Airbnb in Copenhagen, Denmark: The Short-Term Rent Gap, Gentrification & the Housing Market

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Abstract

Short-term tourists visiting formerly residential areas are a potential source of conflict as the short-term tourists change the place they are visiting and represent an inconvenience to residents. This research uses a mixed methods approach with the short-term rent gap framework introduced by Wachsmuth and Weisler (2018) as the quantitative and an additional online expert interview as the qualitative part to analyse the effects of short-term rentals hosted on Airbnb on gentrification processes and the housing market in Copenhagen, pre- and during Covid-19.

In Copenhagen, Airbnb is widespread in the city and the hotspot districts are København N and København V. One possible way that Airbnb influences the housing market is that buyers calculate the additional revenue from Airbnb in when buying their apartment. Due to the regulated nature of Copenhagen's housing market there is no gentrification process underway that is led by short-term tourists, rather the gentrification that occurs in the city is led by the city itself by implementing major urban regeneration projects. The gentrification process that Airbnb adds on is a form of exclusionary displacement. Covid-19 did impact the available listings on Airbnb significantly as a 70% decrease of listings was investigated in comparison from January 2020 to January 2021. Nevertheless, was the spatial distribution of entire home Airbnb listings resistant in Copenhagen.

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1. Introduction

In the 21st century, tourism has experienced a significant growth and increased its focus on urban areas around the world. Especially the rise of low-cost airlines and the growth of online platforms like Airbnb promoted a rise in short-term rentals in the urban destinations (Cócola-Gant et al., 2020). Furthermore, tourists began to explore new paths in the city leaving the 'tourist bubble', which describes areas that are tourist-oriented with its amenities and attractions. The emergence of leaving the 'tourist bubble' was conceptualized as 'new urban tourism' (Füller and Michel, 2014) where tourists prefer to stay in a local's home and seek off the track experiences (Gravari-Barbas and Guinand, 2017; Mermet, 2017). These developments happened since 2008, in a post-crisis context, and intensified "the consumption of residential areas by visitors" (Cócola-Gant et al., 2020: 1). After the crisis, many urban economies refocused towards the tertiary sector resulting in some cities relying solely on tourism, making them dependent on incoming tourists (ibid.). In the same year, the online platform Airbnb was created on which individuals can rent out their flats or spare rooms to tourists or other extra local visitors for a short-term period. In the last decades, Airbnb developed itself as a serious competition for hotels especially in cities that are considered as tourist destinations. Growing research shows interest in the urban effects of short-term rentals like Airbnb and how it is influencing gentrification processes in and around the city. Balampanidis et al. (2019) describe Airbnb as a "transformative force of urban space, economy and society" (Balampanidis et al., 2019: 1), which has a binary effect on cities. On the one hand, the reuse and partial upgrading of building stock and the reactivation of the local economy. On the other hand, Airbnb is influencing the processes of residential segregation and touristification (ibid.).

Many cities experience gentrification processes driven by short-term tourists in that context. The short-term tourists change the place they are visiting by influencing it with their status, behaviour and culture. This type of gentrification is understood as 'tourism gentrification' (Gotham, 2005). Tourism gentrification challenges the traditional explanations of gentrification assuming of demand- or production side factors that are driving the process (Cócola-Gant, 2016; Gotham, 2005). Processes of tourism gentrification occur geographically uneven and short-term rentals create a new form of a rent gap in internationally recognizable neighbourhoods. In comparison to the classical forms of gentrification, minimal new capital input is required, and it can get exploited by

different actors such as homeowners, landlords or developers (Wachsmuth and Weisler, 2018).

Most of the literature about Airbnb and its effects on gentrification in Europe focuses on tourist hotspots like Barcelona (Arias-Sans and Quaglieri-Domínguez, 2016; Cócola-Gant, 2016; Cócola-Gant, 2018), Madrid (Ardura Urquiaga et al., 2020), Mallorca (González-Pérez, 2017; Yrigoy, 2020), Athens (Balampanidis et al., 2019), Berlin (Füller and Michel, 2014) or Reykjavik (Mermet, 2017). But research about Airbnb in Scandinavia is still in an early phase and comparable work to Wachsmuth and Weisler (2018) where the short-term rent gap framework is being used still cannot be found. The only paper about Airbnb and the housing market in Copenhagen that was found during this research was published in 2018 by the Boligøkonomisk Videncenter in Danish (Liliegreen, 2018).

1.1 Research Aim & Questions

This research project analyses the effects of short-term rentals on gentrification processes and the housing market in Copenhagen, Denmark. It is important to understand the context-based effects of tourism gentrification to understand how the processes unfold themselves and to be able to guide policy makers and other actors in the decision-making to counteract these developments if necessary. This research will help to gain an overview of the spatial patterns of Airbnb listings in Copenhagen and to what extent these Airbnb listings are affecting gentrification processes and the housing market by using the framework of the short-term rent gap provided by Wachmsuth and Weisler (2018).

Research Questions:

● How is Airbnb spatially distributed in Copenhagen?

● To what extent can short-term rentals have an effect on gentrification processes and the housing market in the neighbourhoods of Copenhagen, pre- and during Covid-19?

1.2 Overview of the Project

The project proceeds as follows. The next chapter presents the related theories to this study. The third chapter provides a background about the housing market and Airbnb in Copenhagen.The fourth chapter is presenting what kind of data is used in the GIS-analysis of this study, their purpose and from which sources the data got acquainted. In

addition, the chapter will explore the use of an online expert interview as a complementary method for this research. In the fifth chapter, the results are presented. Afterwards, in the sixth chapter, the results are analysed and discussed. Lastly, in the seventh chapter, the findings are concluded and an outlook for further research possibilities in the field is provided.

