. After this, control variables which are needed to account for external effects are discussed. Second, this section shows the descriptive statistics of the variables, including multicollinearity analysis. This section helps to ensure that the data is entered in the regression correctly. Finally, the regression models which will be analysed in Stata are formed and explained.

4.1. Dependent variable

The dependent variable taken in this research is house price. This variable will be represented by the WOZ value, which is the value of the property on the first on January l of the previous year based on similar properties and their values (Rijksoverheid.nl, 2019). This measure of house prices is chosen because it represents a relatively up-to-date value of the property and has the most amount of observations and therefore, allows for the most representative analysis. This WOZ value is one of the variables of interest of the government in the WoON database and is thus taken from the 2018 WoON database. It is a continuous variable and will therefore also be put in the regression as a continuous variable.

4.2. Independent variable

The main independent variable is neighbouring. As explained in the theory, neighbouring represents the extent to which neighbours help each other and interact with each other kindly. This variable is composed in the WoON database by asking respondents to rate the following statement from completely disagree to completely agree: "I live in a cosy neighbourhood where people help each other and do things together". This variable is therefore ordinal and put in as such in the analysis. Initially, the value "1" in neighbouring stood for "completely agree" and the value "5" stood for completely disagree. However, for interpretation purposes, the value labels have been turned around. This means that the lowest value "1" now refers to the lowest level of neighbouring with "completely disagree" and the highest value "5" now refers to the highest level of neighbouring with "completely agree".

It needs to be mentioned that the answers to this question could be biased. First, respondents who are not involved in the neighbourhood, might not recognize neighbourhood interactions in the same way as those that are. However, interaction between neighbours happens in front of you and therefore, this research assumes that the respondents will recognize interaction between the neighbours despite of its involvement in this.

Second, the values (completely) disagree could be interpret in two ways, either as negative neighbour behaviour or the absence of neighbouring. In the current research it is interpreted as negative behaviour, but respondents might assume different and answer (completely disagree) while not experiencing nuisance. Here, it is assumed that respondents will only answer (completely) disagree when neighbouring is at its lowest, given that completely disagree represents the lowest value. Neighbouring at its lowest means completely not taken into account your neighbours and represents negative behaviour like nuisance. Therefore, it is expected that these problems will not affect the results and their perception is relevant in understanding property values.

4.3. Control independent variable

Based on prior research, several macro-level variables can be identified which affect house prices. Economic factors such as real disposable income and consumer price index positively affect house prices whereas unemployment rate, real mortgage rates, equity prices, and housing stock negatively affect house prices. Moreover, both affect the house prices with significant lags (Abelson, Joyeux, Milunovich & Chung, 2005). Other macro-level factors include land-use planning and building regulations. Research finds that such regulations generate significant costs by exacerbating house prices in times of economic growth, but not allowing for extra housing output in times of economic downturn, thus negatively affecting the housing markets ability to respond to economic conditions (Monk, Pearce & Whitehead, 1996). However, since these factors primarily have an effect on the long run, this research does not control for these factors. Furthermore, since the consumer price index, real mortgage rates and equity prices are generally on the national level, these will also be kept out of consideration for this country-level analysis. Finally, real average disposable income, unemployment rate and housing stock can differ on the neighbourhood-level. Therefore, these variables will be taken into account.

When looking at micro-level factors, each property has a unique set of attributes, e.g. accessibility to work, accessibility to transport, accessibility to amenities, its structural characteristics such as age, size, floor, available "gadgets". These attributes all have an effect on the property price, although these results are found to differ between the higher-priced market and the lower-priced market (Zietz, Zietz & Sirmans, 2007). Nevertheless, these variables need to be taken into account to research the individual effect of neighbouring on house prices. The WoON 2018 database has the following data available which will be included regarding these variables. First, the type of property shown by 8 categories: (1) Flat, apartment, upper- or lower-floor property, (2) terraced or corner house, (3) semi-detached, (4) detached, (5) farmhouse, (6) house with separate store, office, or practice, (7) housing unit with shared facilities, and (8) different type of property. Second, the presence of an outside area which is represented by a dummy variable where the value "2" entails having an outside area and the value "1" entails not having an outside area. Third, the parking type represented by (1) on own terrain, (2) on public terrain, (3) no parking space, and (8) deny to answer. Fourth, the amount of rooms in the property, which is a discrete variable. Fifth, the size in square meters of the property, presented by a discrete variable. Sixth, the square meters of the living room, also represented by a discrete variable. Seventh, the presence of mold in the property representing the state of the property, which can take on the value "1" yes, the value "2" for no, and the value "8" for refusing to answer. Eight, the building year of the property. Next, we're looking at the location of the property in relation to amenities. For this, variables regarding the number of meters to the nearest pharmacist, general practice, shop, big supermarket, primary school, hotel, restaurant, cafe, swimming pool, library, and train station are taken into account. Further, the amount of cinemas and musea within 20 kilometres as a discrete value and the availability of a general practice and a hospital as represented by a 5-point scale [(1) very well access, (2) good access, (3) neutral

access, (4) bad access, and (5) very bad access]. Together these variables will control the micro-level factors which influence property values in this research.

Finally, meso-level characteristics (neighbourhood characteristics) such as the social-economic characteristics discussed above concerning density, social status of the inhabitants, percentage of certain homes and number of immigrants will be controlled for by using municipality control variables. Two variables are used for this, e.g. municipality size and the COROP area. Municipality size is chosen since it relates to property values, as larger municipalities generally have more and better amenities. This variable is represented by 8 groups [(1) less than 5.000 inhabitants, (2) 5.000 to 10.000 inhabitants, (3) 10.000 to 20.000 inhabitants, (4) 20.000 to 50.000 inhabitants, (5) 50.000 to 100.000 inhabitants, (6) 100.000 to 150.000 inhabitants, (7) 150.000 to 250.000 inhabitants, and (8) more than 250.000 inhabitants]. The second variable, COROP, represents the 40 COROP areas in the Netherlands which are based on a core and catchment area. This measure of COROP areas is established by the Dutch statistical bureau for statistical purposes and therefore, expected to capture area effects related to factors discussed in the literature, such as social status, immigrants, income, and unemployment rates. The 40 areas can be found in appendix A.I and an overview of all variables used can be found in appendix A.II.

4.4. Descriptive statistics

The descriptive statistics of the variables included are shown below. The variables will be discussed based on its properties. Table 1 shows the amount of observations, the mean value, the minimum value and the maximum value, the standard deviation, variance, skewness, and kurtosis. Skewness shows the direction of the tail and kurtosis the extent to which the distribution of the data is tailed. Both have predefined optimal values which represent normally distributed data. Data is assumed to be normally distributed when skewness is 0 and kurtosis is 3.

The dependent variable WOZ value has a mean of 229,557, which means that the average WOZ value of the properties in the data is €229,557. Moreover, the lowest WOZ value in this database was €5,000 and the highest WOZ value €4,163,00. This shows that the data has respondents from a large range of economic environments. The standard deviation of €139,274.90 shows that there is low variation in the data, since its coefficient of variation (st. dev./mean) is lower than 1. Looking further, the variable seems to have some extreme values and its skewness and kurtosis values are very different from the optimal value. Therefore, it can be assumed that the data is not normally distributed, which makes it difficult to analyse a linear relationship. Therefore, the natural log of the WOZ value is taken for analysis. This variable is normally distributed as can be seen by its skewness and kurtosis values.

The independent variable neighbouring has a mean of 3.31, which means that the average value given in the survey is between 3 and 4, meaning between “neither agree nor disagree” and “agree”. Therefore, respondents are on average neutral towards or agreeing with the statement that they live in

a cosy neighbourhood where people help each other. The minimal and maximal value are 1 and 5, based on the 5 values assigned to this data. The standard deviation is 0.97, which again indicates low variation in the dataset based on its coefficient of variation (0.97/3.31 = 0.29 < 1). However, the skewness and kurtosis values are close to 0 and 3, indicating normally distributed data. The negative skewness value shows that the data is slightly tailed to the left, whereas the kurtosis value below 3 shows that these tails are slightly smaller than in normally distributed data.

