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A comparison between location effects on the price of Airbnb listings and Hotel rooms.

A CONTRIBUTION TO THE DEBATE ABOUT THE DIFFERENCES BETWEEN AIRBNB AND THE TRADITIONAL HOTEL INDUSTRY

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1. Summary

This thesis focusses on the question*: To what extend is there a difference in the way location plays a role in constituting the price of Airbnb listings and hotel rooms?* This question is the result of a) the promotion strategy of Airbnb and b) the conclusions from the theoretic framework. As is mentioned in the theoretic framework repeatedly, Airbnb tries to promote an image in which Airbnb is depicted as a philanthropic organization which is part of the sharing economy and has a focus on sustainable, local and authentic travel which is good for hosts and guests. By doing so they try to differentiate themselves from the traditional lodging industry. Other ways they distance themselves from the traditional lodging industry is by claiming that they do not compete with the traditional lodging industry, but instead are part of the less commercial sharing economy. Another claim by Airbnb is that they have a different spatial distribution than hotels, which is mostly true. But does not mean that Airbnb relieves cities from touristic pressure, which is implied by Airbnb by such a claim.

The theoretic framework shows that many of the claim made by Airbnb are not accurate or the implications are more subtle than Airbnb implies. An implication regards the question whether Airbnb is part of the sharing economy. This is at least debatable, and depends on what definition is used about the poorly defined concept of the sharing economy. Nevertheless, whether Airbnb is part of the sharing economy or is not, does not erase the fact that there are commercial Airbnb hosts and therefore that Airbnb has an impact on the housing- and hotel industry. Research showed that Airbnb does compete with the hotel industry in the low- and middle segment. This shows that Airbnb can be treated as a commercial organization and as competitor for the hotel industry. The perceived effects of Airbnb presence has incentivised governments to regulate Airbnb in ways that restricts Airbnb listings to be used as commercial hotel like rooms. Concluding, the claims about the spatial distribution of Airbnb listings seems to be the most accurate of all claims surrounding Airbnb. This has led to the main question, together with the distinction Airbnb tries to promote between hotels and Airbnb listing and the fact that Airbnb is increasingly treated as a commercial organization, rather than a part of the sharing economy. The main question can be found in the first part of this section.

The importance of location is underlined in the last section of the theoretic framework, in which price determinants are identified with regards to location and accommodation specific attributes. Price determinants with regards to location identified in the literature are: Distance to city centre, Distance to public transport stops/hubs, Distance to amenities and distance to scenic views/green spaces. This has led to the following variables, which are all measured in straight-line meters: Distance to city centre, distance to parks, distance to nearest restaurant/eatery, distance to nearest supermarkets, distance to nearest public transport stop, distance to the central station, distance to nearest Airport. The other control variables used in the regression model are: Room type, star rating, consumer rating and the amount of reviews.

In order to answer the main question, firstly an visual presentation of the difference in spatial distribution for Airbnb listings and hotels is provided. The ArcMap maps (See appendix) show that there is a different spatial distribution for hotels and Airbnb listings in the chosen cities (Groningen and Amsterdam). This could imply that location plays a different role for both industries. The importance of location is quantified using regression models and the earlier mentioned distance variables. The regression models are often referred to as hedonic price models. Hedonic price models have some cons, like an often occurring misspecification of the model. A reflection and more

extensive explanation on the model and the data used for this thesis can be found in the reflection and methods sections of this thesis.

In order to show the possible difference in importance of location, two different models are made. One model is made for Airbnb listings and one for hotel rooms. The models capture the effects of the individual variables on the price of hotels/Airbnb listings. The models (See table 3 in the appendix) firstly show a big difference in explained variance, which makes the models hard to compare. This is mainly caused by the fact that star-rating explains a big part of the variance in price for hotels, while there is no such rating for Airbnb listings. Consumer rating for hotels and Airbnb listings is added to control for this effect, but does decrease the gap in explained variance. The consumer rating is for both models a significant predicter of the price, but the coefficient for hotels is a lot higher than for Airbnb listings. An explanation for this can be found in the theoretic framework and regards the difference in anonymity involved in the rating systems. Summarizing the location results: the models shows that most variables are insignificant price determinants for Airbnb listings and hotels. Those insignificant variables are: Distance to nearest parks, distance to nearest eateries/restaurants, distance to nearest public transport stop and distance to supermarkets. Significant variables are distance to city centre (negatively related with the price), distance to central station and distance to nearest airports (both positively related).

Besides the difference in explained variance, there seem to be no large differences in the importance of price determinants with regards to location. This is an answer to the main question of this thesis. The results of the models shows that the difference in spatial distribution between hotels and Airbnb listings is not that relevant when constituting price determinants. And thus that hotels and Airbnb listings do not differ that much on location based price determinants. This obviously does not answer the whole question regarding whether Airbnb listings and hotels are similar or different, but it does contribute to the discussion by showing that location plays a similar role in constituting the price of both Airbnb listings and hotels.

However, there are some limitations and cons to this research. First off all, there is a big different in the amount of cases used for the models regarding Airbnb listings (16000+) and Hotels (209), this is one of the causes for a large difference in R^2. This makes the models hard to compare. The models suffer also from a form of misspecification, which is not unusual for Hedonic Price models. Another issue regards an omitted variable bias. Some important variables were not included due to the fact that their was no data available to do so. Variables not included are for example the m^2 of the Airbnb listings and the amount of rooms an Airbnb listing consists of.

2. Introduction

In 2008 a relatively new business model in the lodging industry emerged called Airbnb. Airbnb is a peer-to-peer online platform that allows house owners to rent their house or apartment to tourists from all over the world. Airbnb likes to promote itself as a progressive and philanthropic organization. Airbnb's mission is to promote travel with a focus on diversity, inclusivity and sustainability, in which local and authentic travel experiences are central. Airbnb claims that by allowing people to rent out their properties, they offer unprecedented access to local communities and authentic experiences (Airbnb, 2018a). Furthermore, they claim that their business model benefits all stakeholders involved, which includes hosts, guests, employees and the communities in which they operate (Airbnb, 2018b). However, whether these claims are all accurate is debatable. And even though Airbnb has a philanthropic mission, criticism has increased over the years (f.e, Parool, 2016; NOS, 2018; Nieuwsuur, 2018; The Guardian, 2018).

In addition to its mission, Airbnb likes to associate it's product with the sharing economy. They do this by arguing that Airbnb guests not only share residences with hosts, but also share an environment with local citizens. Airbnb argues that, while sharing an environment travellers stimulate the local economy and allow local businesses to flourish in neighbourhoods which were initially less touristic (Oskam & Boswijk, 2016; Crommelin et al. 2018; Slee, 2015). Whether this is accurate and whether Airbnb is part of the sharing economy is debatable. Nevertheless, Airbnb carefully tries to promote this progressive, philanthropic non-commercial image in order to differentiate itself from the traditional hotel industry.

Whether Airbnb and the traditional hotel industry are actually different is debatable. Airbnb does promote this distinction. Airbnb's promotion strategy helped forming interest in the main question of this thesis. An aspect Airbnb tries to be different in, or promotes as being different is spatial distribution of both industries. According to Airbnb, Airbnb listings are more present in neighbourhoods that initially were less touristic than the city centre. Airbnb tries to frame this as a good thing, and argue that by staying in a formerly non-touristic environment, tourists support local businesses and thus help the local economy. While doing so, they ignore the negative effects tourists penetration in to formerly non-touristic neighbourhoods might have. Such as a loss of community feeling, displacement, increasing rents and other tourist related disturbances (Nieuwland & van Melik, 2018; Füller & Michel, 2014; Gant, 2016).

Whether Airbnb actually has a completely different spatial distribution than hotels is debatable and some nuances should be made when comparing the two. Both industries often have a centre-periphery distribution, with both industries more prevalent in the city centre. On the other side, a point can be made about the fact that Airbnb is more spread out over cities, with besides presence in the city centre, with also a relatively larger presence in neighbourhoods outside the city centre. Nevertheless, the effects of this difference are marginal, since tourists still go to touristic hotspots and Airbnb listings are still most prevalent in the city centre (Quattrone et al., 2016)

Another aspect Airbnb tries to promote as being different are the motives of tourists to choose Airbnb over the traditional lodging industry. Airbnb argues that their guests want to live a local and authentic live. However, this is only part of the reasons why guests choose a Airbnb over a hotel room. The main reasons to choose an Airbnb is price, which is the same argument for guests visiting hotels (Guttentag et al., 2018). Other reasons to choose an Airbnb is having home benefits, like

kitchen tools and wasmachines, and being in the vicinity of touristic amenities (Brochado et al. 2017; Varma et al. 2016; Guttentag, 2013; Gunter & Önder, 2018). Wanting to live a local and authentic live is a reason to choose an Airbnb, but not the sole reason and thus only part of the story. Concluding, Airbnb guests and hotel guests do not differ that much, this leads to the fact that Airbnb does not create a separate parallel market, but does compete with the hotel industry (Neeser et al., 2015).

This thesis tries to contribute to the debate about whether Airbnb and hotels are different by comparing price determinants for hotels and Airbnb listings with a focus on location effects. By doing so, first of all, room rate of hotels and Airbnb listings are compared and secondly the effects of a different spatial distribution are being examined. The importance of location is highlighted by the fact that location is one of the most important factors influencing the price of the traditional lodging industry (Chan & Wong, 2006; Zhang et al. 2011; Li et al. 2015). The main question of this thesis is: *To what extend is there a difference in the way location plays a role in constituting the price of Airbnb listings and hotel rooms?*

3. Theoretic framework

This theoretic framework starts with an introduction in to Airbnb, which is followed up by an section about Airbnb and the sharing economy, in which the commercial character of Airbnb comes to light. The motives for travellers to choose Airbnb over hotels are discussed in section 3.3, in which the commercial aspect of Airbnb again comes to light. One of the main differences between Airbnb and hotels lays in the spatial distribution of both industries, this is discussed in section 3.4. After this section the effects off an increased Airbnb presence on the property- and hotel market are discussed in section 3.5 and 3.6, after which the regulating efforts of governments are addressed in section 3.7. A conclusion from these 3 sections is that Airbnb does compete with the hotel industry and the effects of an increasing Airbnb presences urges governments to regulate Airbnb more often. Lastly, some location effects on the price of Airbnb listings are discussed in section 3.8, which led to a conceptual model in 3.9. After those sections, some concluding remarks and a hypothesis are given section 3.9.