2. Related Theories & Background

2.1 Gentrification

In the following sub-chapters, the theoretical background is summarized starting with the gentrification and rent gap theory literature, followed by tourism gentrification and ending with Airbnb and the short-term rent gap.

2.1.1 Gentrification & Rent Gap Theory

The term *gentrification* was first used in 1964 by Ruth Glass who described the processes that were starting to affect central London during that time. The term was used in a literal sense meaning that an existing population got replaced by a gentry. Glass´ definition of gentrification is still a part of contemporary definitions of gentrification and created some unity within the field itself. But as gentrification itself, the definition of the term evolved over time to describe the phenomenon in a suitable manner. Not long after Glass´ definition, it became apparent that cultural, social, economic and institutional factors influence gentrification. Which showed that gentrification processes are complex, and context based. With numerous variations of gentrification, it is necessary to rethink the definitions that Ruth Glass and other scholars created to include all forms of gentrification into one definition rather than having many different definitions that vary a little from each other causing a chaotic web of definitions (Lees et al., 2008). Clark (2005) presented a definition that fits into that description by defining gentrification in an 'elastic yet targeted' way that "gentrification is a process involving a change in the population of land users such that the new users are of a higher socio-economic status than the previous users, together with an associated change in the built environment through a reinvestment in fixed capital" (ibid.: 25). Therefore, any process that fits the description above is understood in this research as gentrification (ibid.). As there is nothing natural about gentrification processes, Smith (1979) addressed the need for a theory of gentrification aiming to explain why certain neighbourhoods are profitable and redeveloped instead of others that do not meet the criteria and offered an economic explanation for gentrification by introducing the theory of a rent gap (ibid.).

The *rent gap* is the divergence that exists between capitalized ground rent and potential ground rent (Figure 1: (a)). The capitalized ground rent is the rent that the landowner appropriates with the present land use whereas potential ground rent is the amount that the landowner could capitalize if the land would be under its 'highest and best use'. Capital depreciation, continued development and expansion of the build environment are producing the rent gap and only if the gap emerges, redevelopment can be expected. Therefore, "gentrification occurs when the gap is wide enough that developers can purchase shells cheaply, can pay the builders' costs and profit for rehabilitation, can pay interest on mortgage and construction loans, and can then sell the end product for a sale price that leaves a satisfactory return to the developer" (Smith 1979: 545). In Smith's (1979) view, gentrification is the product of land and housing markets and is to be expected to happen (ibid.). The rent gap hypothesis did provoke urban studies as it challenged the assumption that was given in that time that urban landscapes were largely results of consumer preferences and faced disagreements in the field because of concerns over terminology, conceptual disputes and the difficulty to measure the concepts accurately (Lees et al., 2008).

2.1.2 Tourism Gentrification

As mentioned above, the process of gentrification mutated over time as well as its definitions. Some of these 'mutations' are rural gentrification (Parsons, 1980), new-built gentrification (Zukin, 1993) or super gentrification (Lees, 2003; Lees et al., 2008). The type of gentrification that this thesis will address 'tourism gentrification', which was first mentioned by Gotham (2005), as the research aims to analyse the effects of touristic short-term rentals on gentrification processes. Gotham (2005) used the term to describe "the transformation of a middle-class neighbourhood into a relatively affluent and exclusive enclave marked by a proliferation of corporate entertainment and tourism venues" (ibid.: 1102). He argues that the changing capital flows into the real estate market and the growth of tourism increase the consumption-oriented activities in the urban and promote the possibility of gentrification. Tourism gentrification challenges the traditional explanations of gentrification assuming demand- or production side factors that are driving the process. It provides a conceptual link between these explanations as it involves the capital investment and its shifting patterns in the production sphere and the socio-physical space that is the visual expression of consumption in the city and its changing patterns. Therefore, the taste for the gentrified space of consumers is "created and marketed and depends on the alternatives offered by powerful capitalists who are

primarily interested in producing the built environment from which they can extract the highest profit" (ibid.: 1114). Gotham (2005) connects the gentrification processes in his case study in New Orleans to global socio-economic transformations and follows Neil Smith´s argumentation that gentrification has become a 'global urban strategy' which is "densely connected into the circuits of global capital and cultural circulation" (Smith 2002: 427).

In fact, the growth of tourism represents a worldwide phenomenon that is differently experienced in places. In advanced capitalist economies, tourism and gentrification coexist, interact and build up on each other. This is an important point for the conceptualisation of tourism gentrification in urban spaces as tourism does not stay in isolation from other processes in the city. It overlaps with the other processes of production and consumption of urban space. Especially former gentrified areas are favourable spaces for tourism gentrification as the consumption facilities and the sense of place create a tourist-friendly environment (Cócola-Gant, 2018). The boundaries between locals and tourists blurred over time as they intend to seek authentic local experiences and blend in with the residential population as previously visiting designated attractions and tourist hotspots. This emergence of leaving the tourist bubble was conceptualised as 'new urban tourism' (Füller and Michel, 2014). These tourists prefer to stay in a local's home and seek off the track experiences rather than staying in traditional hotels (Gravari-Barbas and Guinand, 2017; Mermet, 2017). The spread of tourism to residential areas is a potential source of conflict between the residents and the tourists. This development happened in a post-crisis context since 2008 where many urban economies refocused their economical focus towards the tertiary sector and in some cases exclusively on tourism. Low-cost airlines and the emergence of online platforms like Airbnb led to an increase of short-term rentals in residential areas and impacted the neighbourhood life as well as the housing market dynamics. A difference to classical forms of gentrification is that in this case transnational migrants and tourists who stay on a short-term basis are gentrifying the area (Cócola-Gant et al., 2020).