The other independent variables COROP, Municipality size, Parking type, amount of cinemas are all to be assumed normally distributed based on their skewness and kurtosis values. The remaining independent variables all have skewness and kurtosis values outside of the accepted range and can therefore be assumed to be non-normally distributed. This is not expected to cause difficulties, since the normality assumption in the error terms is satisfied with the heteroskedastic and robust standard errors.

Table 1 Descriptive statistics

	Observations	Mean	Min	Max	St. Dev.	Variance	Skewness	Kurtosis
Dependent variable								
WOZ value	67,523	229,557	5000	4,163,000	139,274.90	19,400,000,000	4.015	47.815
Independent variable								
Neighbouring	67,523	3.31	1	5	0.97	0.937	-0.374	2.654
COROP	67,523	23.893	1	40	10.12	103.989	-0.229	2.052
Municipality size	67,523	5.032	1	8	1.474	2.173	0.727	2.523
Type	59,098	2.291	1	8	1.255	1.575	1.506	6.534
Outside area	59,098	1.96	1	2	0.196	0.038	-4.705	23.136
Parking type	37,053	2.319	1	3	0.732	0.536	-0.576	2.05
Amount of rooms	59,098	4.412	1	69	1.662	2.761	3.434	83.099
Property size	67,523	127.269	14	2970	79.726	6356.257	7.043	111.288
Living room size	59,098	39.014	5	200	20.895	436.61	2.365	11.856
Mold in the property	59,098	1.831	1	2	0.375	0.141	-1.763	4.107
Availability general practice	67,523	1.826	1	5	0.737	0.543	1.17	5.782
Availability hospital	67,523	2.1296	1	5	0.796	0.634	1.039	4.75

Table 1 Descriptive statistics, continued

	Observations	Mean	Min	Max	St. Dev.	Variance	Skewness	Kurtosis
Building year	67,523	1,968.24	1005	2018	46.265	2,140.49	-9.52	173.213
Meters to nearest pharmacist	64,843	1,169.64	0	13199	1120.754	1,256,089	2.637	11.887
Meters to nearest general practice	64,843	940.5139	0	13199	871.435	759,398.90	3.003	16.155
Meters to nearest shop	65,888	759.674	0	13918	794.873	631,823.50	3.345	20.817
Meters to nearest big supermarket	65,888	881.569	0	12552	854.5	730,170.40	3.194	17.648
Meters to nearest primary school	64,843	664.485	0	12493	561.994	315,837.60	3.754	31.267
Meters to nearest hotel	65,888	2,411.12	0	15404	1958.42	3,835,408	1.632	6.355
Meters to nearest restaurant	65,888	814.769	0	11266	804.865	647,808.10	3.13	19.336
Meters to nearest cafe	65,888	1,125.58	0	12036	1099.63	1,209,186	2.476	12.059
Meters to nearest swimming pool	64,315	3,298.70	0	34638	2754.49	7,587,229	2.196	10.135
Meters to nearest library	64,315	1,815.36	0	18442	1563.23	2,443,701	2.587	13.434
Meters to nearest trainstation	65,888	4,903.20	0	59210	5946.79	35,400,000	3.692	22.83
Amount of musea within 20 km	64,315	22.45	0	77	18.16	329.636	1.211	3.474
Amount of cinemas within 20 km	64,315	6.75	0	22	5.42	29.393	0.827	2.687

Looking at the descriptive statistics per neighbouring level allows for initial insight in its relationship with the variables and these descriptives can be found below in table 2. From this table, we can see that the mean WOZ value goes up as the level of neighbouring goes up, which implies a correlation between the two variables.

Table 2 Descriptive statistics per neighbouring level

Neighbouring level	**1**		**2**		**3**		**4**		**5**	
Variables	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
WOZ value	194873.70	131061.60	209573.70	139725.40	230123.60	137478.00	235853.10	138492.50	253979.30	145132.30
Type	2.03	1.36	2.10	1.27	2.23	1.23	2.39	1.23	2.56	1.28
Outside area	1.93	0.26	1.94	0.24	1.96	0.20	1.97	0.17	1.98	0.15
Parking type	2.41	0.68	2.39	0.70	2.33	0.73	2.28	0.75	2.26	0.76
Amount of rooms	4.00	1.59	4.16	1.58	4.41	1.68	4.51	1.67	4.67	1.62
Property size	112.38	68.43	117.12	74.20	126.45	79.03	131.60	81.46	137.34	86.43
Living room size	36.97	21.25	37.25	20.71	39.62	21.56	39.11	20.17	40.73	21.54
Mold in the property	1.70	0.46	1.77	0.42	1.83	0.38	1.86	0.35	1.88	0.33
Availability general practice	1.94	0.91	1.90	0.79	1.83	0.72	1.82	0.70	1.64	0.74
Availability hospital	2.29	0.99	2.20	0.85	2.13	0.77	2.11	0.76	1.97	0.83
Building year	1965.36	56.78	1966.96	49.13	1968.93	44.61	1968.71	44.15	1967.13	50.88
Meters to nearest pharmacist	1002.34	902.91	997.87	908.26	1103.87	1017.81	1263.93	1226.10	1408.45	1358.25
Meters to nearest general practice	835.48	707.26	832.68	702.68	887.45	766.76	1005.23	964.63	1110.95	1094.15
Meters to nearest shop	637.61	654.41	661.09	650.44	724.09	710.49	811.37	873.23	911.79	981.68
Meters to nearest big supermarket	757.32	693.45	769.09	688.56	835.52	759.20	946.73	949.53	1039.85	1035.05
Meters to nearest primary school	628.30	471.31	622.94	480.86	641.63	513.08	687.47	607.13	747.27	688.32
Meters to nearest hotel	2166.89	1763.14	2217.64	1811.19	2355.03	1903.56	2527.81	2043.45	2583.20	2075.41
Meters to nearest restaurant	725.41	740.92	728.20	709.69	786.26	740.34	860.86	862.86	925.62	936.02
Meters to nearest cafe	1019.38	1026.90	1022.51	955.16	1104.22	1044.18	1174.06	1166.91	1238.29	1255.65
Meters to nearest swimming pool	2923.64	2573.89	2977.56	2496.86	3163.09	2624.83	3499.76	2898.25	3703.48	2994.68
Meters to nearest library	1639.30	1371.81	1673.77	1405.64	1746.36	1457.12	1907.00	1672.97	2021.28	1753.84
Meters to nearest trainstation	4155.76	5149.16	4382.98	5695.53	4674.50	5757.89	5256.98	6173.77	5525.66	6250.15
Amount of musea within 20 km	24.26	19.16	24.27	19.09	23.47	18.69	21.09	17.35	20.35	16.56
Amount of cinemas within 20 km	7.32	5.67	7.31	5.66	7.05	5.51	6.35	5.23	6.15	5.10

Another important descriptive is multicollinearity. This is an assumption of multivariate linear regressions and can be checked in several ways. First, by looking at the correlation matrix seen in table A.III. Using the cut-off value of 0.7, none of the variables can be considered multicollinear based on the correlation matrix.