3.1 Introduction in to Airbnb

Airbnb is a digital platform that tries to connect hosts who offer their residences to tourist. Hosts may choose to offer their entire residence to guests or share a part of their residence with guests seeking for a short-term accommodation in exchange for a fee (Crommelin et al. 2018). Airbnb was founded in San Francisco, USA, in 2008 and has been growing rapidly and spread all over the world, with listings in almost all major cities of the world (Guttentag et al. 2018). The website allowed Airbnb to spread over 5 million unique places, 81000 cities and 191 countries. The availability of Airbnb listings all over the worlds, suggests that Airbnb has had an major impact on the accommodation industry in the last decade (Airbnb, 2018a). Over the past decade the valuation of Airbnb has increased to 25 billion in 2017. This increase in value led to early estimates in 2014, about the probability of Airbnb overtaking the biggest hotel chains in value, without owning a single hotel (Liu & Matilla, 2017). This eventually led to Airbnb being the number one most valuable lodging company in the world (The Atlas, 2018).

According to Airbnb itself, it's mission is to promote healthy travel by offering an authentic, local, diverse, inclusive and sustainable way to travel (Airbnb, 2018a). Airbnb tries to promote its product as a part of the sharing economy. They do this by promoting the idea that Airbnb guests not only share residences with hosts, but also participate in the local economy and live an authentic live. By living a local live, they allow local businesses to flourish in neighbourhoods which were initially less touristic. At least, that is what Airbnb claims (Oskam & Boswijk, 2016; Crommelin et al. 2018; Slee, 2015). Airbnb promotes this philanthropic non-commercial image in order to distinguish itself from the traditional lodging industry. However, there is a growing amount of criticism regarding those statements and the effects Airbnb has on cities, which will become clear later in this theoretic framework (Crommelin et al. 2018; Mody et al. 2018).

3.2 The sharing economy and Airbnb

The sharing economy is a relatively new concept and therefore much debate is still ongoing on how to define the concept (Crommelin et al 2018; Schor, 2014). The concept used to be so poorly defined that association with the concept by the companies itself or association with the concept by the press was considered to be enough to be part of the sharing economy (Schor, 2014). Even though the definition of the sharing economy is not clear, it is certain that the sharing economy has become a more widely used concept. One of the explanations for this, is that the sharing economy is promoted as a positive development. This causes that companies like Airbnb and Uber associate themselves with sharing economy (Schor, 2014; Crommelin et al. 2018; Frenken & Schor, 2017). Recently, there have been debates about the sharing component of sharing economy and about whether companies like Airbnb are still part of the sharing economy, or whether they are just regular business trying to maximize their profits.

Over the last decade there has been made an effort in to defining the sharing economy and in to identifying components of the sharing economy. Belk (2014) starts with defining what sharing is. He states that sharing is the act of distributing what is ours to others for their use. He argues that Airbnb and other short-term rental services do not fit this definition since they entail the exchange of a gift for an asset. He argues that Airbnb is more collaborative consumption rather than sharing, due to the fact that a fee is involved. Belk (2014) defines collaborative consumption as people coordinating the acquisition and distribution of a resource for a fee, and thus as a commercial activity. Other researchers argue that the terms collaborative consumption and sharing economy are often mixed up, and used interchanged (Liang et al. 2018). However, Liang et al. (2018) argue that there is a difference between the two terms. There are differences in the actors involved and the type of transaction. Actors in the collaborative consumption can be individuals or groups of people. With collaborative consumption a fee or other form of compensation is always involved. The sharing economy involves actions between individuals with an emphasis on sharing for free. Airbnb is a hybrid between those two approaches and resembles a peer-to-peer economy business, where fees are included and a there is an emphasis on sharing (Liang et al. 2018).

Schor (2014) takes another approach to defining the sharing economy. Schor (2014) tries to divide the sharing economy in to four categories. First of all, the recirculation of goods, online marketplaces like Ebay and Marktplaats are examples of companies facilitating in this practice. Secondly, there is the increased utilization of durable assets. In this category falls Airbnb and rental services like Bikeswap and Uber. The third category is the exchange of services, apps like Tikkie, an app which allows to send a payment request to other people, are included in this category. The fourth category is the sharing of productive assets and space between companies. Companies sharing an office building or facilities like restaurants or even coffee/candy machines are part of this category. Within the categories a divide can be made between for-profit companies and non-profit companies, just as between peer-to-peer platforms and business-to-peer platforms (Schor, 2014).

Regardless of what approach or definition is used for sharing; the sharing economy or collaborative consumption, it is evident that there are multiple sides to Airbnb. There are commercial hosts which do not have a lot in common with the novelty of sharing, and there are host that genuinely want to share their property, for the sake of sharing rather than a fee (Ključnikov, 2018; Oskam & Boswijk, 2016). Tussyadiah (2015) and Liang et al (2018) identified economic benefits, among societal aspects of sustainability and community, as the drivers of the use of peer-to-peer accommodation rental

services, like Airbnb. This suggests that hosting an Airbnb is a commercial activity, rather than a sharing activity. This is a reason why Crommelin et al. (2018) make a distinction between hosts that are part of the sharing economy and hosts that are part of the short-term rental industry. And thus a distinction between commercial profit driven hosts and non-commercial sharing driven hosts. Prague is an extreme example of a city with a big proportion hosts. In Prague eighty percent of the Airbnb listings are owned by parties with multiple listings (Ključnikov, 2018). This clearly indicates that Airbnb listings are not solely individuals wanting to earn an extra bit of money, and indicates that there are a big amount of commercial listings. This makes Airbnb just another platform where commercial parties want to rent out their lodging accommodation. This is not that much different from platforms like booking.com, which is a platform where hotels rent out their rooms to their customers.

Summarizing, whether Airbnb is part of the sharing economy depends on what definition you use. With researchers including Airbnb in the sharing economy (Schor,2014), researchers partly including Airbnb in the sharing economy (Crommelin et al. 2018; Oskam & Boswijk, 2016), and researchers claiming that Airbnb is not or barely part in the sharing economy (Liang et al. 2018; Tussyadiah, 2015). Regardless of what definition you use, there are elements of Airbnb which are not in line with the concept of sharing. Examples of that are commercial interests of parties with multiple listings (Oskam & Boswijk, 2016). With multiple researchers stating that there are commercial elements to Airbnb which do not fit the sharing narrative (Ključnikov, 2018; Tussyadiah, 2015; Liang et al. 2018). The association between Airbnb and the sharing economy might be influenced by the fact that Airbnb tries to promote the association between Airbnb and sharing (Schor, 2014). Rather than Airbnb actually fitting the definition of the sharing economy (Liang et al. 2018; Belk, 2014). The commercial side of Airbnb makes Airbnb comparable to the traditional lodging industry. The extent to which Airbnb can be compared to the traditional lodging industry, with regards to price and factors influencing the room-price, is something this research tries to examine.

3.3 Why do people choose Airbnb over hotels or other options?

A growing body of literature discusses why guests choose to book an online Airbnb, instead of a room in a hotel or another more traditional lodging accommodation. Airbnb (2018a) itself claims that they offer an opportunity for tourists to live more local and authentic, but is this actually the case or are other factors more important or relevant when booking an Airbnb? Listings on the website of Airbnb are diverse in price, types of accommodation and have varying characteristics that might appeal to the potential guests (Guttentag et al. 2018). The diversity of Airbnb listings suggests that guests have varying motives to choose an Airbnb and thus it may be possible to divide guests in to different categories based on the motives they have to choose an Airbnb (Guttentag et al. 2018).

Within de research discipline of tourism, push- and pull factors are often used as framework to assess the motives of guests to choose a certain country, place or accommodation (Guttentag et al. 2018). Push factors are often reasons to go on vacation, like wanting to escape the every-day life or a mundane situation (Dann, 1981). Klenosky (2002) adds to this that push factors are related to the needs and wants of the traveller, like the desire to escape. While pull factors are defined as characteristics of the visited location/place/country. Push factors are often seen as reasons to go on a holiday trip, while pull factors on the other side are seen as factors which influence the decision where to go to (Dann, 1981; Klenosky, 2002). Push/pull factors cannot be seen as two different reasons to go to a place, but instead are interlinked and influence each other (Klenosky, 2002). Even though push and pull factors influence each other, this section mainly focusses on the pull factors of Airbnb listings. This is because Airbnb itself promotes pull factors as the main reason to choose their product. The main pull factor mentioned is the possibility to live and authentic and local live (Airbnb, 2018a).

Literature about the traditional lodging industry identifies a set of factors as reasons to choose an accommodation. Factors mentioned which influence the decision to choose an accommodation over another one are: location, reputation, price value, service quality, comfort and security (Guttentag et al. 2018). With regards to Airbnb, Volgger et al. (2018) argue that activity patterns of Airbnb users differ from tourist using traditional accommodations. One of the main reasons for choosing an Airbnb over a hotel is the price (Brochado et al. 2017; Varma et al. 2016; Guttentag, 2013; Gunter & Önder, 2018).There are more factors influencing the decision of guests to choose a certain accommodation over another one (Liang et al. 2018). Guttentag et al. (2018) identify interaction with locals and having home benefits as factors influencing the choice of Airbnb. Home benefits include amenities like washing machines, kitchens and other household machines often available in homes.

Another research done in to this subject is done by Varma et al. (2016). They identify multiple factors influencing the decisions of Airbnb users and non-Airbnb users when choosing a lodging facility. Airbnb users are influenced by their loyalty to Airbnb, the location, the availability of amenities and past experiences. Non-Airbnb users on the other side are influenced by security concerns, advertisements, and service qualities. Both groups are influenced by price, reviews, access to transport amenities and recommendations by friends and families. Varma et al. (2016) also identify a few reasons why non-Airbnb users prefer more traditional accommodations. Those reasons are mostly related to being satisfied with the traditional way of vacating, having concerns about the reliability of hosts, having concerns about safety and not being familiar with Airbnb.

Summarizing, reasons to choose an Airbnb over a more traditional accommodation are different for specific guests, but factors mentioned are price, wanting to live local and authentic, having home

benefits, the location and the availability of amenities in the near environment, like restaurants and transport facilities. Airbnb's promotion of being able to live a local and authentic live is only part of the story and earlier mentioned factors are part of the reason to choose an Airbnb.