2.1.3 Airbnb and the Rent Gap

To be able to use the rent gap theory properly for a case of tourism gentrification or in this case particularly the short-term rental platform Airbnb, it is necessary to adapt the theory. Wachsmuth and Weisler (2018) argue that Airbnb is creating a new form of the rent gap as it involves new potential revenue flows that are unevenly distributed in space: The short-term rent gap (Figure 1: (b) and (c)). Especially internationally recognizable

and culturally desirable neighbourhoods are experiencing the new rent gap which emerges quickly as it requires, in comparison to the classical forms of gentrification, minimal new capital input and can get exploited by different actors such as homeowners, landlords or developers. They argue that it is possible that Airbnb creates rent gaps systematically in urban areas around the world as "across certain neighbourhood types (primarily still-gentrifying areas and now-affluent, formerly gentrifying areas), the new, technologically enabled possibility of short-term rentals systematically raises potential ground rents and thus creates rent gaps even where there has been little or no devalorization of existing housing" (ibid.: 1152). Airbnb is therefore changing the 'highest and best use' of housing in areas where extra-local interest exists sufficiently and creates the short-term rent gap. The very same apartment has the possibility to have a higher potential economic return than a few years ago for the only reason that there is a platform to offer the apartment to short-term visitors. Therefore, the rent gap that Airbnb creates is technical and mediated culturally. Regarding former rent gaps, in this form of rent gap there was an exogenous shock that lifted the potential rent rather than a period of speculation and actual rents that increased gradually. Not a single step that Smith (1979) described is necessary to change the former residential unit to a rental for short-term visitors. There is only one step that is to be taken to accomplish this change which is terminating the contract of the tenant of the unit. Figure 1 provides a visual overview of the differences between the rent gap described by Smith (1979) and the 'short-term rent gap' (Wachsmuth and Weisler, 2018).
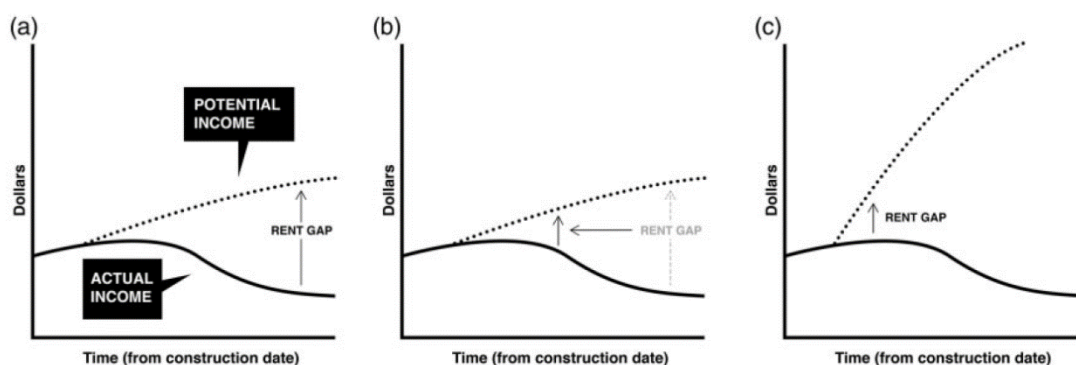
Figure 1: Rent Gap Variations: (a) The rent gap model in Smith's (1979) original analysis. When the rent gap is big enough between the gradually declining actual ground rent and the potential ground rent, redevelopment and gentrification may occur. (b) As the conversion to a unit for short-term visitors takes minimal capital input, the Airbnb rent gap can become big enough even before the traditional rent gap which is disinvestment-driven, leading to an earlier reaction of the landowners. (c) Airbnb has the potential to let the potential income rise sharply resulting in the creation of a rent gap that is in advance of the moment where property income declines (Wachsmuth and Weisler, 2018).

Airbnb´s rent gap creates two other implications as well. First, rental unit owners in areas where high tourist demand for short-term rentals exists get economic incentives that may lead to the eviction of tenants or to not searching for new tenants to be able to quickly realize higher possible rents through renting out their unit for short-term tourists. Second, it is to be expected that the rise in short-term rentals will be at the expense of long-term rental housing as the conversion to short-term rentals will shorten the supply of housing. These implications will result in the displacement of the existing, lower income residents and the arrival of temporary visitors with a higher income background. The gentrification and displacement processes will be distributed unevenly across space as it relies on the demand of tourists in a particular area in the urban space (ibid.). Marcuse (1985) distinguishes between 'exclusionary displacement' and 'direct displacement' (ibid.). The displacement process that Airbnb can cause refers to the latter as the landlords evict the tenants actively. But gentrification is also able to end in displacement through an indirect way in changing affordable housing into unaffordable housing. The possibility of Airbnb to increase the housing costs is to understand through two plausible mechanisms. The first is the decreasing supply of available housing through conversions to short-term rentals. The second is the increase of economic potential of properties and therefore increasing the market price of the properties (Wachsmuth and Weisler, 2018).

The highest demand for Airbnb´s is likely to be found in two types of neighbourhoods. First, neighbourhoods that are close to the central business district and traditionally hosting tourists already in hotels, hostels or B&Bs. Second, neighbourhoods that have strong cultural value, leisure amenities and are well connected to transport infrastructure. These characteristics can be found in recently gentrified or still gentrifying areas which formerly did not host tourists. "From a gentrification-theoretical perspective, therefore, we should expect Airbnb induced gentrification pressures to overlap incompletely with other drivers of gentrification" (ibid.: 1155). Therefore, Airbnb is further intensifying the displacement and gentrification dynamics that already existed in the neighbourhoods. It should not be expected that the number of short-term rentals will exceed the long-term ones, but it can be expected that in neighbourhoods where the divergence between these two rents becomes large enough, the conversion of former long-term rentals to short-term rentals could occur (ibid.).