Table 3 VIF values

Variable	VIF
Neighbouring	1.04
Type	1.30
Outside area	1.12
Parking type	1.16
Amount of rooms	1.40
Property size	1.45
Living room size	1.05
Mold in the property	1.04
Availability general practice	1.23
Availability hospital	1.22
Building year	1.14
Meters to nearest pharmacist	2.12
Meters to nearest general practice	2.58
Meters to nearest shop	2.43
Meters to nearest big supermarket	2.48
Meters to nearest primary school	1.39
Meters to nearest hotel	1.30
Meters to nearest restaurant	1.65
Meters to nearest cafe	1.53
Meters to nearest swimming pool	1.42
Meters to nearest library	1.41
Meters to nearest trainstation	1.32
Amount of musea within 20 km	7.14
Amount of cinemas within 20 km	7.68
COROP	1.06
Municipality size	1.49

A different way to detect problems with multicollinearity is looking at the variance-inflation factor (VIF) value. The same conclusion can be drawn when looking at the VIF values above, since they must exceed the value of 10 to indicate multicollinearity.

4.5. Regression models

The hedonic models used to analyse the relationship are outlined below. To analyse the models, OLS and fixed effects regressions in Stata will be used. Moreover, robust and heteroskedastic standard errors are used in the models. The hypotheses regarding the relationship between neighbouring and house prices has several aspects, which will be analysed by 4 regressions.

The first model (1) shows the most basic model within this research: the effect of neighbouring on house prices. As mentioned above, this regression will be analysed using ordinary least-squared (OLS). This model only contains the constant, independent variable and error term. The constant is represented by alpha, beta1 is the coefficient of the independent variable *neighbouring* and the error term is represented by epsilon. The subscripted "i" ({(xi,yi): i=1,...,n}) represents the random observation of size "n" from the dataset. Therefore, ε_i represents all factors affecting $log\ WOZ\ value_i$ apart from $neighbouring_i$.

(1) $log\ WOZ\ value_i = \alpha_i\ + \beta_1 neighbouring_i + \varepsilon_i$

In this regression, neighbouring is thus the independent variable and house prices the dependent variable. Based on the literature discussed above, it is expected that *neighbouring* will have a positive effect on *log WOZ value.*

In order to answer hypothesis 2, the independent explanatory variable neighbouring will be put in as a dummy variable in the second regression. The value "1" represents "completely disagree", value "2" represents "disagree", value "3" represents "neither agree nor disagree", value "4" represents "degree", and value "5" represents "completely agree". The dummy is represented in the equation by "i.", leading Stata to take 1 as its reference group. In this equation, again the constant is shown by α, the error term by ε, and $\beta_1$is the coefficient of the neighbouring dummy.

(2) $log\ WOZ\ value_i = \alpha_i\ + \beta_1 i.neighbouring_i + \varepsilon_i$

The equation above can also be written as follows to better show the dummy variable:

$$log\ WOZ\ value_i = \alpha_i + \beta_1\ disagree_i + \beta_2\ neither\ agree\ nor\ disagree_i + \beta_3\ agree_i + \beta_4\ completely\ agree_i + \varepsilon_i$$

As can be seen in this equation, the reference category *completely disagree* is not inserted in the equation, since this would result in multicollinearity. Based on the literature, it is expected that neighbouring will have a positive effect on house prices. Moreover, that this effect is more pronounced on the negative side of the scale "completely disagree" and in the extreme values "completely disagree" and "completely agree". From now on, the variable neighbouring will continually be put in as a dummy variable by using "i.", to see the detailed effects of neighbouring on house prices, while controlling for other effects.

In the third regression, the control variables regarding the property will also be taken into account. These variables include characteristics of the property itself, e.g. type of house, number of rooms, property size, living room area size, outside area availability, parking, and mold, as well as its location to amenities, e.g. pharmacists, hospitals, general practices, shops, big supermarket, primary school, hotel, restaurant, cafe, swimming pool, library, train station, musea, and cinema. These variables are added, as prior research shows these variables to affect house prices. Initially, energy label and presence of solar panels was also added. However, these significantly reduced observations and are not the same core characteristics of the house as intended to capture. This results in the following regression.

(3) $$log\ WOZ\ value_i = \alpha_i + \beta_1\ i.neighbouring_i + \beta_2\ type_i + \beta_3\ number\ of\ rooms_i + \beta_4\ property\ size_i + \beta_5 living\ room\ size_i + \beta_6 outside\ area_i + \beta_7 parking_i + \beta_8 mold_i + \beta_9 building\ year_i + \beta_{10} av.gen.practice_i + \beta_{11} av.hospital_i + \beta_{12} meters\ pharmacist_i + \beta_{13} meters\ gen.practice_i + \beta_{14} meters\ shop_i + \beta_{15} meters\ supermarket_i + \beta_{16} meters\ primary\ school_i + \beta_{17} meters\ hotel_i + \beta_{18} meters\ restaurant_i + \beta_{19} meters\ cafe_i + \beta_{20} meters\ swimming\ pool_i + \beta_{21} meters\ library_i + \beta_{22} meters\ trainstation_i + \beta_{23} musea_i + \beta_{24} cinemas_i + \varepsilon_i$$

In the above equation, alpha and epsilon again represent the constant and error term, respectively. β_1 is the coefficient of neighbouring, $\beta_2$the coefficient of the type of property, β_3 the coefficient of the number of rooms in the property, β_4 the coefficient of the property size in m2, β_5 the coefficient of the living room size in m2, β_6 the coefficient of the variable *outside area*, β_7 the coefficient of the type of parking of the property, β_8 the coefficient of the presence of mold, $\beta_9$the coeffcient of the building year of the property. Further,$\beta_{10}$and β_{11} the coefficients of the availability of a general practice and

hospital respectively, β_{12}- β_{20} the coefficients of the amount of meters to the nearest pharmacist, general practice, shop, big supermarket, primary school, hotel, restaurant, cafe, swimming pool, library and trainstration respectively. Finally, β_{21} and β_{22}represent the coefficients of the amount of musea and cinemas within 20 km from the property. Positive effects are expected with the access to amenities, larger (types) of houses, number of rooms, living room size, availability of an outside area, parking, and the absence of mold.

Finally, in the fourth regression, controls regarding the neighbourhood will be added. The F-test of the fixed effects regression shows that the fixed effects intercepts are different from zero (p = 0.00). Therefore, COROP fixed effects will be added and a fixed effects model will be run. Second, municipality size is a categorical variable and will be added as a dummy variable. These variables will allow us to control for differences in house prices caused by the size of the town, area in the country, and economic conditions in the area.

(4) $$log\ WOZ\ value_i = \alpha_i + \beta_1\, i.neighbouring_i + \beta_2\, type_i + \beta_3\, number\ of\ rooms_i + \beta_4\, property\ size_i + \beta_5 living\ room\ size_i + \beta_6 outside\ area_i + \beta_7 parking_i + \beta_8 mold_i + \beta_9 building\ year_i + \beta_{10} av.gen.practice_i + \beta_{11} av.hospital_i + \beta_{12} meters\ pharmacist_i + \beta_{13} meters\ gen.practice_i + \beta_{14} meters\ shop_i + \beta_{15} meters\ supermarket_i + \beta_{16} meters\ primary\ school_i + \beta_{17} meters\ hotel_i + \beta_{18} meters\ restaurant_i + \beta_{19} meters\ cafe_i + \beta_{20} meters\ swimming\ pool_i + \beta_{21} meters\ library_i + \beta_{22} meters\ trainstation_i + \beta_{23} musea_i + \beta_{24} cinemas_i + \beta_{25} i.municipality\ size_i + \theta_i + \varepsilon_i$$

This equation holds the same specifications as equation (3) with the addition of two variables. The addition of β_{23}, the coefficient of municipality size and theta i, which represents the COROP fixed effects. A positive effect is expected for larger municipality sizes, given houses are in high demand and in low supply in these dense areas.

5. Results

To analyse the effect of neighbouring on house prices, 4 regressions are run. The results for these 4 regressions can be found in table 4. In general, a 95% confidence level is used to identify significant results. The results presented below will be discussed per model.