3.4 Do hotels and Airbnb listings have a different spatial distribution?

Besides the earlier mentioned similarities between Airbnb and the traditional lodging industry, Airbnb claims that there are aspects that make them different from the traditional lodging industry. One of those aspects is the spatial distribution of Airbnb. Airbnb (2018) claims that their hosts are mainly located outside the traditional hotel areas, and thus that Airbnb listings have a different spatial distribution than hotels. This claim suggest that Airbnb spreads tourism out over the whole city and by doing that relieves pressure from touristic hotspots. Which would fit their mission of sustainable travel, which benefits tourists and locals. Airbnb has become more regulated over the last years, initially it had no restrictions and regulations and thus potentially could spread over cities, even in to areas that had no previous touristic presence (Zervas et al. 2017). At the same time the spatial distribution of the lodging industry is restricted and bounded by planning regulations and decisions. This forced hotels to cluster in certain places. Another factor which stimulated hotel clustering is the fact that small hotels are able to benefit from the proximity of large hotels and other touristic amenities (Urtasun & Gutiérrez, 2006). Clustering of hotels often happens around the city centre. Recently, research about Airbnb has focused on the spatial distribution of Airbnb and thus the earlier mentioned claims in this section by Airbnb (2018) can be verified or falsified.

Research into the spatial distribution of Airbnb listings were done in Barcelona (Gutierrez et al., 2016; Aznar et al., 2017; Sans & Domínguez., 2016) , Paris (Heo, et al. 2019) and London (Quattrone et al., 2016) among others. The spatial distribution for Barcelona shows a centre-periphery pattern for both hotels and Airbnb listings, and shows that most of both lodging types are located in the city centre (Gutierrez et al., 2016). However, within the city centre of Barcelona Airbnb listings are more spread out and evenly distributed the hotels are. This shows that Airbnb offers accommodations within neighbourhoods that were up until recently, relatively untouched by the hotel industry (Guttierez et al. 2016; Sans & Domínguez., 2016). The spatial distribution of Airbnb listings and hotels in Paris does yet again have a different pattern. Airbnb listings are more spread out to the outer parts of the city and more present in more densely populated neighbourhoods like the Rive Droite district, in the north of Paris while hotels are more clustered around the Champs Elysées (Heo et al. 2019). Quattrone et al. (2016) discover in London that the closer to the city centre the density of Airbnb listings gets. Furthermore, they argue that tourists will keep going to the city centre for activities and amenities, even though their Airbnb locations have become more spread out over the city. A different case is Los Angeles, here Airbnb listings are, besides the city centre, clustered around the coasts. This is mainly due to the attractiveness of being in the proximity of the ocean and the panoramic views they can offer (Sarkar, 2017). Dudás et al. (2017a) discovered in Budapest that Airbnb density is higher in locations that are attractive to tourists, which is mainly the city centre.

A different approach was taken by Dudás et al. (2017b), who performed a socio-economic analysis in to the spatial patterns of Airbnb in New York. They discovered that Airbnb tend to concentrate around areas where young higher educated people live. Areas with a significant number of housing units and areas surrounding places of interests. A more complete picture of socio-economic patterns of Airbnb listings in the US is offered by Quattrone et al. (2018) who show that in eight major US cities, Airbnb has a high presences in neighbourhoods near the city centre and in neighbourhoods where the creative and talented classes live.

Summarizing, Airbnb listings cluster around the city centre, touristic amenities and neighbourhoods with higher educated young people. Gutiérrez et al. (2016) and Sans & Domínguez (2016) show that

Airbnb is located in other areas than the traditional hotel district. This does not mean that the city centre is relieved of touristic pressure, since the city centre is not just the hotel district but often considered to be bigger. Airbnb listings have spread to other neighbourhoods in the city centre, which means that touristic pressure has spread to other parts of the city centre, rather than completely away from the city centre. Furthermore, Quattrone et al. (2016) argue that guests who book an Airbnb outside the city centre, still do visit the city centre a lot. This shows that despite the different spatial patterns between hotels and Airbnb listings, this does not mean that city centres are relieved from touristic pressure and thus that claims by Airbnb (2018) are true, but rather meaningless.

3.5 Airbnb and the housing market

Concerns about the impact of Airbnb on housing prices has grown in multiple cities around the world. Those concerns are most of the time underlined by the argument that commercial Airbnb hosts take out a share of the housing supply and uses it for the short-term rental segment instead (Barron et al. 2018). This has led to the idea that commercial parties commodify houses. In other words: it transforms houses into accommodations for tourist. This transformation process has accelerated in cities and neighbourhoods where short-term rental has become more profitable than long-term rental. Airbnb accommodates in this process by providing an easy to use tool for finding short-term renters which makes it easy for lenders to find customers (Gant, 2016). This section gives an overview of the literature available on the effects of Airbnb listings on property prices and rent.

Airbnb is often blamed for increases in housing- and rent prices. The idea that an increased presence of Airbnb listings leads to a change in housing prices and availability and rental prices stems from the following reasoning. Those increases occur in two steps (Barron et al., 2018). First there is a decrease in housing supply and an increase in short-term rental units. This happens due to the fact that Airbnb induces landlords to retract their properties from the long-term rental market and reposition them in the short-term rental market. The second step occurs because Airbnb offers home-owners the opportunity to gain addition income by giving them the opportunity to rent out parts of their home, or their entire home when they're not at home themselves. Both steps led to an increase in property value. The two effects cause the price-to-rent ratio to increase, and thus causes that owning a house becomes more attractive than renting a house.

Uneven impacts

In previous sections the spatial distribution of Airbnb listings has been discussed. The spatial distribution of Airbnb listings and the effects on the housing market is something that Wachsmuth and Weisler researched (2018). They argue that there exists a geographically uneven distribution of Airbnb listings in New York. With a big proportion of Airbnb listings located in areas of the city which are culturally desirable and internationally recognizable. The uneven distribution of Airbnb listings causes a rise in property prices in neighbourhoods with a high Airbnb density, while at the same time other neighbourhoods aren't affected by a rise in property/rent price. This causes an increasing rent/property gap between the culturally desirable internationally recognizable neighbourhoods and other neighbourhoods. Next to a uneven geographical distribution there exists an uneven social-demographic distribution of Airbnb hosts. Hosts are often young higher educated people and more often part of the creative/talented class. Which suggests that benefits of Airbnb impact certain social classes more than others (Frenken & Schor, 2017; Dudas et al., 2017b; Quattrone et al., 2018).

One of the examples of empirical research in to Airbnb listings impact on the housing supply in Los Angeles is done by Lee (2016). He argues that there is a simple underlying dynamic which causes that an increase in Airbnb leads to an increase in rental price. He argues that tourists and long-term renters are traditionally non-overlapping population with non-overlapping markets. With mainly hotels for short-term renters and houses/other properties for long-term renting. The entrance of Airbnb in the market has changed those markets in to over-lapping markets competing for the same properties. Lee (2016) argues that Airbnb takes supply away from the long-term market and induces it in the short-term market. He argues that 64% of Airbnb listings in Los Angeles are entire homes and thus that those have been taken out of the regular housing market. Lee (2016) argues that this decrease in supply should led to an increase in rent/property price. Such an increase is visible in New

York City, where an doubling of Airbnb listings is associated with an increase of 6% to11% in house values (Sheppard & Udell, 2016). Similar results are shown for rent by Horn and Merante (2017) in Boston. They found that one standard deviation increase in Airbnb listings results in an increase of asking rents of 0.4%. Yrigov (2016) argued that an increase in Airbnb has led to an increased housing and rent price. This increase in housing and rent price, triggered a mechanism of gentrification and has forced local inhabitants to relocate to other places.

Even though, there is not a lot of empirical work done in to this subject, the results that are published are consistent. The articles that are published with regards to this subject show a picture in which Airbnb does impact the price of houses in a geographically and social uneven way (Lee, 2016; Sheppard & Udell; 2016; Horn & Merante, 2017). The effects of a geographically and socially uneven distribution of Airbnb listings has uneven effects. Economic benefits of Airbnb listings will be clustered in certain places and are mainly clustered in hands of the creative class. On the other side, negative effects will be perceived by people who do not own a house and whose rent might increases due to the presence of Airbnb listings. This may cause a divide between social classes. With on the one side the class that often participate sin hosting Airbnb listings and on the other side social classes that do not. This may be something planners or politicians want to avoid.

Since this section shows that the presence of Airbnb has impacts the property market, it may also impact the hotel market and thus the locations effects on price, which is discussed in the next section.

3.6 The effects of an increasing Airbnb presence on the hotel Industry

Whether Airbnb and the hotel industry are actually different is debatable. If they are entirely different, than it would be likely that they do not compete with each other. This section discusses whether Airbnb listings and hotels compete with each other. As mentioned before, Airbnb has been spread out all over the world. Its presence in cities has increased the supply of accommodations/short term rentals. Besides that Airbnb's value is approximated at a higher level than the value of the largest hotel chains (The Atlas, 2018). The increase of Airbnb activities around the world and the large valuation of the company suggests that Airbnb can compete with the hotel industry or should at least influence the hotel industry. In this section the effects of Airbnb on the hotel industry are discussed, in order to review whether Airbnb competes with the hotel industry and thus review whether Airbnb can be treated as a competitor for the hotel industry.

Guttentag (2015) was one of the first to put an effort in to describing the effects of Airbnb on the traditional hotel industry. Guttentag uses the disruptive innovation theory and mirrors Airbnb to it. The disruptive innovation theory is a theory that describes a process in which a disruptive product enters a market and focusses on being cheaper, more convenient or simpler than the already established products. The disruptive product uses this strategy because it can't compete with the other characteristics of the traditional product. The disruptive theory suggests that the disruptive product initially won't catch a lot of attention, but will gradually improve to a point where they either push out the lower segment of the traditional market or form an entirely new niche market (Christensen et al. 2015).

The growth of Airbnb with an initial slow start and a rapid expansion after a few years is in line with the product expansion process of a disruptive product, described by the disruptive innovation theory. Airbnb is being perceived as cheaper and more convenient, which are characteristics in line with the theory (Guttentag, 2015). It has become clear that Airbnb will have an impact on the short-term rental industry, either be by creating a new niche market or by disrupting the low-end segment. Research showed that only a small percentage of respondents would not have gone to the same place if Airbnb did not exists (Guttentag & Smith, 2017). This suggests that that Airbnb is almost exclusively used as a substitute for existing accommodations, and mainly as substitute for middle- and low segment hotels (Guttentag & Smith, 2017; Frenken & Schor, 2017).