2.2 Summary

This paper will address a study of possible tourism gentrification, a term coined by Gotham (2005), in which the possibility of gentrification gets promoted due to changing capital flows into the real estate market and the growth of tourism (ibid.). The growth of tourism connected with the emergence of 'new urban tourism' resulted in touristic activities and infrastructure in former residential areas which represents a potential source of conflict (Füller and Michel, 2014; Cócola-Gant et al., 2020). This research understands gentrification in Clark´s (2005) definition as "a process involving a change in the population of land users such that the new users are of a higher socio-economic status than the previous users, together with an associated change in the built environment through a reinvestment in fixed capital" (ibid.: 25). Therefore, any process that fits this 'elastic yet targeted' definition is understood as a process of gentrification in this study.

To analyse the potential effects of short-term rentals on gentrification processes Wachsmuth and Weisler´s (2018) short-term rent gap is used in which "certain neighbourhood types (primarily still-gentrifying areas and now-affluent, formerly gentrifying areas), the new, technologically enabled possibility of short-term rentals systematically raises potential ground rents and thus creates rent gaps even where there has been little or no devalorization of existing housing" (ibid.: 1152). With the changing 'highest and best use' of housing where extra-local interest exists, the short-term rent gap is created. Due to the likelihood of finding the highest demand of Airbnb in recently or still gentrified areas, the Airbnb induced gentrification pressures are expected to incompletely overlap with the other gentrification drivers present (ibid.).

3. Background

This chapter aims to provide a background to the housing market as well as Airbnb in Copenhagen. The housing sector represented one of the key elements of the development towards the Scandinavian welfare states in the past. It was placed on the principle of being use value rather than exchange value. Therefore, housing was a component of basic services rather than a commodity to be traded for personal profit maximization. With the emergence and subsequent expansion of welfare states, however, Denmark saw the rise of two alternatives to private ownership of housing. The first alternative is cooperative housing. In cooperatives each member acquires a right to use an apartment and pays a monthly fee, with all members being collective owners of

the properties. Today, cooperatives are the dominant form of housing in Copenhagen with over 30% of the total housing stock. The second alternative is non-profit housing. Non-profit housing is accessible to all and is not restricted to certain groups and is based on the principle of non-profit. Non-profit housing in Denmark represents collective ownership by private companies that receive public support in the form of government-backed loans and tax relief (Larsen and Lund Hansen, 2016).

In the early 2000s reforms challenged the Danish housing systems from the 'golden years' of Scandinavian welfare states, when the newly inaugurated liberal-conservative government sought to make the cooperative sector more market-oriented. The Copenhagen Municipality estimates that prices of cooperative housing quadrupled between 1999 and 2011. The commodification of cooperatives ultimately led individuals to appropriate a source of public wealth by trading cooperative housing on the market or using them as collateral for private loans, which transformed a housing form (ibid.).

In Denmark, Airbnb started in the centre of the largest cities and spread throughout the country. The platform started relatively late in Denmark, but recently the activity on the platform has almost exploded. There are Airbnb rentals all over the country, but the rentals are concentrated in parts of Copenhagen. Here, the activity is so high that it can potentially affect the real estate market. Today, Copenhagen is one of the cities worldwide where Airbnb is most prevalent relative to the metropolitan population. Only cities like Venice and Florence surpass Copenhagen when the number of announced Airbnb offers in relation to the population is determined (Liliegreen, 2018).

Airbnb is widespread in most parts of Copenhagen, but the intensity is higher in some parts of the city. Two of these parts are København V, particularly the area around Enghave Square, and København N. Since Airbnb is concentrated rather than evenly distributed, it is likely that the lease can affect the local real estate market. Airbnb cannot directly influence the price of cooperative housing, as Copenhagen has a maximum price regulation. However, in the event of deregulation, there could be a similar effect as in the condominium market and in the unregulated part of the rental market. The cooperative housing market is dominant in the 'bridge districts'. The 'bridge districts' is a common name that is used for Nørrebro, Vesterbro, Østerbro, Amagerbro and Islands Brygge (as bro mean bridge in Danish). It is a market that is already difficult for young people, first-time buyers, and low-income groups to access. Prices per m² have nominally doubled in the last 6 years to DKK 43,500 (ibid.).

The Danish parliament voted on a new home sharing legislation in Denmark which got implemented in different phases between 2019 and 2021. In this new legislation Airbnb is collaborating with the Danish government "to share basic information for income tax purposes" (Airbnb, 2021) which is directly reported to the Danish tax authorities. Furthermore, in the new legislation Airbnb hosts are able to share their primary entire homes for a maximum of 70 nights a year, and municipalities are able to raise this limit to 100. No night limits are chosen for shared private rooms as well as summer houses. In the same time the tax-free earnings were raised for primary houses to 28.000DKK and summer houses to 40.000DKK. The 'basic data' that Airbnb is sharing with the tax authorities does include the name of the host, as well as the birth date if it is included on their personal site, the address of the listing and the total income in a year. Airbnb does not share the information regarding how many nights a listing was rented out, leaving the 70 days cap in the responsibility of the hosts (ibid.). Therefore, there is no official record of the nights booked per listing and the legislation only applies to Airbnb and no other platform where landlords can rent out their apartment leaving the Danish authorities with no possibility to check if the 70 nights limit is realised (Liliegreen, 2018).