Table 4 Results

Dependent variable: log WOZ value				
Model	(1)	(2)	(3)	(4)
Neighbouring	0.065***			
	(0.002)			
Neighbouring (dummy)				
"Disagree"		0.071***	0.036***	0.030***
		(0.011)	(0.009)	(0.010)
"Neither agree nor disagree"		0.176***	0.082***	0.070***
		(0.010)	(0.009)	(0.010)
"Agree"		0.207***	0.098***	0.087***
		(0.010)	(0.009)	(0.011)
"Completely agree"		0.277***	0.124***	0.110***
		(0.012)	(0.011)	(0.017)
Constant	12.000***	12.042***	11.400***	11.255***
	(0.007)	(0.010)	(0.124)	(0.410)
Property control variables			Yes	Yes
Area control variables				Yes
COROP fixed effects				Yes
Observations	67,523	67,523	34,629	34,629
Adj. R-squared	0.016	0.017	0.4413	0.4216

* significant on the 10% level, ** significant on the 5% level, *** significant on the 1% level

Model (1) $log\ WOZ\ value_i = \alpha_i + \beta_1 neighbouring_i + \varepsilon_i$

The first model shows that neighbouring has a positive effect on house prices. The coefficient of the independent variable neighbouring is 0.065 and is significant at the 1% level. This means that as neighbouring goes up by 1, the log of the WOZ value goes up by 0.065. To get the effect on the WOZ value, this coefficient has to be exponentiated, 1 has to be subtracted and this number has to be multiplied by 100, which gives the percentage change in the WOZ value. Therefore, when

neighbouring goes up by 1, the WOZ value of the property goes up by ([exp(0.065)-1]*100 =) 6.72%. The R-squared of the model is 0.016, which means that 1,6% of the variance in the dependent variable is explained by this model.

Model (2) $log\ WOZ\ value_i = \alpha_i\ + \beta_1 i.neighbouring_i + \varepsilon_i$

The second model shown includes the independent variable "neighbouring" as a dummy variable, allowing for the interpretation of the effect of each level of neighbouring. As can be seen in the results, "completely disagree" is the reference value. The results show that as neighbouring increases from completely disagree to disagree, property WOZ values go up by ([exp(0.071)-1]*100 =) 7.36%, which is significant at the 1% level. As neighbouring increases from completely disagree to neither agree nor disagree, WOZ values go up by ([exp(0.176)-1]*100 =) 19.24%. Next, as it increases to agree, in reference to completely disagree, WOZ values of the properties go up by ([exp(0.207)-1]*100 =) 23%. Finally, when neighbouring increases to completely agree, values increase by ([exp(0.277)-1]*100 =) 31.92%. These results are all significant at the 1% level too. The R-squared of the second model is similar to the R-squared of the first model, due to the same variables being taken into account.

Model (3) $log\ WOZ\ value_i = \alpha_i\ + \beta_1\ i.neighbouring_i + \beta_2\ type_i + \beta_3\ number\ of\ rooms_i + \beta_4\ property\ size_i + \beta_5 living\ room\ size_i + \beta_6 outside\ area_i + \beta_7 parking_i + \beta_8 mold_i + \beta_9 building\ year_i + \beta_{10} av.gen.practice_i + \beta_{11} av.hospital_i + \beta_{12} meters\ pharmacist_i + \beta_{13} meters\ gen.practice_i + \beta_{14} meters\ shop_i + \beta_{15} meters\ supermarket_i + \beta_{16} meters\ primary\ school_i + \beta_{17} meters\ hotel_i + \beta_{18} meters\ restaurant_i + \beta_{19} meters\ cafe_i + \beta_{20} meters\ swimming\ pool_i + \beta_{21} meters\ library_i + \beta_{22} meters\ trainstation_i + \beta_{23} musea_i + \beta_{24} cinemas_i + \varepsilon_i$

The third model includes property control variables. The effects of the individual control variables are not discussed but have been shown to increase the explanatory power of this model. The adjusted R-squared of this third model is 0.4413, which means that 44.13% of the variance in the dependent variable is explained by this model. The amount of observations does decrease to 34,629 due to the addition of these control variables, however, this is mainly caused by the variable "parking type" which is highly significant at the 1% level and therefore cannot be disregarded. Moreover, the amount of observations remains sufficient for analysis.

When looking at the independent variable neighbouring, its effect decreased in comparison to the second model, but its significance has not. All coefficients are highly significant at the 1% level and show that property values increase by 3.67%, 8.55%, 10.30%, and 13.20% for the answers "disagree",

"neither agree nor disagree", "agree", and "completely agree", respectively. All these increases are again in reference to "completely disagree".

$$\textit{Model (4)}\ log\ WOZ\ value_i = \alpha_i + \beta_1\, i.neighbouring_i + \beta_2\, type_i + \beta_3\, number\ of\ rooms_i + \beta_4\, property\ size_i + \beta_5 living\ room\ size_i + \beta_6 outside\ area_i + \beta_7 parking_i + \beta_8 mold_i + \beta_9 building\ year_i + \beta_{10} av.gen.practice_i + \beta_{11} av.hospital_i + \beta_{12} meters\ pharmacist_i + \beta_{13} meters\ gen.practice_i + \beta_{14} meters\ shop_i + \beta_{15} meters\ supermarket_i + \beta_{16} meters\ primary\ school_i + \beta_{17} meters\ hotel_i + \beta_{18} meters\ restaurant_i + \beta_{19} meters\ cafe_i + \beta_{20} meters\ swimming\ pool_i + \beta_{21} meters\ library_i + \beta_{22} meters\ trainstation_i + \beta_{23} musea_i + \beta_{24} cinemas_i + \beta_{25} i.municipality\ size_i + \theta_i + \varepsilon_i$$

The fourth model is the most inclusive one, with area fixed effects and control variable added. These additional variables, however, seem to have decreased the explanatory power of the model. The adjusted R-squared has decreased from 0.4413 in model (3) to 0.4216 in model (4), meaning that this model is less suited than model (3). The amount of observations does not change compared to the third model.

Also in model (4), neighbouring remains significant at the 1% level. However, its coefficients have changed slightly. The effects of additional neighbouring on property values, in comparison to completely disagreeing with neighbourliness in the neighbourhood, are 3.05%, 7.25%, 9.09%, and 11.63%, for each step respectively.

Since model (3) is found to be the most suitable model, inferences about the stated hypotheses will be based on these results. As can be seen from the table, hypothesis 1 is supported as all neighbouring categories are increasingly positive and significant at the 1% level. As neighbouring increases in the area, property values seem to go up as a consequence.

To analyse hypothesis 2 "neither agree nor disagree" will be put in as a reference category. The results of this analysis can be found in table 5. The results show the negative and positive effects are different in magnitude and, specifically, that the negative effects are larger than the positive effects. These results support hypothesis 2.

Table 5 Results with reference category neither agree nor disagree

Dependent variable: log WOZ value	
Model	(5)
Neighbouring (reference category: neither agree nor disagree)	
"Completely disagree"	-0.082***
	(0.009)
"Disagree"	-0.046***
	(0.005)
"Agree"	0.016***
	(0.004)
"Completely agree"	0.043***
	(0.008)
Constant	11.481***
	(0.123)
Property control variables	Yes
Observations	34,629
Adj. R-squared	0.4413

* significant on the 10% level, ** significant on the 5% level, *** significant on the 1% level

5.1. Robustness checks

To validate these results, several robustness tests will be done. First, a different measure of property values will be used to determine whether the WOZ value is properly chosen. Second, the data will be divided by density group to see whether the results hold among all groups and the results above are not biased by one density group. The results of these robustness checks can be found below.