Empirical work by Zervas et al. (2017) and Xie & Kwok (2017) showed that Airbnb has an impact on the hotel industry in Austin, with mainly the low-end segment hotels' revenues being negatively impacted by the presence of Airbnb. A study in Korea shows a different result and argues that Airbnb has no impact on hotel revenue. Although, it should be noted that Airbnb entered the market later in Korea and thus less time has gone by than in earlier mentioned research , which might be the reason that no impact has been made yet (Choi et al. 2015). Another case-study was done in Barcelona by Aznar et al. (2017). Their results show that there is a correlation between the presence of Airbnb and the revenue of hotels. A possible cause is that Airbnb apartments are often located in attractive areas within the inner city (Ključnikov et al. 2018; Guttierez et al. 2016; Sans & Quaglieri Domínguez, 2016). Summarizing, literature leans towards the side in which Airbnb has an impact on the hotel industry. Recent research by Dogru et al. (2019) underlines this conclusion.

Earlier mentioned research has mainly focused on the impacts of Airbnb on the revenues of the traditional hotel/accommodation industry. However, Airbnb is likely to have impact on more than only revenue. Fang et al. (2016) for example try to evaluate the impact of Airbnb on the employment

of the local tourism industry. Fang et al. (2016) argue that the entry of Airbnb is likely to have two effects. Firstly an increase in employment in the tourists sector due to an increase in tourists coming to an area. Secondly, they argue that there will be a negative impact on employment as soon as Airbnb starts to compete with the low-end hotel segment as mentioned earlier. Neeser et al. (2015) found that Airbnb competes with the traditional hotel industry, but did not found that revenue was affected by the entrance of Airbnb in the Nordic countries. The result they found was a reduction in average room price, which again suggests that Airbnb competes with the traditional hotel industry.

The earlier mentioned research suggests that Airbnb does barely create a parallel- or niche market and in most cases competes with the low and middle segment of hotels, which would mean that Airbnb is a disruptive innovation. To the contrary, Guttentag & Smith (2017) argue that Airbnb does not entirely fit the description of a disruptive innovation because Airbnb is by it guests perceived as superior product, rather than solely being chosen because of price/convenience. Even though, Airbnb can't compete with hotels on areas like service, cleanness and amenities. Regardless of whether Airbnb does fit the definition of being a disruptive innovation, Airbnb does compete with the hotel industry. Concluding, arguing that Airbnb and hotels are entirely different is disputable, since they do compete with each other and since Airbnb did not create a parallel market.

3.7 Regulating Airbnb

The perceived and actual effects of Airbnb, on for example the housing market, have sparked a discussion about the regulation of Airbnb and made Airbnb a hot topic (Nieuwland & van Melik, 2018). Arguments in favour of regulation of Airbnb vary from wanting to counter tax evasion to protecting the hotel industry (Nieuwsuur, 2018; NOS, 2018). The main argument in favour of regulating Airbnb is the idea that regulations will help with countering the earlier mentioned effects on the housing market, namely a drop in housing supply and an increase in rent/property price. Furthermore, regulation may ensure the availability of affordable housing.

There are different ways to regulate Airbnb (Nieuwkerk and Van Melik, 2018). First off all the laissez-faire approach in which there is no government control. Secondly, limitation of the amount of Airbnb listings and at last the full prohibition of Airbnb. The second option can be split into different aspects. First of all quantitative restrictions, which include restrictions on the amount of days an owner is allowed to rent out its property. Secondly, there are locational restrictions, which might help to get Airbnb listings out of specific neighbourhoods. Density restriction is the third option, this option allows governments/cities to limit the amount of Airbnb listings in neighbourhoods. The fourth option is a qualitative restriction, this might include a ban on certain kinds of listings. An example of this is the partial ban on entire homes to be listed as Airbnb in New York (Klučnikov et al. 2018).

On 25 September of 2018 a letter to the Dutch parliament was written by Minister Ollongren (2018) about the future regulation policies, with regards to short-term touristic rentals. She proposed a mandatory registration in order to prevent illegal listings. Even though Airbnb claims that the majority of Airbnb listings are legal (Airbnb Citizen, 2018), there are still hosts who are not paying tourist taxes (Nieuwsuur, 2018). The Netherlands is not the first country with mandatory registration. In San Francisco, USA a similar policy led to a decrease in Airbnb listings of fifty percent and in Japan a similar policy led to an eighty percent decrease (Sfchronicle, 2018; Nikkei, 2018). The main motive for implementing a mandatory registration, is the motive that it gives governments a tool to counter tax evasion. Another way of regulating Airbnb is by limiting the amount of days a property is allowed to be offered for rent during a year. However, the limit can differs from city to city. An overview of limits set in different cities are shown in table 1 (Ključnikov et al. 2018).

Table 1: Regulation of Airbnb listings

Max. days a property can be rented out	Cities
28 days	Toronto
30 days	Portland
60 days	Amsterdam & San Francisco.
90 days	Berlin, London, Reykjavik, New Orleans & Philadelphia.
120 days	Paris
180 days	Miami & Los Angeles
Full prohibition of entire homes/apartments	Las Vegas, Orlando & Washington DC

As shown above, regulating Airbnb can be done in different ways and quantities. Policies should aim at dealing with the externalities caused by Airbnb and aim at using the opportunities Airbnb offers without causing unwanted externalities (Quattrone et al., 2016). A way to do this is by making a

distinction between commercial and non-commercial hosts and by having neighbourhood level policies based on what is needed in the specific neighbourhoods (Klučnikov et al., 2018; Wegmann & Jiao, 2017). The increased interest of regulating Airbnb shows that governments start treating Airbnb as a commercial organization, which should have similar rules as the hotel industry.

3.8 Factors influencing accommodation prices

In the previous sections it was underlined that Airbnb can be treated as an commercial organization and is in a lot of aspects similar to the hotel industry. In order to answer the main question of this thesis, it is useful to assess factors influencing property and hotel prices. According to Papatheodorou et al. (2016) hotel and lodging prices are a function of hotel specific attributes as well as environmental attributes. Research about price determinants, or factors influencing the price, of the hotel industry has been done extensively (Zhang et al. 2011; Soler & Gemar, 2018). Research about price determinants of Airbnb is not as widely available as research in to price determinants of hotels. This means that in order to identify possible factors, which might influence the price of Airbnb listings, literature about price determinants of hotels and are being discussed. This is not likely to be a problem since Airbnb Listings and hotels do have a lot of similarities, as mentioned earlier. First of all, price determinants with regards to location are being discussed, after which accommodation specific characteristics are being discussed.

3.8.1 Location effects influencing the price of hotels

Price determinants for the lodging industry can be split in to two groups. First of all the accommodation specific attributes and secondly, the location factors. Accommodation specific attributes entail things like the availability of amenities and services. Location factors are attributes specific to a location which influence the price of hotels. The importance of location is highlighted by the fact that a convenient hotel location, meaning a location close to touristic amenities and transport facilities, is one of the most important factors for tourists when choosing a hotel. Price is the most important factor (Chan & Wong, 2006; Zhang et al. 2011; Li et al. 2015). Another factor that influences the price of hotels is the is the amount of time tourists are willing to spend traveling from their hotel towards touristic attractions. Research from Arbel and Pizman (1977) showed that people are willing to travel 15 to 20 minutes without having a compensation of room rate. They argue that the availability of public transport is sufficient, and no private transport is needed. Thus, public transport availability and being in the proximity of touristic amenities are important price factors. The importance of location and being in the proximity of touristic amenities is underlined by the fact that smaller hotels cluster around bigger high-end hotels. This happens because of the availability of complementary amenities around those high-end hotels (Enz et al. 2008; Urtasun & Gutiérrez, 2006).

An overview of literature with regards to both location- and site-specific attributes is given by Zhang et al. (2011). Zhang et al. (2011) show a range of literature which entails information about location factors that influence either room rate or price for the hotel industry. Examples of research mentioned is from Bull (1994), which revealed that room rates decrease with an increasing distance to the town centre. Which is likely due to the earlier mentioned maximum time tourists are willing to travel to touristic amenities. Espinet et al. (2003) show that distance to the beach and town are important price determinants. Distance to the central station/nearest transport hub (Thrane, 2007; Zhang et al. 2011) and distance to first scenic view or landscape (Wind et al. 1989) are other situation factors affecting the price of hotel rates. Another more recent overview of literature is given by Soler and Gemar (2018). They identify a lot of the same factors. Such as the distance to the nearest city centre (Monty & Skidmore, 2003; Aguilo et al., 2003; Schamel, 2012; Soler & Gemar, 2016), distance to Airports or Central business districts (Lee and Jang, 2011) and the sistance to a railway station (Abrate et al. 2011).