4. Methods & Data

This research uses a mixed methods approach with GIS as the quantitative and one additional online expert interview as the qualitative part. The data for the GIS-analysis is collected from various sources which are displayed in Figure 2 as well as their purpose in the analysis. The data is used in the short-term rent gap framework introduced by Wachsmuth and Weisler (2018). The online expert interview is conducted to extend the findings of the quantitative analysis by discussing the results and possible effects of Airbnb on gentrification processes and the housing market in Copenhagen. Before turning to the methodology and what kind of data is used to conduct this research, the following section aims to present how the theory presented in the previous chapter gets operationalized.

4.1 Operationalization of the Theory

To measure the short-term rent gap, the framework that Wachsmuth and Weisler (2018) provide to analyse the relationship between Airbnb rentals and gentrification is used. In the framework the average rent price will be used as the proxy for the capitalized ground rent and the average rent landlords can gain renting their flat out to short-term visitors will portray the 'highest and best use' or proxy for the potential ground rent. The

assumption that underlies in Wachsmuth and Weisler´s (2018) argument is "that the extent to which contract rents map onto actual ground rent is agnostic to long-term or short-term rentals. This will be true if the ownership costs for long-term and short-term rentals are reasonably similar" (ibid.: 1168). If a higher contract rent can only be achieved through higher investments the earning of the land use in the end may not be higher than before. In these cases, contract rent does not provide a reliable guide to actual ground rents. But as short-term rentals do hold the key characteristic that huge capital investments are not required to convert them from long rental to short-term rental properties, this problem does get answered. The only investment and change that are needed are some furnishing of the flat and the change of tenant. Even the additional cleaning costs are mitigated by the fees that Airbnb charges dedicated to that purpose. Therefore, Wachsmuth and Weisler (2018) "feel confident assuming that variations in contract rent between long-term and short-term rentals adequately reflect underlying variations between actual ground rent for long-term rentals and these properties' potential ground rent as short-term rentals, as indicated by the contract rent generated by other nearby short-term rentals" (ibid.: 1168). The difference between the rent that can be accomplished through long term rentals and that can be accomplished through short-term rentals represents the revenue that renting out to short-term visitors holds and is understood as the short-term rent gap. From a rent-gap theory perspective it is important to mention that "neither of these indicators is claimed to directly measure potential or capitalized ground rent, or the difference between the two which is the rent gap. Instead, they are used as proxies for these abstract concepts, and there are compelling theoretical reasons to believe they will adequately describe the existence and relative size of rent gaps" (ibid.: 1158).

4.2 Data Collection

Table 1 provides an overview of the data that is used in this research, as well as their source, and for what purpose that data is chosen.

Data [Source]	Purpose
Airbnb listings locations (2016, 2019, 2020 & 2021) [Inside Airbnb]	Development of listings, density map, distribution in Copenhagen (2016, 2019, 2020 vs. 2021)
Total number of dwellings & average apartment sizes per district in Copenhagen & for the municipality of Frederiksberg [Københavns Kommune/DST]	Comparison with Airbnb listings & Use in the proxy for capitalized ground rent
Average rent costs in Copenhagen & Frederiksberg per m² per year in DKK [Husleje.dk]	Use in the proxy for capitalized ground rent
Price per night of Airbnb listings in DKK (2016, 2019, 2020 & 2021) [Inside Airbnb]	Use in the model of occupancy to calculate the proxy for the potential ground rent
Average realised transaction prices per sqm per postal code in DKK (2008-2019) [Finans Danmark]	Development of real estate prices in Copenhagen's districts

Table 1: Overview of the Data and their Purpose (own contribution)

Data about the Airbnb listings in Copenhagen is accessed via Inside Airbnb. Inside Airbnb is dedicated to exploring how Airbnb is used and provides a set of tools that are non-commercial and independent. The website analyses only publicly available information on Airbnb and provides key metrics and filters to "see how Airbnb is being used to compete with the residential housing market" (Inside Airbnb, 2021). It allows the user to see where the listings are located (in accordance to Airbnb´s privacy policy the listings are scattered 0 to 150m from their actual location), how many reviews the listing has and the date of the last review, as well as how much the host charges per night and how many listings a host has. It is important to keep in mind that the data is a snapshot of the platform available at the time of access. In the case of Copenhagen, the datasets for this research were created on 28.06.2016, 28.01.2019, 29.01.2020, 26.06.2020 and

30.01.2021. The dataset of the 28th of June 2016 represents the first dataset that was extracted from the Airbnb website by Inside Airbnb and is the starting point of this research. To be able to investigate how the listings changed during summertime the dataset of 26.06.2020 will be used. The dataset of January 2019 represents the situation before Covid-19 existed and the dataset of January 2020 is situated before the first border regulations due to Covid-19 came into effect in Denmark. The dataset of January represents the listing landscape after 9 months of Covid-19 regulations in Copenhagen.

The Danish Statistical Agency (DST) provides the data about the total number of housing ('BOL101: Dwellings by region, type of resident, use, tenure, ownership and year of construction') and the average size of an apartment ('BOL106: Dwellings with registered population (average) by area, unit and use') between 2016 to 2020 for Frederiksberg municipality (DST 2021a; DST 2021b).

Data about the real estate market is collected from the Danish Mortgage Bank Association (Finans Danmark) who provides the data for property prices in Copenhagen referring back to 'BM011: Property prices in housing market by postal code, property category and prices of completed transactions' which is published by DST (Finans Danmark, 2021).