As a first robustness check, the dependent variable “WOZ value” will be replaced by the sale value of the property. This is a different measure of the value of a property which is based on its market value at time of measurement, and which is individually determined rather than based on the selling prices of comparable properties. A consequence of this is a more limited sample size, however, sufficient for this robustness check. The results can be found in table 6 and support our results. Neighbouring again shows to have an increasingly positive effect on the value of the property, which is highly significant at the 1% level for all steps except “disagree” which is significant at the 5% level. When using

"neither agree nor disagree" as reference category, the negative effect also seems slightly larger. Compared to the reference category, the house price changes in percentage are -8.15%, -3.15%, 3.77%, and 7.04%, representatively. However, this effect is less clear compared to the results above.

Table 6 Results with log of sales value as dependent variable

Dependent variable: log sales value	
Model	(6)
Neighbouring (reference category: completely disagree)	
"Disagree"	0.053**
	(0.021)
"Neither agree nor disagree"	0.085***
	(0.020)
"Agree"	0.122***
	(0.020)
"Completely agree"	0.153***
	(0.023)
Constant	12.402***
	(0.170)
Property control variables	Yes
Observations	17,108
Adj. R-squared	0.3371

* significant on the 10% level, ** significant on the 5% level, *** significant on the 1% level

As a second robustness check, the results will be checked per density group. Prior research has shown differing effects based on the density within the area. In high density areas, neighbours will be geographically closer and therefore, nuisance might be a larger problem or neighbours run into each other easier and thus might get into contact easier. In the United States, researchers found that interaction with neighbours is negatively related to density (Hawley, 2012). On the other hand, interaction with friends is positively related to density, which indicates that in low-density areas within the United States, neighbours seem to somewhat take over the role of friends. Due to the high density, people have a lot of choices when it comes to friends, so neighbours which might not suit their ideal is

not a problem. However, in low density areas the choice is more limited and people are willing to let go of that ideal in order to have someone nearby with whom they can interact. Research in New Zealand, however, has found no differences in socio-cultural activities between small, medium, and high-density areas (Walton, Murray & Thomas, 2008). Therefore, this effect does not seem to be universal and checking these in the Netherlands is necessary to support the results. The Wald test will be used to analyse the possible differences and their significance, the results of which can be found below in table 8.

Table 7 Results with data divided up by municipality size

Dependent variable: log WOZ value			
Model	(7) Municipality size < 50.000	(8) Municipality size >50.000 & <100.000	(9) Municipality size > 100.000
Neighbouring (reference category: completely disagree)			
"Disagree"	0.011	0.039**	0.039***
	(0.015)	(0.016)	(0.015)
"Neither agree nor disagree"	0.054***	0.077***	0.085***
	(0.014)	(0.015)	(0.015)
"Agree"	0.060***	0.101***	0.104***
	(0.014)	(0.015)	(0.015)
"Completely agree"	0.071***	0.122***	0.136***
	(0.016)	(0.019)	(0.019)
Constant	8.760***	9.089***	11.943***
	(0.165)	(0.212)	(0.094)
Property control variables	Yes	Yes	Yes
Observations	13,461	8,053	13,115
Adj. R-squared	0.4475	0.5541	0.4603

* significant on the 10% level, ** significant on the 5% level, *** significant on the 1% level

Table 8 Wald test for results of different municipality sizes

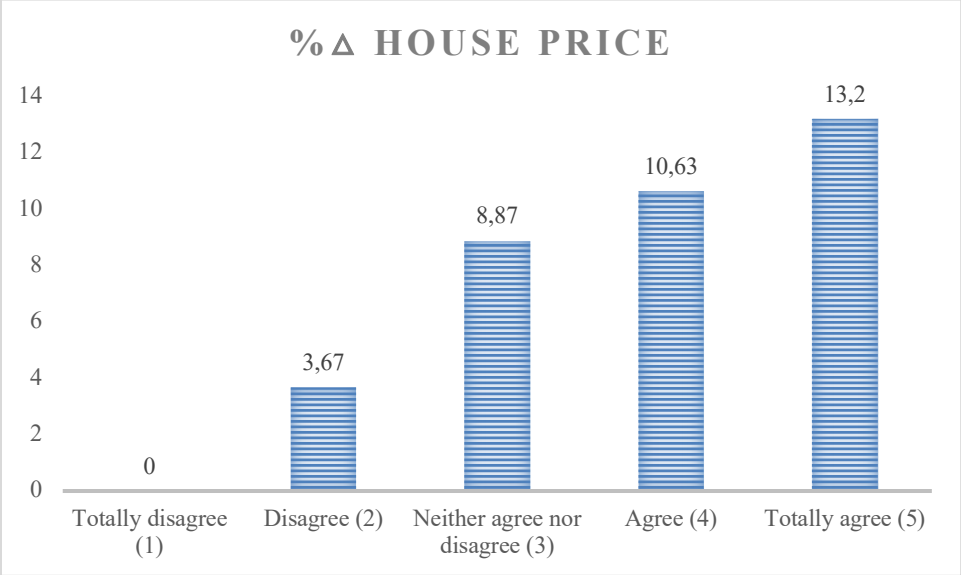
Wald test - small vs medium vs large municipalities		
	Chi-squared	P-value
Neighbouring (reference category: completely disagree)		
"Disagree"	2.64	0.2676
"Neither agree nor disagree"	2.87	0.2379
"Agree"	6.65	0.0360
"Completely agree"	8.25	0.0161

The results show that the results for the first two steps “disagree” and “neither agree nor disagree” do not significantly differ between the three groups. The values “agree” and “completely agree” on the other hand differ significantly between small, medium, and large municipalities. This can also be seen in table 7, which shows the coefficients per group. All these coefficients are significant, however its effects differ. For small municipalities, (completely) agreeing with neighbouring in the neighbourhood seems to have (less than) half of the effect on house values, as compared to medium and large municipalities. This supports the idea that in smaller municipalities, less dense areas, people have less to do with their neighbours, and therefore, do not value particularly considerate neighbours. In larger, more dense areas, people are confronted frequently with their neighbours, and therefore, good neighbours are worth more. Overall, the results do support the general model in which neighbouring has an increasingly positive effect.

5.2. Discussion

The results above show that neighbouring increases house prices. In all regressions neighbouring is found to positively and significantly influence house prices. When using a different measure of property price and dividing the data up by municipality size, the same conclusions can be drawn. Further, when using a different reference group for the variable *neighbouring*, e.g. neither agree nor disagree, the results show that the negative effect of less neighbouring is larger than the positive effect of increasing levels of neighbouring. Based on these results, both hypothesis 1 and 2 can be accepted.

Graph 1 Percentage house price difference based on neighbouring level, (1) as reference category



Graph 1 above shows the results of hypothesis 1, creating a fluent line of house price increases (in percentages) based on increasing neighbouring. As mentioned above, this means that neighbouring has a positive effect on house prices, which is in line with expectations. Based on the descriptive statistics, indications of a positive relationship could already be found as average property prices increased per neighbouring level.