3.8.2 Hotel specific attributes

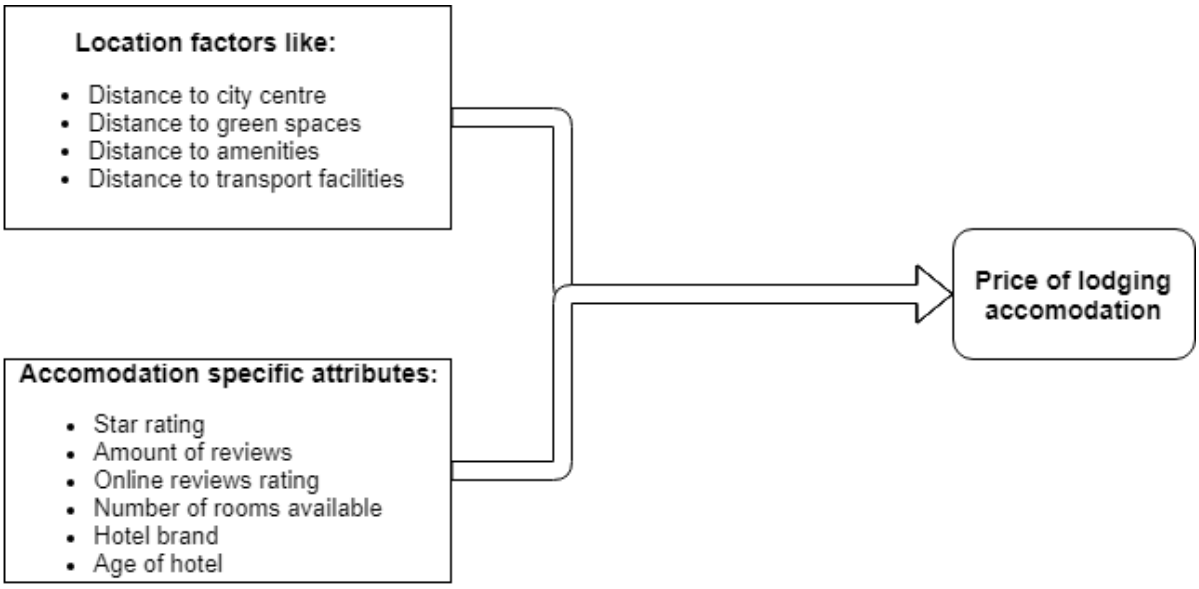
Next to location specific attributes, there are accommodation specific attributes. Research in to price determinants with regards to hotel specific attributes showed that there are multiple factors influencing the price of a hotel. One of the most obvious factors influencing the price is the star rating (Zhang et al. 2011; Schamel, 2012). With the internet a new form of rating has emerged, namely consumer ratings (Wang & Nicolau, 2017; Yang et al. 2016). Even though online ratings have some issues, 70 % of the consumers report that they trusts online reviews (Zervas et al. 2015). This suggests that even though there are issues with the rating systems, a high rating could cause a consumer to book a room and thus a higher price. Research in to consumer ratings has shown that a better consumer rating means a higher price (Schamel, 2012; Yang et al., 2016). However, Airbnb does have a specific kind of review system where instead of anonymous reviews, reviews are written via a personal account. Airbnb has a feedback system for the reviewers, in which the host can react to the reviews. Zervas et al. (2015) already noted that average ratings for Airbnb listings where significantly higher than ratings for TripAdvisor, which is a site similar to booking.com. Pitt et al. (2018) proposed that Airbnb's review system might be one the reasons for the difference in rating. They argue that due to the feedback system, bias may occur. Another reason they propose is the fact the lack of anonymity influences the guests to be more civil and positive (Pitt et al. 2018).

Concluding, earlier literature showed a positive relation between consumer ratings and the price of hotels. Airbnb has a different rating system, which might cause this effect not to occur for Airbnb, or to occur in other proportions. Other factors influencing the price positively are affiliation with a well-known hotel brand (Thrane, 2007) and the age of the hotel (Zhang et al. 2011). A negative relation is observed between the number of rooms and the price (Thrane, 2007).

This section has led to the following conceptual model, which shows the location factors and the accommodation specific attributes that influence the price of the lodging accommodation.

3.9 Conceptual model

Figure 1: Conceptual model of factors influencing the price of lodging accommodations.



3.10 Concluding remarks.

As mentioned in the first section of the theoretic framework, Airbnb has a philanthropic and progressive mission, with a focus on inclusive and sustainable travel and likes to promote itself as part of the sharing economy (Airbnb, 2018a). However, the other sections of the theoretic framework show a different image. Whether Airbnb is actually part of the sharing economy is disputable and depends on what definition is used for the sharing economy. Apart from all issues with the definition of the sharing economy, it is a fact that Airbnb is often used in a commercial way. In cities like Amsterdam, Barcelona and Prague a big part of the listings on Airbnb are owned by people who have multiple listings, which suggests that they are commercial hosts rather than the struggling inhabitants who try to earn a little bit of extra money to cover their rent bill, as Airbnb likes to promote. This leads to problems with over-touristification and increasing property prices.

Literature in to motives for tourist to choose Airbnb's or hotels, show that there are similarities between people who use Airbnb and people who use the traditional lodging industry. The motives for choosing an Airbnb extend further than just wanting an local and authentic travel experience and are besides this rather similar to the motives of hotel customers. This shows that Airbnb and hotel customers do not differ that much. With regards to the spatial distribution of Airbnb and hotels there are some differences, but those are not as big as Airbnb tries to promote and are rather meaningless since tourists are still mainly present in touristic areas in the city centre. Another section of the theoretic framework is about the effects on the housing market and on the hotel industry. Previous research shows that Airbnb competes with hotels and has an impact on the property prices of houses. This conclusion might give governments an incentive to regulate and treat Airbnb as a commercial lodging organization, which has been done more and more over the past years.

Thus the philanthropic image Airbnb tries to sketch is not entirely accurate and it is evident that Airbnb has a commercial aspect to it. Other differences Airbnb likes to promote, like the difference in travel motives and spatial distribution, turn out to be not that big. Thus suggesting that Airbnb and the hotel accommodation do not differ that much. The spatial distribution between Airbnb listings and hotels is one of the areas where there is a difference. This research tries to contribute to the question whether Airbnb and the hotel industry are different by comparing whether location effects impact the price of rooms differently between the two accommodation types. In order to identify factors which might influence the room price of Airbnb listings and hotels a small literature review was done in to factors influencing hotel prices, which can be found in the previous part of the theoretic framework and conceptual model. This led to the following hypothesis:

H1. The location factors mentioned in the conceptual model influence the price of hotels and Airbnb in a similar way/to a similar extend.

4. Methods

The main question of this research regards whether there are differences in location factors influencing the price of hotels or Airbnb listings. The data gathered and the methods used to analyse the data are chosen in order to identify the variables that influence the price and in order to identify to what extend they influence the price. This sections focusses on explaining what and why was used to answer the main question of this research.

4.1 Data

In order to answer the main question of this thesis, multiple datasets had to be collected. First of all data with regards to Airbnb listings. Airbnb data was obtained with the use of websites as InsideAirbnb and TomSlee, which are both non-commercial entities. InsideAirbnb and TomSlee both gather data with regards to Airbnb using web scraping tools (InsideAirbnb, 2018. & Tomslee, 2018). This information was scraped from the web on a weekday in October 2018. Due to the fact that non-bookable hotel rooms were not shown on booking.com, a few hotels might not have been included in the data set.

The datasets provided by those sites aren't as extensive as the datasets from AirDNA (TomSlee, 2018). However, they are free and that's the main reason these dataset were chosen over the ones from AirDNA. A recommendation for further research, with sufficient funds, would be to use the datasets of AirDNA since these provide more variables and information and thus a higher degree of explained variance is likely to be obtained using these datasets. Another reason to choose for AirDNA would be that the data is more up to date. The dataset from Tomslee.net is dated on May 2017, while the data obtained from InsideAirbnb is dated on October 2018. Another issue with the Airbnb data was the presence of outliers. Even though these listings exists and do rent their homes for excessively high prices (with the highest being 6000€ a day), they have been removed out of the model because they are likely to skew the results. Another minor limitation of the datasets is the fact that the coordinates are educated guesses based on the map provided on the website of Airbnb. Thus their might be slight differences between the actual location and the coordinates given in the datasets (InsideAirbnb, 2018). Even though the data is not perfect, this thesis still managed to identify a number of location factors influencing the price of hotels/Airbnb listings as discussed in the conceptual framework. This shows that the methods used are sufficient to find factors which influence the price of hotels/Airbnb listings.

Data gathered for hotels was obtained using the web scraping tool Octoparse. This is a tool that helps extract data from the internet. Booking.com was used as data-source for hotels. In order to identify the location of the hotels, coordinates of the hotels where added using www.overpass-turbo.eu, which is a website that extracts data from Open Street Map. Coordinates with regards to the location of eateries, parks and supermarkets were also extracted from Open Street Map. The locations of public transport were added from ArcGis online using the dataset: Haltes in Nederland (Maart 2018), which is a dataset provided by the Geodienst of the University of Groningen.

The distance variables are gathered using ArcMap. Individual data points were created in ArcMap by displaying the coordinates of Airbnb listings/hotels and for all the location variables (Parks, City centre, Transport hubs, public transport stop, supermarkets and eateries). Distances between Airbnb listings and hotels on the one side, and the earlier mentioned location variables on the other side,

were measured using the near tool in ArcMap. This tool measures the straight-line distance between two points. This is an easy and convenient tool to measure distances at bird's flight for a large number of cases at once.

4.2 Variables:

The conceptual framework of this research has led to an overview of variables that influence the price of accommodations. An overview of the data sources and the tools used to gather the data are shown in table 3

Table 2: Variable overview HPM

Variables	How was the data obtained/data source?	Control/Location factor/ dependent
Prijs in €– Airbnb listings	TomSlee.net/InsideAirbnb.com	Dependent variable model 1
Prijs in € – Hotel accommodation	Booking.com	Dependent variable model 2
Roomtype (1= entire home/apartment 2=Shared room 3 = private room)	Tomslee.net/InsideAirbnb.com/Booking.com	Control variable model 1
Amount of Reviews	Tomslee.net/InsideAirbnb.com/Booking.com	Control both models
Review Score (1-10 scale)	Tomslee.net/InsideAirbnb.com/Booking.com	Control both models
Stars	Booking.com	Control variables model 2
Distance in meters to City centre	Near tool ArcMap	Location factor
Distance in meters to Restaurants	Near tool ArcMap	Location factor
Distance in meters to Airport	Near tool ArcMap	Location factor
Distance in meters to central station	Near tool ArcMap	Location factor
Distance in meters to parks	Near tool ArcMap	Location factor
Distance in meters to public transport stop	Near tool ArcMap	Location factor
Distance in meters to supermarkets	Near tool ArcMap	Location factor

4.3 What models were used?

In previous research in to price determinants, regression models were used to identify factors influencing the room rate of hotels (Abrate et al. 2011; Gibbs et al. 2018; Zhang et al. 2011). These models are often referred to as hedonic price models. Hedonic price models estimate the impact of product differentiation on price levels (Rosen, 1974). For the accommodation industry product differentiation can be explained as differences in services and facilities. Another difference between accommodations is their location and the distance to certain amenities and places. Abrate et al.

(2011) argue that hedonic price models have the potential to quantify the effect of each factor on price proposals, and by doing that, isolate the impact of the price determinants. Furthermore, hedonic price models assume that the price of a product is a linear function of a bundle of items. The idea behind hedonic price models for the accommodation industry is that room price is linked to the availability or absence of certain hotel/location items or attributes. This availability or absence of attributes will influence the willingness of customers to pay for the hotel room and thus will influence the price (Zhang et al. 2011). Concluding, a hedonic price model is used as a model to measure the impact of location effects on the hotel industry. The models fits well within this thesis, but there are some limitations to the hedonic price method. Most hedonic price models suffer from some sort of misspecification, which is most likely caused by the linearity assumption (Chin & Chau, 2003; Andersson, 2000). Another limitation is that the model offers limited guidelines on what variables to include (Chin & Chau, 2003; Andersson, 2000). However, existing literature about location factors for the hotel industry does give a guideline in to what variables to use, which makes this limitation neglectable.