The city of Copenhagen does not hold an official register about the average rent prices in Copenhagen. Therefore, the numbers that husleje.dk publishes themselves on their website are used. Husleje.dk is a website that is dedicated to give an overview of what a fair price for rents would be throughout Denmark by showing the average rent prices for a specific postal code (Appendix A). It does so by obtaining residential leases from a variety of sources. The data is taken from leases that are offered by housing associations, private individuals, and a number of private actors and pension companies. The data gets retrieved on a daily or weekly basis depending on the sources. The statistics given on the website, which are accessible by creating a free account, are an expression of what landlords have entered in connection with the creation of their advertising. Therefore, they are user dependent. The more data there is for a specific postcode, the more accurate the displayed statistic will be. Ads that differ 'greatly' from median calculations are taken out to avoid miscalculations due to incorrect entries. The data is critically reviewed daily and does not solely rely on algorithms. Husleje.dk started collecting its statistics in 2020, but also collected a number of historical information which is included in the statistics. But as this data was not actively monitored, the statistics may

deviate from the data regarding 2020 onwards (Husleje, 2021). It is possible to filter for the time frame of data collection as well as other attributes like size of the housing, amount of rooms, length of contract or housing type (apartment, house, room or terraced house). For this research the data is filtered for apartments, as it is assumed that most of the Airbnb listings will fit the description, with no specific filter for the size or amount of rooms of the apartment in a time period from March 2019 to March 2021. The reason for not filtering other attributes can be explained as follows. The data for Airbnb listings does not divide on the size or rooms of the flat, therefore it is reasonable to include all kinds of apartments. Filtering for a more specific time frame was not necessary as most of the information before 2020 did not influence the average rent price in a significant way. Most of the time the average rent differed only a few DKKs (most of the time roughly 1 DKK (0,13€)).

The geospatial data regarding the zip codes in Denmark is accessed through Kortforsyningen, the Danish Agency for Data Supply and Efficiency's self-service solution for downloading geodata (Styrelsen for Dataforsyning og Effektivisering, 2021).

Furthermore, data regarding the housing stock and the average apartment size in Copenhagen was extracted via the platform opendata.dk with the data shared by Københavns Kommune (Københavns Kommune, 2021a; Københavns Kommune, 2021b)

4.3 Data Analysis

The data accessed from Inside Airbnb is used to gain an overview of the spatial distribution of Airbnb listings in Copenhagen, to show how the numbers of listings have developed and to calculate the proxy for the potential ground rent. To analyse the spatial distribution of the Airbnb listings in Copenhagen, density maps are used that rely on the point density tool of ArcMap. The components used for the tool are the geographical locations (points) of the listings. The tool calculates the sum of the points within a neighbourhood (search area) and divides it by the search area size setting density values for each cell (ArcGIS, 2021a). The number of entire home Airbnb listings of each datasets is classified into the different districts and compared with the total amount of housing per district to grasp what percentage share the entire home Airbnb listings are taking. The data about housing is provided by DST and Københavns Kommune (Appendix B).

To highlight the potential that Airbnb holds to influence gentrification processes in Copenhagen the short-term rent gap and comparisons of different datasets are used. To be able to calculate the potential ground rent by using the apartment as an Airbnb listing, it is necessary to build a model for the occupancy. The model is used to calculate the potential ground rent for each listing based on the individual price charged per night. This model is necessary as the data from Inside Airbnb does not include how many nights the listing is booked. The dataset provides the price of a specific listing per night. Therefore, it is possible to calculate the amount that a specific host at a certain location can acquire per year by multiplying the price with 365 (days). This would imply that it is assumed that the short-term rental is booked every day of the year. The reality is likely to look different. Therefore, the assumption taken in this research is that a host can occupy the flat for 60% (219 days) of a year, given that the listing is active all year around on Airbnb. The model used by Inside Airbnb to calculate the occupancy uses 70%, illustrating a highly occupied hotel (Inside Airbnb, 2021). The 60% in this research is chosen to be more conservative as individuals may not be as well organized as a hotel and that individual listings may be more vulnerable to the touristic seasons. Therefore, the occupancy model for this research does look like this:

(Listing price per night) x (a year= 365 days) x (0,6 = occupancy rate) = Potential ground rent (per year)

The datasets of Inside Airbnb include listings categorized by Airbnb as 'entire home/flat' and therefore can also include whole houses which normally will have higher per night prices as flats. To avoid that the listings of entire houses will have a great influence on the analysis, the top 2.5 percent as well as the low 2.5 percent of listings of each district will be excluded from the analysis. The exclusion of total 5 percent of the listings is strengthening the analysis as the proxy for the capitalized ground rent is based on averages. In the next step, the calculated proxy for the potential ground rent is converted from a point layer into a raster one. The tool 'Point to Raster' creates a raster in which the potential ground rent of each point laying in the specific raster cell is averaged (ArcGIS, 2021b).

The proxy for the capitalized ground rent is based on the average rent price per apartment per district. To be able to work with the data provided by husleje.dk, it is necessary to multiply the value of each specific postal code with the average apartment size that can be found in these parts of the city. The average apartment size of each district is multiplied with the average rent price per m² per year per zip code. In the next

step, the average rent price is divided by 12 to display the rent per month. The rent prices are adjusted towards the different years as the data from husleje.dk is mainly involving data from 2020. The percentage share in relation to the year 2020 of the realised transaction price per district of each year is used as a basis for the adjustment (Appendix C). The proxy of the capitalized ground rent is transferred into raster with the tool 'Polygon to Raster' as the data is saved as a polygon layer (the districts of Copenhagen) (ArcGIS, 2021c). The conversion of both proxies into raster of the same size enables the use of the raster calculator tool of ArcMap which is used to calculate the proxy for the short-term rent gap. The last step is to calculate the difference that is existing between these two rasters and convert it to the percentage share.