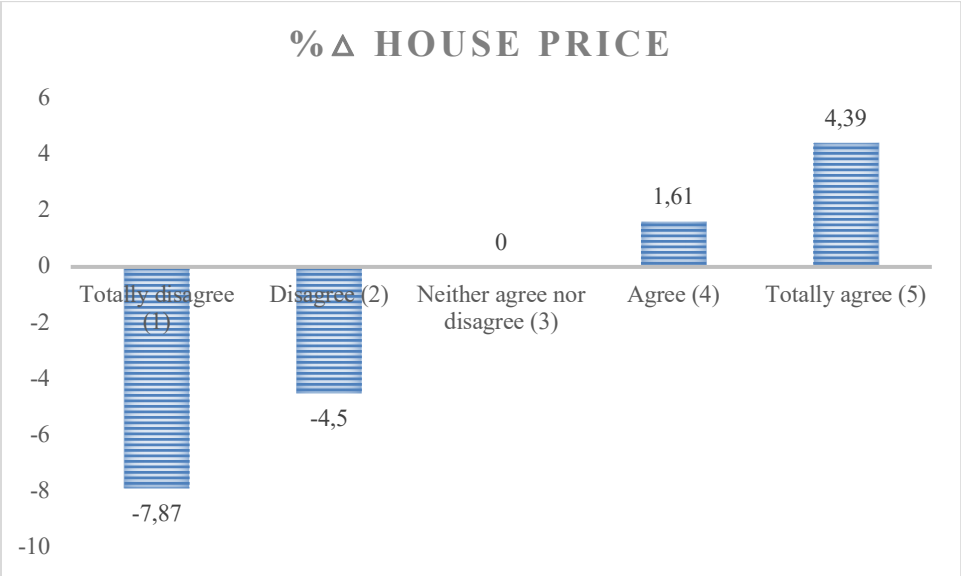
Next to this, the above results were expected based on prior research by Keskin (2008). Keskin shows that neighbour satisfaction is positively related to house prices in the Istanbul market. Doubt existed regarding the relation between neighbour satisfaction and neighbouring due to societies perception towards neighbourly behaviour as discussed in chapter 2. Despite this, neighbouring has been shown to have a significant and positive effect. Therefore, both are shown to positively affect house prices and it seems that neighbouring is still valued in the current society, despite its individualism (Buenfido & Hilder, 2006).

Building on research by Visser & Van Dam (2006) and Buenfido & Hilder (2006), certain social characteristics of the neighbourhood have proven to affect both neighbouring and house prices. Therefore, a positive effect between those variables could also be expected. Again, the results have supported this expectation. Moreover, the results indicate that neighbouring might be one of the ways through which the social characteristics affect house prices. Neighbourhood fixed effects do not add additional explanatory power when neighbouring is included while the effect of neighbouring only decreases slightly (see table 7). Therefore, neighbouring seems to capture most of its effect. Based on the regressions in this research, we are not able to determine the exact manner in which neighbourhood

characteristics and neighbouring affect property prices, however it indicates that these two interact in affecting house prices.

The positive relationship between the independent and dependent variable was also expected due to the health and wellbeing benefits associated with neighbouring. The results show that these indeed generate additional demand and therefore a higher price for such properties. Moreover, the results also support the notion that neighbouring is increasingly becoming more important again. One of the explanations may be globalization, as proposed by Amin (2001; 2002). According to this research, the importance of neighbouring is increasing due to the need for roots and belonging in this globalized world. Although cross-sectional data is used rather than panel data, and developments over time cannot be seen, prior research has shown a decreasing trend in the appreciation of neighbouring (Buenfido & Hilder, 2006). Therefore, the significant positive effect of neighbouring on house prices shown in this research indicates that its importance is increasing again.

Graph 2 Percentage house price difference based on neighbouring level, (3) as reference category



Second, the results of hypothesis 2 can be seen in graph 2 above. Based on this, we can accept hypothesis 2, as mentioned before. Accepting hypothesis 2 entails that the effect is asymmetric based on its direction. This means that the absence of neighbouring decreases house prices more than the presence of neighbouring increases house prices. This is in line with the idea that our society is individualistic, but not in line with Van Eijk's (2012) research. Due to individualism, people seem to ask for help less and interact with friends rather than with neighbours. Thus, neighbourly behaviour is not necessarily needed in this society, however, nuisance is experienced negatively. The results are in line with this hypothesis.

There might be several explanations for the results not being in line with Van Eijk's notion that neighbouring is based on low expectations (2012). Firstly, it could be that neighbouring is not based on low expectations and it takes significant neighbouring to be appreciated. Secondly, Van Eijk's (2012) finding that neighbouring is based on low expectations might still be valid. However, the presence of neighbouring is less necessary than the absence of nuisance. Based on the results, the second option seems more likely. An increase in neighbouring immediately generates significant and positive effects, which shows that neighbouring is quickly appreciated. This does not support the rejection of Van Eijk's theory.

Overall, the results indicate a significant and positive effect of neighbouring on house prices. Based on prior research, this seems to be due to associated health benefits and therefore, a higher demand for properties in such an area. The results show that neighbouring is valued significantly and some neighbourhood characteristics affect house prices through neighbouring. Moreover, the results indicate that bad neighbouring decreases house prices more than good neighbouring increases house prices. Given that neighbouring increases house prices significantly at each step, this shows that the absence of nuisance is more appreciated and valued than the presence of neighbouring.

6. Implications, future research and conclusions

In the final chapter, theoretical and societal implications will be discussed as well as recommendations for future research. Furthermore, the conclusions of this research will be written out.

6.1. Theoretical implications

This research has several theoretical implications. Firstly, relating to house prices research, large spatial house price differences in the Netherlands have not been completely explained yet. Several factors which cause these differences have been found (Visser, Dam & Hooijmeier, 2008), however neighbouring has not been studied as one of them. Other neighbourhood-related variables have been used to explain the house price differences, but these were unambiguous variables such as the share of one-person households in the neighbourhood. Neighbour interactions is a more elusive concept, which is harder to measure objectively. The results of this research, however, show the importance of measuring such concepts and including them in explaining house price differences.

Next to this, the fact that neighbourhood fixed effects do not add explanatory power generates insight. Prior research has already shown that several neighbourhood characteristics affect house prices and that some of these characteristics also affect neighbouring (Visser & Van Dam, 2006). In the current research neighbourhood effects do not add explanatory power, while the effect of neighbouring slightly decreases when adding those fixed effects. This supports the notion of an interaction between neighbourhood characteristics and neighbouring in affecting house prices.

In this research, some limitations can also be found. First of all, the risk of autocorrelation was present. People in low-cost, dense housing might be more neighbourly as the distance to neighbours is smaller and perhaps less money is available for outside help. For expensive areas, this might be the other way around. Based on prior research, however, such problems with autocorrelation were not expected as income (which is one of the determinants of the value of one's property) has not been found to be related to being a "good" neighbour or the cosiness within the neighbourhood (Tolsma, Meer & Gesthuizen, 2009). Moreover, the results support this as both the initial regressions as well as the robustness checks including control variables generate a similar highly significant and positive relationship.

Second, as mentioned in chapter 4, the survey answers regarding neighbouring might be biased. It could be that only those that actively engage in, and thus value, neighbour-connections recognize them and will answer "(completely) agree" while those people that shy away from these connections will not notice them and might answer "(completely) disagree" unrightfully. However, as explained above, in this research it is assumed that neighbour-interactions will be recognized despite one's activeness in this. Furthermore, the answers could be biased in how they are interpreted. In the current research, completely disagreeing with neighbouring indicates negative behaviour since it is the lowest value. However, respondents could choose this value while not experiencing nuisance, but merely not having any contact with neighbours. This could affect the interpretation of the results.

Third, the data only allowed cross-sectional analysis. Since prior WoON surveys did not include questions regarding neighbouring, only the 2018 issue could be used for the current research. As a result, we cannot draw scientific conclusions regarding trends in the relationship between neighbouring and house prices. Multi-year data of observation $\iota = 1, 2, \ldots, n$ is needed to draw such conclusions. However, using the WoON 2018 data we are able to see some initial trends. As prior research indicates that neighbouring was on its decline and this research indicates the importance of neighbouring again, this research shows a changing dynamic.

6.2. Societal implications

This research also generates societal implications. As discussed in the introduction, house prices affect people's wealth and borrowing constraints and therefore, studying the formation of house prices is important. Next to this, it could affect people's ability to move. This research shows that neighbouring indeed affects one's wealth and flexibility through its effect on property prices. As neighbouring would increase in a neighbourhood, one's spending abilities would significantly increase due to an increase in the value of one's property. Moreover, one's ability to move would be increased due to an increase in demand for the property.