5.1 Results – Visual overview of the spatial distribution

This thesis focusses on price determinants for hotels/Airbnb listings with regards to location. An visual overview of the spatial distribution of Airbnb listings and hotels is provided in Map 1 and Map 2 in the appendix. This has been done in order to get a first hint of what factors might be important. GIS software was used to constitute a comprised overview of the spatial distribution. This was done by adding point polygons for hotels and by adding a density colour scheme for Airbnb listings. The location of Airbnb listings was derived using coordinates. The Coordinates of Airbnb listings were provided in the earlier mentioned data sets and are estimations of their actual location. This might cause a slightly off measurement. However, this is unavoidable since actual address information is not provided. Other researchers have used similar datasets and methods and this has not caused troubles. Coordinates from the earlier mentioned location variables were extracted from Google Maps and Open Street Map. The data set contains a big amount of Airbnb listings and hotels, which causes that a visual presentation of those cases would look like a sea of points. This would cause the underlying map and other location to be barely visible. That's why a point density was done for all Airbnb listings and hotels were chosen to be visualized by points. This way the difference in spatial distribution between hotels and Airbnb listings is visible.

5.1.1 Interesting points about the spatial distribution

As you can see map 1 (See appendix), the spatial distribution of Airbnb and hotels differs slightly. Map one shows the Airbnb density for Amsterdam. The biggest density of Airbnb listings are located in a ring around the city centre, rather than in the city centre. Another neighbourhood where a lot of Airbnb listings are located is above the Vondelpark in the Oud-West part of Amsterdam. Hotels on the other side are more located within the city centre, near the dam-square and near the Rijksmuseum and van Gogh museum. In map 2 the spatial distribution for Groningen is visualized. Groningen has less Airbnb listings (700+) and hotels (20). However, a different spatial distribution is still visible in map two (See Appendix). Hotels are mainly located in the city centre and especially around the Zuiderdiep. Airbnb listings on the other hand have a bigger presence in the whole city, with the biggest density in the city centre. Another place with a lot of Airbnb listings is around the Noorderplantsoen park. Concluding from these two figures, hotels are mostly located within the city centre and do not have a larger presence in neighbourhoods outside the city centre. Airbnb listings on the other side have a different spatial distribution with a lot of Airbnb listings in a ring around the city centre (for Amsterdam) and for Groningen within the city centre and around the Noorderplantsoen park.

5.1.2 Possible reasons for the spatial distributions

The big Airbnb presence in the Oud-West neighbourhood, above the Vondelpark, in Amsterdam, can be explained by the fact that Oud-West is a relatively cosmopolitan area of the city with a lot of people who can be identified as being part of the creative class, which Quattrone et al. (2018) identified as a population which is more likely to participate in renting out their property. The ring around the city centre in Amsterdam might be explained by the fact that there are relatively more housing units outside the city centre than inside the city centre. Dudás et al. (2017b) showed that in New York a lot of Airbnb listings where located in neighbourhoods with a lot of housing units, rather than in areas where hotels, restaurants, museums and other amenities occupy a lot of space. Which is the case in the city centre of Amsterdam. A similar pattern is visible in Barcelona, where Airbnb listings aren't located a lot in the hotel district (The Ramblas). Instead, Airbnb listings are located in

other parts in and near the city centre with a lot of housing units(Gutiérrez et al., 2016; Sans & Domínguez. 2016). This explains the spatial pattern of Airbnb listings in Amsterdam. Groningen has a slightly different spatial distribution with a centre-periphery pattern, together with a high density spot located near the Noorderplantsoen. The Noorderplantsoen is known as a location in high demand, just like the Oud-West neighbourhood in Amsterdam above the Vondelpark. The fact that there are a lot of Airbnb listings located around those two parks suggest that Parks are important price determinants for Airbnb in these cities, as is mentioned earlier in the theoretic framework (Wind et al. 1989).

5.2 Results – Hedonic price model

In this section the results of the regression models will be discussed. In order to make a distinction between location factors hotels and Airbnb, two different regression models where made. This led to one regression with 16000+ Airbnb cases and another one with the Airbnb and with 209 hotels included. This is a big difference in the amount of observations. However, Airbnb listings have in general less rooms, whereas hotels rent out multiple rooms at once. The price in the model for hotels is the price for a one-person private room for one day. This section will start with elaborating on model 1, followed by elaborating on model 2, after which the differences between the estimations in both models are being discussed. The results of the regressions are summarized in table 3, in the appendix. The full models are shown in picture 1 and 2 in the appendix.

5.2.1 Model 1 – Airbnb listings

The model for Airbnb listings is significant and has a explained variance (R^2) of 0.1449 or 14.49%, with an adjusted R^2 of 14.43%. Thus the variables included in the model only explain a small (14.49%) part of the variance in the dependent variable (Price). With regards to Airbnb listings there are three types of listings categorized in the data set. Those are entire homes/apartments, private rooms and shared rooms. The regression model in table 3 shows that Private rooms are significantly less expensive than Entire homes/apartments, both on a 0.05 and 0.01 significance level. There is no significant difference between Private rooms and Shared rooms. The amount of reviews has a non-significant positive effects on the price of Airbnb listings. However, the review score does have a significant effect and affects the price positively. Thus a higher rating means a higher price and via versa. With regards to the distance variables, there are some significant and some insignificant effects. The distance to restaurants/eateries, distance to supermarkets, Distance to parks and the nearest regular public transport stop (Not CS/Airport) are insignificant variables. Significant location effects are distance to city centre (negatively related), Distance to central station (positively related), Distance to Airport (Positively related).

5.2.2 Model 2 – Hotels

The model for hotels is significant and has a explained variance R^2 of 0.7311 or 73.11%, with an adjusted R^2 of 0.7131. Thus the variables included in the model only explain a large part (71.31%) of the variance in the dependent variable (Price). With regards to star category a 2-star hotel does not have a significantly different price than a 1-star hotel. However, a 2-star hotel has a significantly different price than a 3-star hotel, a 4-star hotel and a 5-star hotel. The results show an obvious and significant increase in price when star rating improve. The model shows that the amount of online consumer reviews has a significant negative effect on price on a 0.05 significance level, but not on a 0.01 significance level. This would either suggests that a bigger amount of reviews leads to a lower price, or that hotels with a lower price receive more online reviews. The average review score on the other side has a significant (on all levels) positive effect with a big coefficient (11.48589), which suggests that the average consumer rating is an important factor explaining or influencing the price of hotels. With regards to the distance effects distance to nearest eatery/restaurants, distance to nearest supermarket, distance to parks and distance to nearest public transport stop are all insignificant variables. Distance to city centre (negative), distance to the central station (positive) and distance to airport (positive) are all significant variables on all levels.

5.3.3 Differences between the models

The first difference between the models is the explained variance. The R^2 for the Airbnb model is quiet low, where the R^2 for the model for hotels is quiet high. This might be caused by difference in the amount of cases used in both models. The difference in R^2 makes the models hard to compare, since there might be variables not included in the Airbnb model that might change the coefficients and significance of the included variables. This might also be one of the reasons that certain results are not in line with what literature suggests. Another reasons for the difference in explained variance is the fact that star-rating explains a big part of the differences in room rate between hotels, while there does not exists a similar rating for Airbnb listings. The consumer review score was added as variable in order to try to reduce this gap between the models, but apparently this does not explain as much variance as the star-rating does for hotels. The review rating shows a significant effect for both accommodation types, but the coefficient is a lot higher for hotels than for Airbnb listings. This might be because of the biases the Airbnb review system introduces, as is explained in the theoretic framework. Furthermore, the amount of reviews shows no significant effect on the price of Airbnb listings, but shows a significant (on a 0.05 level) effect for hotels.

With regards to distance variables there are some differences and similarities. In both models the distance to restaurants/eateries is insignificant and thus does not seem to influence the price. Just like being close to a public transport stop, other than the central station, and being close to a supermarket. The distance to parks is insignificant in both model. This suggests that being close to green spaces does not influence the price of hotels or Airbnb listings, even though literature suggests that being close to greenspaces has an effect on the room rates.

Similarities in the effect of distance variables can be found in the distance to the city centre, for both models the distance to city centre is negatively related to the price and significant on all significant levels. However, the coefficient for hotels is bigger than the coefficient for Airbnb listings. Which suggests that location near the city centre is more important for hotels than for Airbnb listings. Another similarity is the variable Distance to Airport. The variable is in both models significant and positively related to the price, meaning that an increase in distance to the airport increases the price of hotels and Airbnb listings. This is also the case for the distance to the cities central station. A reflection on the relevance of the results can be found in the last section of this thesis.

6. Conclusion

This thesis tries to contribute to the debate about whether Airbnb listings and hotels are entirely different or can be compared and treated as similar products. This might give governments an incentive or a justification to regulate Airbnb in a similar way as the traditional lodging industry is regulated. The theoretic framework of this thesis showed that there are a lot of areas in which Airbnb and the traditional lodging industry are similar, but there are also differences. Research in to motives of travellers to choose Airbnb listings over hotels, identified mainly budget as a reason to choose a certain accommodation (Brochado et al. 2017; Varma et al. 2016; Guttentag, 2013; Gunter & Önder, 2018). The authentic and local travel experience Airbnb tries to promote is a smaller part of the reason to choose an Airbnb (Guttentag, 2018). Overall, based on their motives, travellers who choose Airbnb do not differ that much from travellers who choose a hotel. Earlier research in to the spatial distribution of Airbnb showed that the spatial distribution of hotels and Airbnb listings differs. Both industries often have a centre-periphery distribution (Gutierrez et al., 2016). However, Airbnb listings are more spread out over the city and are more present in neighbourhoods. Concluding, with regards to the spatial distribution of both industries, there are similarities but also differences.