To show the developments of the real estate market in the districts in Copenhagen with a high concentration of entire home Airbnb listings, the realised transaction prices of owner-occupied flats by postal codes in Copenhagen are compared during the time period from 2008 to 2020. This data can also be used as an indicator for the development of rent prices in the private rented market.

4.4 Online Expert Interview

The qualitative part of this research is conducted as an online expert interview via the video conferencing program Zoom (Zoom Video Communications Inc.) due to the worldwide spread of Covid-19 and the following border regulations of Denmark. The interview aims to validate the results of the analysis and to collect further input around Airbnb, the housing market and gentrification processes in Copenhagen. The interview is conducted as a semi-structured interview in which the interview guide (Appendix D) contends a set of open-ended questions to specific topics but is designed to be flexible and shape around the topics of the interviewee´s concern. This flexibility allows the interviewer to ask follow up questions that differ from the interview guide as the aim is to form the questions compatible to the way the interviewee understands and frames them, while still following the interview guide to a certain extent (Bryman, 2016). The set of open-ended questions used in the interview guide can be divided into thematic blocks which are the spatial distribution of entire home Airbnb listings, the short-term rent gap, gentrification processes and the housing market, policy regulations, and the general housing market in Copenhagen.

The interviewee chosen for this research is Curt Liliegreen, director of Boligøkonomisk Videncenter (The Knowledge Centre for Housing Economics) in Copenhagen. Curt Liliegreen published previous work on Airbnb in Copenhagen in his article 'AirBnB:

Deleøkonomi, ny teknologi eller en forbandelse' in 2018 and the interview is conducted to discuss the findings of this research in relation to his previous work and knowledge about the housing market in Copenhagen. The interviewee received a short overview of the results (Appendix E) the week before the interview. The interview took place on the 26th of April via Zoom and was conducted in two parts on the same day. The transcript (Appendix F) is generated with the transcription tool offered by Office365. As the automated transcription is flawed, the transcript is proofread in two phases. The first phase focuses on the formatting issues and the wrongly transcribed words. The second phase is focused on the correct spelling of the Danish and Swedish words that Curt Liliegreen used in the interview.

4.5 Limitations & Challenges

The biggest challenge that this research faced was the data acquisition regarding the average rent prices in Copenhagen. Due to the fact that the Copenhagen municipality does not hold an official register, data that is published on the website of husleje.dk had to be used. According to Husleje (2021), the data presented on the website is accurate, but in some cases the data can be misleading especially if the data is based on a little number of ads. With only a small database, single ads that are overpriced can distort the picture. Another misleading factor can be multiple ads of landlords for the same apartment but on different websites, as the algorithm does not check for the name of the landlord, these ads are taken into account separately. Husleje.dk is aware of these problems and working on solutions to filter multiple ads of the same landlord out of the data (Husleje, 2021). As long as the database is based on a great number of ads, the displayed number is strong even with some outliers. But in postal codes where only a couple handful ads are used, these influences can impact the displayed average rent price greatly. Therefore, these numbers should be handled with care. In the districts that include multiple postal codes, postal codes were selected randomly until a sufficient number of ads were basing the average rent price that represented the whole district. This method had to be used as husleje.dk did not provide a tool that offers to include more than 10 postal code at a time as well as no overview for which postal codes the website had data provided for. When a postal code was included that was not provided by husleje.dk an error was displayed leading to the randomisation of the postal codes. Nevertheless, the number of ads that were collected to display the average rent price in those postal codes were high and therefore strong in their significance.

In comparison to the occupancy model of Inside Airbnb where reviews are used to identify recently booked listings and calculated towards the estimated bookings, this research decided to leave out the reviews, as recently Alsudais (2021) raised awareness that in the case of Los Angeles the reviews of some listings were inaccurate and in reality connected to an activity with 'Airbnb experience' in for example Tokyo. Therefore, to minimize the error-proneness and increase the validity of the used datasets only two characteristics of each listing were chosen to be included into the analysis: The location and the price charged per night. To this date, these characteristics are regarded as accurate in the community.

Regarding the numbers used as proxies for the capitalized ground rent in this research, it is important to mention that the average apartment sizes of Copenhagen and Frederiksberg are representing the average of the space in which they are located in. Housing stock differs in the city's districts itself, meaning that bigger and smaller flats can be found. It is likely to have smaller apartments in the more central areas than areas that are further out as factors like available space can be different. Nevertheless, as the average rent prices extracted from the husleje.dk website are not bound to any specific amount of m²'s and the data about the Airbnb listings does not provide statistics to these characteristics, it is useful to work with the number provided by DST and Københavns Kommune to gain an overview. After all, the numbers are used as proxies and do not intend to reflect the exact amount.

Another challenge that this research faced is that the researcher does not speak the native language of the region of the case study. That resulted in some difficulties in the data acquisition as well as in regard to insights of local struggles and discussions of the topic in local media. Some articles were translated via Deepl into German (native language) which has the same Germanic language roots resulting in translations that were easily understandable. To overcome this challenge, the online expert interview with Curt Liliegreen intended to talk about this research's findings in relation to his article and his knowledge about the housing market in Copenhagen. In addition, it was also used to get further insights of the debates that exist in politics or society about that topic.