As neighbouring was already found to increase health and wellbeing, this again shows the importance for the government to support communities in connecting with each other. The Dutch government has

put aside some money to invest in neighbourhoods which need help with, among others, enhancing social cohesion to increase happiness, but does not have many campaigns towards this goal (Binnenlandsbestuur, 2019; Delhey & Dragolov, 2015). Some firms and foundations work together to increase interaction between neighbours. This includes initiatives like neighbour day, where people can sign up their neighbourhood with an activity and in that way, connect more with each other (burendag.nl, 2020). The results of this study have shown that there are positive effects related to property appraisal with neighbouring, thereby generating an additional motivation for governments to stimulate interaction between neighbours, apart from the associated health benefits (Buonfido & Hilder, 2006; Wenger, 1990; Leslie & Cerin, 2008; Oshio & Urakawa, 2012). More campaigns and interventions from the government to promote neighbouring will aid a happier and wealthier population. The same goes for firms and foundations, who can support this by continuing initiatives like neighbour day.

Next to this, the results generate insight in our society as a whole. The results regarding hypothesis 2 indicate that we indeed live in a more individualistic society as mentioned by Buonfido & Hilder (2006). People seem to care more about nuisance than support from neighbours, which shows that people are more concerned with themselves not being hurt. The truth will not be this straightforward, but it gives some indication of how society perceives neighbourhood interactions.

On the other hand, however, the results support a more collectivistic society, as neighbouring still has a positive and significant effect. Therefore, neighbouring seems to (still) be important and valued. People still experience the positive health and wellbeing effects associated with neighbouring. It could be that especially in a time of globalisation and individualism, a place and people to come home to seems to become more important (Amin, 2001; Amin, 2002).

6.3. Future research

These implications discussed above generate some recommendations for future research. Firstly, the interaction between neighbourhood characteristics and neighbouring in relation to house prices. By the use of interaction and moderating variables, the exact relationship through which these factors affect house prices will become more clear. This might be interesting for future research, since it could aid neighbourhood intervention. By showing how the relationships work, governments could implement a more tailored approach in areas.

Second, future research could gather data over several years which could be used as panel data. By using multi-year data, developments in the appraisal of neighbouring can be identified. This might be an interesting topic to study, since prior research has indicated a decline and a following increase due to globalization. Doing multi-year analysis could gain insight in the current developments and possible future developments. Moreover, since neighbouring positively affects health and wellbeing, seeing developments could aid in understanding societal trends related to these topics.

Third, research into the stability of house prices in areas with positive neighbouring is an interesting area for future research. This research shows that neighbouring positively affects house prices, however, not at which rate house prices react to changes. It might be interesting to analyse this in several settings: in the setting of a crisis, future research could study whether these areas might be more resilient due to a higher demand or in the setting of changing neighbour dynamics, how fast house prices react to certain neighbours coming or leaving.

Fourth, data could be gathered by interviews. By asking face to face questions and interaction between the interviewee and interviewer, the chance of interpretation issues are smaller. With question such as: "I live in a cosy neighbourhood where people help each other", the interviewer could clarify answers given. Future research could be done in this way to test and verify the results above.

6.4. Conclusions

In conclusion, this research shows that neighbouring has a positive and significant effect on house prices. This is found using WoON data from the Netherlands and running OLS and fixed effects regressions in Stata. The results show that house prices increase with 3.67%, 8.87%, 10.63%, and 13.20% for the answers "disagree", "neither agree nor disagree", "agree", and "completely agree" as compared to completely disagree, respectively. As graph 1 shows, this creates a fluent pattern, which shows the consistent positive effect of neighbouring on house prices. This highlights the value of neighbouring for people and house price determination.

Furthermore, this research shows that the negative effect in the absence of neighbouring is larger than the positive effect in the presence of neighbouring. People seem to be more concerned by the absence of neighbourly behaviour than they appreciate its presence. An explanation for this could be the individualistic society in which there is less need for neighbouring, but nuisance is still considered disruptive. On the other hand, the significant and positive effect shows a need for people to interact with neighbours and indicates a more collectivistic society.

Overall, this research helps in explaining spatial differences in house prices by showing an additional factor which influences house prices. The results show that neighbouring indeed affect one's wealth and flexibility, apart from its proven effect on health and wellbeing. Therefore, the results will also be an extra motivator for governments and businesses to intervene in neighbourhoods and support neighbouring in areas.

It seems that when it comes to house prices, a good neighbour is indeed worth more than a distant friend.

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Appendix

APPENDIX A.I Figure regarding COROP areas in the Netherlands (Source: CBS, 2019b)

APPENDIX A.II Overview of variables

Variable	Definition	Categories	Notes
WOZ value	The value of the discounted flow of rental income in euros	Not applicable	
Neighbouring	The extend to which the respondent agrees with the term "I live in a cozy neighbourhood where people help each other and do things together"	1 = completely disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = completely agree, 8 = deny to answer	*(no respondent answered 8)*
Type	The type of property	1 = Flat, apartment, upper- or lower-floor property, 2 = terraced or corner house, 3 = semi-detached, 4 = detached, 5 = farmhouse, 6 = house with separate store, office, or practice, 7 = housing unit with shared facilities, and 8 = different type of property	
Outside area	The presence of an outside area, either a balcony, garden, patio or courtyard	1 = no outside area, 2 = outside area present	
Parking type	The type of parking available	1 = on own terrain, 2 = on public terrain, 3 = no parking space, 8 = deny to answer	*(no respondent answered 8)*
Amount of rooms	The amount of rooms in the property	Not applicable	
Property size	The size of the property in square meters	Not applicable	
Living room size	The size of the living room in square meters	Not applicable	
Mold	The presence of mold or humidity in the property	1 = yes, 2 = no, 8 = deny to answer	*(no respondent answered 8)*
Building year	The building year of the current property	Not applicable	
Meters to nearest pharmacist	The amount of meters from the property to the nearest pharmacist, calculated over the road	Not applicable	
Meters to nearest general practice	The amount of meters from the property to the nearest general practice, calculated over the road	Not applicable	
Meters to nearest shop	The amount of meters from the property to the nearest shop, calculated over the road	Not applicable	
Meters to nearest big supermarket	The amount of meters from the property to the nearest big supermarket, calculated over the road	Not applicable	
Meters to nearest primary school	The amount of meters from the property to the nearest primary school, calculated over the road	Not applicable	
Meters to nearest hotel	The amount of meters from the property to the nearest hotel calculated over the road	Not applicable	
Meters to nearest restaurant	The amount of meters from the property to the nearest restaurant, calculated over the road	Not applicable	
Meters to nearest cafe	The amount of meters from the property to the nearest cafe, calculated over the road	Not applicable	
Meters to nearest swimming pool	The amount of meters from the property to the nearest swimming pool, calculated over the road	Not applicable	
Meters to nearest library	The amount of meters from the property to the nearest library, calculated over the road	Not applicable	
Meters to nearest trainstation	The amount of meters from the property to the nearest trainstation, calculated over the road	Not applicable	
Amount of musea within 20 km	The amount of museas that can be reached by road within 20km	Not applicable	
Amount of cinemas within 20 km	The amount of cinemas that can be reached by road within 20km	Not applicable	
Availability general practice	The availability of a general practice from the property	1 = very well access, 2 = good access, 3 = neutral access, 4 = bad access, and 5 = very bad access, 8 = deny to answer	*(no respondent answered 8)*
Availability hospital	The availability of a hospital from the property	1 = very well access, 2 = good access, 3 = neutral access, 4 = bad access, and 5 = very bad access, 8 = deny to answer	*(no respondent answered 8)*