Another debate about Airbnb regards whether Airbnb does compete with the traditional hotel industry and is considered a disruptive innovation or not (Guttentag & Smith, 2017). It is quite clear that Airbnb does compete with the hotel industry, and especially the lower- and middle segment of hotels (Fang et al. 2016). Recent research concluded that Airbnb starts to compete with all hotel segments (Dogru et al. 2019). With regards to another debate about the sharing economy, research showed that it is disputable whether Airbnb is part of the sharing economy. Furthermore, research showed that there are commercial aspects to Airbnb, with commercial parties using the platform to rent out their properties (Ključnikov, 2018; Oskam & Boswijk, 2016). The commercial aspects would make them comparable to hotels. The section about regulation in the theoretic framework also showed that governments are treating Airbnb more and more as a commercial organization and are trying to regulate the platform. They do this in order to counter the perceived negative effects of Airbnb and a possible rise in property value. The idea that Airbnb can be treated as a commercial organization, the different spatial distribution and the ongoing debate about whether Airbnb and the traditional hotel are different led to the main question of this thesis: *To what extend is there a difference in the way location plays a role in constituting the price of Airbnb listings and hotel rooms?*

Results

The spatial distribution of Groningen has a clear centre-periphery distribution, with a Airbnb density hub around the Noorderplantsoen, which suggests that the city centre and parks are important price determinants (see appendix map 2). The spatial distribution of Amsterdam shows a big Airbnb density at the border of the city centre and above the Vondelpark. Again, suggesting that parks are important price determinants (see appendix map 1). Hotels are in both cities mostly located in the city centre.

The results of the regression show that there are more similarities than differences with regards to the price determinants. The distance to parks in for both Airbnb listings and hotels insignificant, just like the distance to eateries/restaurants, public transport and supermarkets. This is not in line with what literature tells. Wind et al. (1989) showed that distance to nearest scenery/green space is a price determinant for hotels, which is not what the output of model 1 and 2 show. This might be

caused by the fact that all parks were included, thus small and unknown parks were included as well. Different results might arise when only the Vondelpark and the Noorderplantsoen were included. With regards to the variables distance to eateries/restaurants and the distance to supermarkets, Enz et al. (2008) and Urtasun & Gutiérrez (2006) argued that hotels cluster around places with certain amenities, suggesting that amenities like restaurants and supermarkets are factors that influence the price and the location of choice. However, the model shows that those variables are insignificant. There can be various reasons this. With regards to the variable eateries/restaurants, all eateries were included. This causes that there is always an eatery within a small distance to the Airbnb listing, and might skew the variable in to insignificance. Further research could split the variable in to high-end restaurants and other eateries, like kebab shops and fast-food chains.

The distance to the city centre is significant and negatively related with the price. This is in line with what literature concluded (Bull, 1994, Monty & Skidmore, 2003; Aguilo et al., 2003; Schamel, 2012; Soler & Gemar, 2016). The distance to the CS & distance to Airports are significant and positive, meaning that a bigger distance means a higher price and via versa. This is not in line with literature (Thrane, 2007; Zhang et al. 2011). This might be caused by the fact that the Airports are located outside the city, in another municipality. Hotels/Airbnb listings in the same municipalities as the Airport might show different results.

Concluding remarks

Summarizing, the signs and significance do not differ that much for location effects. The coefficient of the distance variables differ only slightly between Airbnb listings and hotels. However, these differences are small and it is not clear whether these differences are significant. With regards to location effects there are no big differences between hotels and Airbnb listings. The biggest differences in price determinants can be found in non-location specific attributes like the review score and the amount of reviews. Those differences might be caused by the different rating systems of Airbnb.com and Booking.com. Another big part of the variance is explained by the star rating for hotels, and the room type for Airbnb listings.

Concluding, the models show that the location related price determinants for hotels and Airbnb listings barely differ. Thus, location seems to play a similar role in constituting the price of Airbnb listings and Hotels. Which can be seen as an answer to the main question of this thesis. The hypothesis in the theoretic framework thus can't be rejected. The results of the models shows that the difference in spatial distribution between hotels and Airbnb listings, is not that relevant when constituting price determinants. And thus that hotels and Airbnb listings do not differ that much on location based price determinants. This obviously does not answer the whole question regarding whether Airbnb listings and hotels are similar or different, but it does contribute to the discussion by showing that location plays a similar role in constituting the price of both Airbnb listings and hotels. And may partly give an incentive or a justification for governments to regulate Airbnb listings like hotels. Nevertheless, there are some cons and limitations to this research, which will be explained in the reflection part of the thesis.

7.1 Reflection

When reflection on the results it is important to keep in mind the limitations/con's earlier mentioned in the methods section. The low amount of variables in the data sets from Tomslee.net/InsideAirbnb is a cause of the low R^2 in the first model. Another issue with the hedonic price models is the fact that most models do have some sort of misspecification, which might also cause a lower R^2 (Chin & Chau, 2003; Andersson, 2000). The low R^2 and the absence of some important variables, like for example property price or the m^2 of Airbnb listings, might cause some variables to be different than they would've been if these variables were included. This might be one of the reasons that not all results are in line with literature mentioned in the theoretic framework. Another issue with the Airbnb data was the presence of outliers. Even though these listings exists and do rent their homes for excessively high prices (with the highest being 6000€ a day), they have been removed out of the model because they are likely to skew the results. For both Airbnb listings and hotels, the distance to Airport variable might be skewed due to the fact that the Airports are in different municipalities, and by the fact that there are no hotels/Airbnb listings included in the dataset located in those municipalities. Another issue regards omitted variable bias. Important variables like the amount of rooms in Airbnb listings or the M^2 of the Airbnb listings, are not included in the model.

Concluding, there are some limitations, which might be caused by nature of hedonic price models, the small data set or omitted variable bias. This might be one of the reasons that there are some differences and similarities between what literature suggests and the outcomes of the models. Another reason for the differences with the existing literature might be caused by the fact that the R^2 of the models differs a lot.

7.2. Recommendations for further research

The first and most obvious recommendation for further research would be to use another more complete data set. This will be useful in order to get two models with a similar explanatory value. Another recommendation with regards to the data is to split the restaurant data in to more categories. The data used in this thesis consists out of all sort of eateries, from the local bakery and kebab shop to high end restaurants. This might be a cause for the fact that the model shows the distance variable for restaurants/eateries as highly insignificant. A similar suggestion can be made with regards to parks. As shown in map 1 and map 2, there are clusters of Airbnb listings above the Vondelpark and around the Noorderplantsoen area. However, the distance variable for parks shows insignificant effects. This might be caused by the fact that all parks in the city were taken in to account. This could skew the variable in to insignificance since other parks might be too small or unknown to have a price effect. A suggestion could be to identify the main parks and check whether distance to either one of those does have a significant price effect.

Another recommendation regards the difference in distribution pattern of Airbnb listings/hotel in Amsterdam and Groningen. The cities have a different spatial pattern, with a clear centre-periphery pattern in Groningen. This centre-periphery pattern in Amsterdam is less present, with a big density of Airbnb listings in a ring around the city centre and above the Vondelpark. It might be interesting to see what this difference in spatial distribution means for the location variables. A comparison between Amsterdam and Groningen also sketches an image, showing the differences between an

perceived over-touristified city and a city with a relatively low Airbnb presence. A comparison between an over-touristified city and less touristified cities was part of the initial research objectives. However data limitations caused this not to succeed. A suggestion for further research with sufficient funds and less data limitation would be to check whether different spatial distribution cause different location effects to be significantly different between cities.

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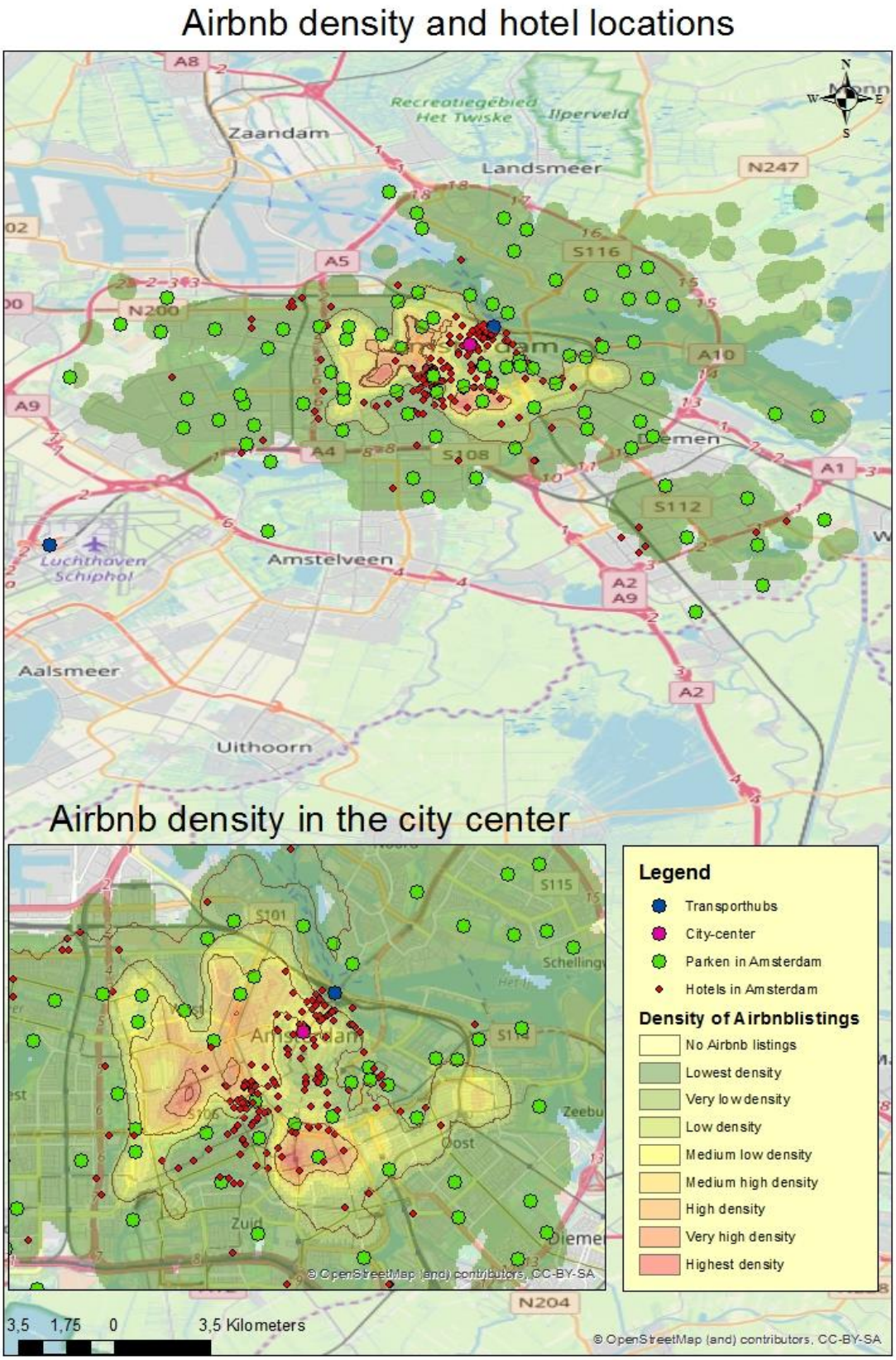
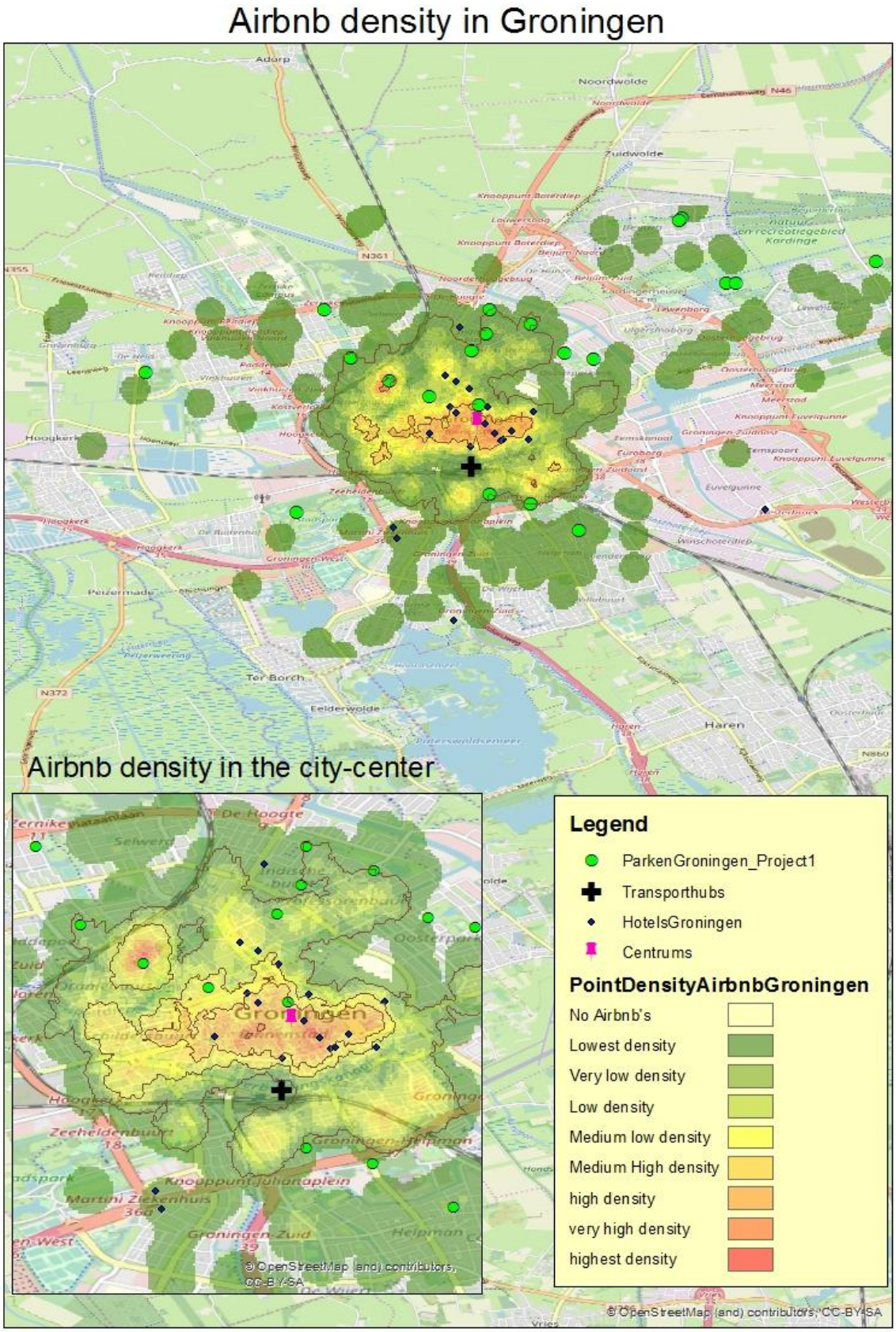
9. Appendix:

*Table 3: Models for Airbnb listings and Hotels. * = 0.1 significance level. ** = 0.05 significance level. *** = 0.01 significance level.*

Model 1 (Airbnb listings)				**Model 2 (Hotels)**		
Variable	Category	Coefficient	Std Error	Category	Coefficient	Std. Error
Roomtype (Private Rooms)/Star rating (2-star-hotel)	Entire home/ apartment	68.80555	1.409577 ***	1-Star-Hotel	5.16816	7.54987
	Shared room	-3.931462	9.216664	3-Star-hotel	15.14335	4.853165***
				4-star-hotel	46.94039	5.989322***
				5-star-hotel	135.7043	8.75921***
AmountOf		0.0177402	0.166687		-0.0022129	0.0010531**
Review_sco		0.4423154	0.1534976 ***		11.48589	2.6127***
Near_Distance_Parks_Meters		0.0006932	0.0021703		0.0033161	0.0035106
NEAR_DIST_Restaurants		0.0004245	0.0027346		-0.0015504	0.0122675
NEAR_DIST_Centrum		-0.0129723	0.0019041 ***		-0.0224604	0.0051258***
NEAR_DIST_CS		0.0140922	0.0019097 ***		0.0176816	0.004777***
NEAR_DIST_Airport		0.0029034	0.0004219 ***		0.0062092	0.0013003***
Near_Distance_OVHalte		-0.0022039	0.0056317		-0.0019709	0.0212671
Near Distance supermarkets		0.0001913	0.0019565		0.0033161	0.0035106
Constante		56.32113	5.756237 ***		-83.60552	26.38981***
Prob > F		< 0.00005			< 0.00005	
R^2		0.1449			0.7311	
Adjusted R^2		0.1443			0.7131	
Obs		16088			209	



Map 1: Visual representation of Airbnb Density in City centre



Map 2: Visual presentation of Airbnb Density in Groningen

Picture 1: Regression output Airbnb listings

```
. reg Prijs ib2.Roomtype2 Review_Sco Amountof NEAR_DIST_RESTAURANTS NEAR_DIST_Centrum NEAR_DIST_CS NEAR_DIST_Airport Near_Distance_OVHalte DistanceToPa
> rks DistanceSupermarket if HotelAirbnb2==1 & Prijs < 500 & Prijs > 1

      Source |       SS       df       MS      Number of obs   =    16,088
-------------+------------------------------   F(11, 16076)    =    247.62
       Model |   13167111    11  1197010.09   Prob > F        =    0.0000
    Residual |  77712007.3 16,076  4834.03877   R-squared       =    0.1449
-------------+------------------------------   Adj R-squared   =    0.1443
       Total |  90879118.2 16,087  5649.22722   Root MSE        =    69.527

------------------------------------------------------------------------------
       Prijs |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  Roomtype2 |
Entire home/apt |   68.80555   1.409577    48.81   0.000     66.04262    71.56848
 Shared room |  -3.931462   9.216664    -0.43   0.670    -21.99715    14.13423
             |
  Review_Sco |   .4423154   .1534976     2.88   0.004     .1414431    .7431878
    Amountof |   .0177402   .0166687     1.06   0.287    -.0149324    .0504127
NEAR_DIST_RESTAURANTS |   .0004245   .0027346     0.16   0.877    -.0049355    .0057845
NEAR_DIST_Centrum |  -.0129723   .0019041    -6.81   0.000    -.0167045   -.0092401
  NEAR_DIST_CS |   .0140922   .0019097     7.38   0.000     .0103491    .0178354
NEAR_DIST_Airport |   .0029034   .0004219     6.88   0.000     .0020764    .0037304
Near_Distance_OVHalte |  -.0022039   .0056317    -0.39   0.696    -.0132426    .0088348
DistanceToParks |   .0006932   .0021703     0.32   0.749    -.0035607    .0049472
DistanceSupermarket |   .0001913   .0019565     0.10   0.922    -.0036437    .0040263
      _cons |   56.32113   5.756237     9.78   0.000     45.03826     67.604
------------------------------------------------------------------------------

.
```

Picture 2: Regression output Hotels

```
. reg Prijs ib2.Stars2 Review_Sco Amountof NEAR_DIST_RESTAURANTS NEAR_DIST_Centrum NEAR_DIST_CS NEAR_DIST_Airport Near_Distance_OVHalte DistanceToParks
> DistanceSupermarket if HotelAirbnb2==2 & Prijs < 500 & Prijs > 1
```

Source	SS	df	MS	Number of obs	=	209
				F(13, 195)	=	40.78
Model	286714.438	13	22054.9568	Prob > F	=	0.0000
Residual	105474.117	195	540.892906	R-squared	=	0.7311
				Adj R-squared	=	0.7131
Total	392188.555	208	1885.5219	Root MSE	=	23.257

Prijs	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Stars2						
1-star hotel	5.16816	7.54987	0.68	0.494	-9.721725	20.05804
3-star hotel	15.14335	4.853165	3.12	0.002	5.571916	24.71478
4-star hotel	46.94039	5.989322	7.84	0.000	35.12823	58.75256
5-star hotel	135.7043	8.75921	15.49	0.000	118.4293	152.9792
Review_Sco	11.48589	2.6127	4.40	0.000	6.333117	16.63867
Amountof	-.0022129	.0010531	-2.10	0.037	-.0042898	-.0001359
NEAR_DIST_RESTAURANTS	-.0015504	.0122675	-0.13	0.900	-.0257444	.0226436
NEAR_DIST_Centrum	-.0224604	.0051258	-4.38	0.000	-.0325696	-.0123512
NEAR_DIST_CS	.0176816	.004777	3.70	0.000	.0082604	.0271029
NEAR_DIST_Airport	.0062092	.0013003	4.78	0.000	.0036447	.0087738
Near_Distance_OVHalte	-.0019709	.0212671	-0.09	0.926	-.043914	.0399722
DistanceToParks	-.0076048	.0082676	-0.92	0.359	-.0239101	.0087006
DistanceSupermarket	.0033161	.0035106	0.94	0.346	-.0036075	.0102397
_cons	-83.60552	26.38981	-3.17	0.002	-135.6516	-31.55942