Municipality size	The size of the municipality divided up by classes	1 = less than 5.000 inhabitants, 2 = 5.000 to 10.000 inhabitants, 3 = 10.000 to 20.000 inhabitants, 4 = 20.000 to 50.000 inhabitants, 5 = 50.000 to 100.000 inhabitants, 6 = 100.000 to 150.000 inhabitants, 7 = 150.000 to 250.000 inhabitants, 8 = more than 250.000 inhabitants	
COROP	The COROP area the property is located in	1 = Oost-Groningen, 2 = Delfzijl en omgeving, 3 = Overig Groningen, 4 = Noord-Friesland, 5 = Zuidwest-Friesland, 6 = Zuidoost-Friesland, 7 = Noord-Drenthe, 8 = Zuidoost-Drenthe, 9 = Zuidwest-Drenthe, 10 = Noord-Overijssel, 11 = Zuidwest-Overijssel, 12 = Twente, 13 = Veluwe, 14 = Achterhoek, 15 = Arnhem/Nijmegen, 16 = Zuidwest-Gelderland, 17 = Utrecht, 18 = Kop van Noord-Holland, 19 = Alkmaar en omgeving, 20 = IJmond, 21 = Agglomeratie Haarlem, 22 = Zaanstreek, 23 = Groot-Amsterdam, 24 = Het Gooi en Vechtstreek, 25 = Agglomeratie Leiden en Bollenstreek, 26 = Agglomeratie 'S-Gravenhave, 27 = Delft en Westland, 28 = Oost-Zuid-Holland, 29 = Groot-Rijnmond, 30 = Zuidoost-Zuid-Holland, 31 = Zeeuwsch-Vlaanderen, 32 = Overig Zeeland, 33 = West-Noord-Brabant, 34 = Midden-Noord-Brabant, 35 = Noordoost-Noord-Brabant, 36 = Zuidoost-Noord-Brabant, 37 = Noord-Limburg, 38 = Midden-Limburg, 39 = Zuid-Limburg, 40 = Flevoland, 98 = Onbekend, 99 = Buitenland	*(no respondent answered 98 or 99)*

APPENDIX A.III Table regarding variable correlations to detect multicollinearity

Table A.1

Meters to nearest general practice	Meters to nearest shop	Meters to nearest big supermarket	Meters to nearest primary school	Meters to nearest hotel	Meters to nearest restaurant	Meters to nearest cafe	Meters to nearest swimming pool	Meters to nearest library	Meters to nearest trainstation	Amount of musea within 20 km	Amount of cinemas within 20 km	COROP	Municipality size
1													
0.6952	1												
0.7312	0.7187	1											
0.5282	0.5202	0.5298	1										
0.2694	0.3175	0.2841	0.1599	1									
0.5217	0.5539	0.534	0.3501	0.3326	1								
0.4674	0.4984	0.4562	0.3537	0.3125	0.4059	1							
0.2722	0.2957	0.3048	0.1997	0.3311	0.3004	0.2715	1						
0.4477	0.4359	0.4716	0.3098	0.2578	0.3821	0.3764	0.336	1					
0.1989	0.1945	0.1975	0.1316	0.2083	0.1959	0.1452	0.41	0.3123	1				
-0.2041	-0.1884	-0.1749	-0.1248	-0.1922	-0.2346	-0.1542	-0.2898	-0.1962	-0.258	1			
-0.221	-0.2056	-0.19	-0.1272	-0.2068	-0.2539	-0.1773	-0.3169	-0.1971	-0.2955	0.9246	1		
-0.1059	-0.0776	-0.0535	-0.0226	-0.0731	-0.064	-0.1818	-0.0325	-0.0006	0.0807	0.0322	0.0669	1	
-0.2039	-0.1935	-0.2027	-0.1347	-0.1969	-0.2067	-0.1177	-0.263	-0.1303	-0.2519	0.4473	0.4813	-0.0484	1

Variable	WOZ value	Neighbouring	Type	Outside area	Parking type	Amount of rooms	Property size	Living room size	Mold in the property	Availability general practice	Availability hospital	Building year	Meters to nearest pharmacist
WOZ value	1												
Neighbouring	0.1271	1											
Type	0.4562	0.1114	1										
Outside area	0.1214	0.0646	0.0087	1									
Parking type	-0.0974	-0.0619	-0.1632	-0.0742	1								
Amount of rooms	0.4827	0.0965	0.3685	0.2227	-0.1079	1							
Property size	0.5228	0.0796	0.4583	0.1118	-0.1757	0.4819	1						
Living room size	0.2981	0.0376	0.0832	0.0741	-0.0741	0.1751	0.2069	1					
Mold in the property	0.1237	0.1074	0.0515	0.042	-0.0788	0.0479	0.0752	0.084	1				
Availability general practice	-0.0656	-0.077	-0.0146	-0.0126	-0.0043	-0.058	-0.0262	-0.0466	-0.011	1			
Availability hospital	-0.0517	-0.0721	-0.0076	0.004	-0.0039	-0.0414	-0.0203	-0.0443	-0.0278	0.3808	1		
Building year	-0.0076	0.0098	-0.0809	0.1277	-0.1547	-0.0166	-0.0368	0.0628	0.1312	0.0032	0.0023	1	
Meters to nearest pharmacist	0.1784	0.1076	0.3193	0.0665	-0.2022	0.1708	0.2318	0.0406	0.0434	0.1074	0.0501	0.0274	1
Meters to nearest general practice	0.191	0.0934	0.3081	0.067	-0.2009	0.1614	0.235	0.0358	0.0412	0.1652	0.053	0.0286	0.7182
Meters to nearest shop	0.2209	0.0917	0.3053	0.0854	-0.2188	0.1759	0.2363	0.0557	0.0512	0.0899	0.0436	0.0776	0.6206
Meters to nearest big supermarket	0.2153	0.0959	0.3233	0.073	-0.2048	0.1772	0.2534	0.0473	0.0403	0.0995	0.0446	0.0284	0.6513
Meters to nearest primary school	0.2211	0.0589	0.2851	0.0297	-0.1863	0.1227	0.2306	0.0603	0.035	0.0724	0.0186	0.0026	0.4318
Meters to nearest hotel	0.0788	0.0656	0.1919	0.0978	-0.1695	0.1374	0.1364	0.0178	0.0367	-0.0039	0.0609	0.1192	0.2961
Meters to nearest restaurant	0.1474	0.0734	0.2535	0.0983	-0.1946	0.1734	0.2032	0.0444	0.0466	0.063	0.0427	0.1006	0.4773
Meters to nearest cafe	0.157	0.0587	0.1863	0.0905	-0.1964	0.1301	0.1567	0.0515	0.0493	0.0382	0.0306	0.1368	0.4242
Meters to nearest swimming pool	0.0809	0.0848	0.2536	0.0547	-0.1414	0.1253	0.1488	-0.0001	0.0333	-0.0148	0.085	0.0161	0.3262
Meters to nearest library	0.1046	0.0701	0.2369	0.057	-0.1296	0.1275	0.1657	0.0261	0.0309	0.0485	0.0351	0.0233	0.4518
Meters to nearest trainstation	0.0321	0.0665	0.1769	0.0653	-0.0805	0.0933	0.0936	0.0003	0.0318	0.0038	0.0937	0.0237	0.2218
Amount of musea within 20 km	0.0476	-0.0746	-0.2871	-0.0966	0.1959	-0.1559	-0.1641	0.0179	-0.0753	-0.0082	-0.0338	-0.0994	-0.2259
Amount of cinemas within 20 km	0.0586	-0.0749	-0.28	-0.1015	0.1984	-0.1568	-0.1686	0.0198	-0.0749	-0.0146	-0.0393	-0.1094	-0.2291
COROP	-0.0184	-0.018	-0.0488	0.0303	0.0124	0.0094	-0.0082	0.0423	0.0141	0.028	0.0247	0.027	-0.042
Municipality size	-0.0853	-0.1032	-0.2694	-0.1567	0.2103	-0.2015	-0.1847	-0.0205	-0.1007	-0.0059	-0.1166	-0.0992	-0.2492