It was decided to involve Covid-19 in the research as it has the potential to show how much tourism can pressure on housing in cities as the tourist numbers will have fallen drastically due to the border regulations of Denmark. Therefore, it is also a chance to see how the city could look like without the booming tourism sector. But, the situation

around Covid-19 and travel restrictions also may change the datasets downloaded from Inside Airbnb as some of the datasets were created on the 26th of June 2020 and the 30th of January 2021 as a snapshot of the Airbnb website. The datasets were snapped respectively a couple of months and almost one year after Covid-19 restrictions were implemented in Denmark resulting in fewer tourists which may have led to lower the per night prices of the listings to remain competitive in the national and international tourist market. As the tourist numbers decreased, it is likely that the competition of listings, hotels and other tourist accommodation increased. Another factor why it was chosen to include Covid-19 is that the situation may be irregular to what we have before, but it does remain for a long period of time as well as offers the opportunity to change existing structures. Therefore, it is a situation worth exploring even though the situation is still unfolding itself and is not yet close to an ending point.

Even though the research faced challenges regarding the data acquisition, the data that is used in this research is valid and unique in its composition. Especially the interview with Curt Liliegreen represents a unique opportunity to discuss the results of the analysis and the general developments in relation to the housing market in Copenhagen. The proxies using in this study fulfil the purpose as being proxies by being based on averages. The potential ground rent proxy is based on actual listing prices per night and are therefore highly accurate at the moment of time that the dataset was extracted from Airbnb´s website. And as argued before, a 60% occupancy during the year is assumed as reasonable to a tourist hotspot like Copenhagen, if the host would decide to rent the apartment out over the whole year on Airbnb. But listing prices can change throughout the year which holds the power to change the proxy for the potential ground rent.

5. Results

5.1 Results of the GIS-Analysis

Before turning to the spatial distribution of the Airbnb listings, it is important to highlight the development of the total numbers of entire home listings on Airbnb in Copenhagen at the day the snapshot of Inside Airbnb was taken to be able to interpret the density maps as well as the maps presenting the short-term rent gap correctly. Even smaller changes in the maps can be important, especially if there was a change of the amount

of entire home Airbnb listings behind it. Figure 2 provides the information about the amount of entire home Airbnb listings per dataset.
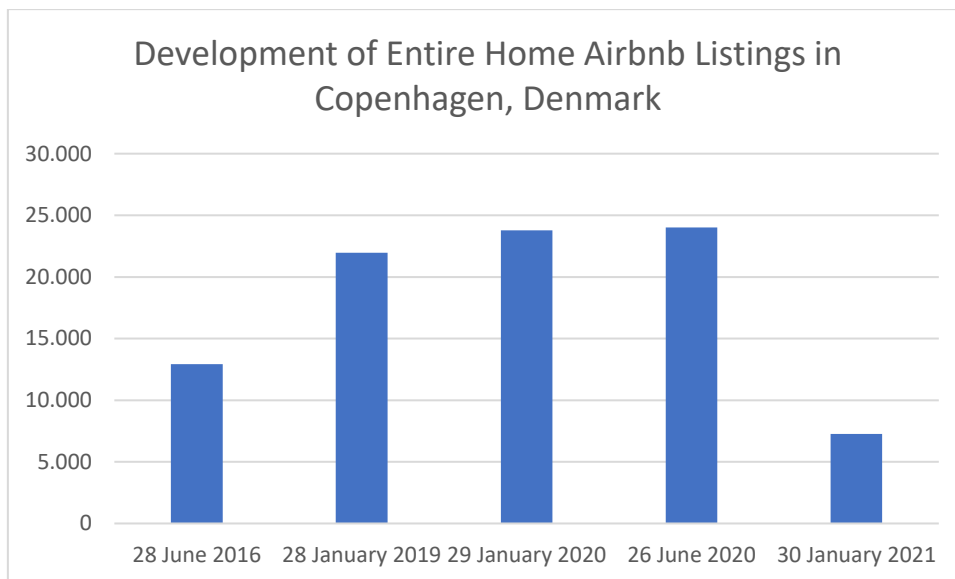

Figure 2: Development of Entire Home Airbnb Listings in Copenhagen, Denmark (own representation based on Inside Airbnb (2021))

The first dataset was taken on the 28th of June 2016 and consisted of 12.916 entire home listings. The amount increased greatly until the 26th of June 2020 when 24.026 listings of that category were listed on Airbnb. These numbers are displaying the complete dataset before the 5% of the listings per district was excluded from the analysis. It is important to mention that there are two and a half years in between June 2016 and January 2019, therefore the increase in Figure 2 looks bigger than the comparably smaller increases during smaller time frames (6 months to a year). But nevertheless, Airbnb did experience a boom during these two and a half years and increased the entire home listings by roughly 86%. After June 2020, the numbers decreased dramatically to 7.255 listings probably due to the 'external shock' that Covid-19 had on the tourism sector as well as the border regulations around it to slow down the spread of the virus nationally and globally. Surprisingly the numbers increased between January 2020 and June 2020 even though the Danish government implemented strict regulations by going into a national lockdown in March 2020 and not opening up the borders to foreign countries until August 2020. The small increase may have been a result of the national lift of the lockdown during the time to open for travels in the own country. Another reason could be the hope that the restrictions were only implemented for a short-term like many nations publicly claimed before implementing full lockdowns. Which can also explain the loss of 69,51% of the listings between June 2020 and January 2021, as hosts realised

that the restrictions will be longer in power than expected resulting in vacant or minimally frequented listings by short-term visitors.

A deeper look into the datasets also reveals another important indication. Nearly all hosts active on Airbnb in Copenhagen only have one listing to their account indicating that private individuals are active rather than professionals.

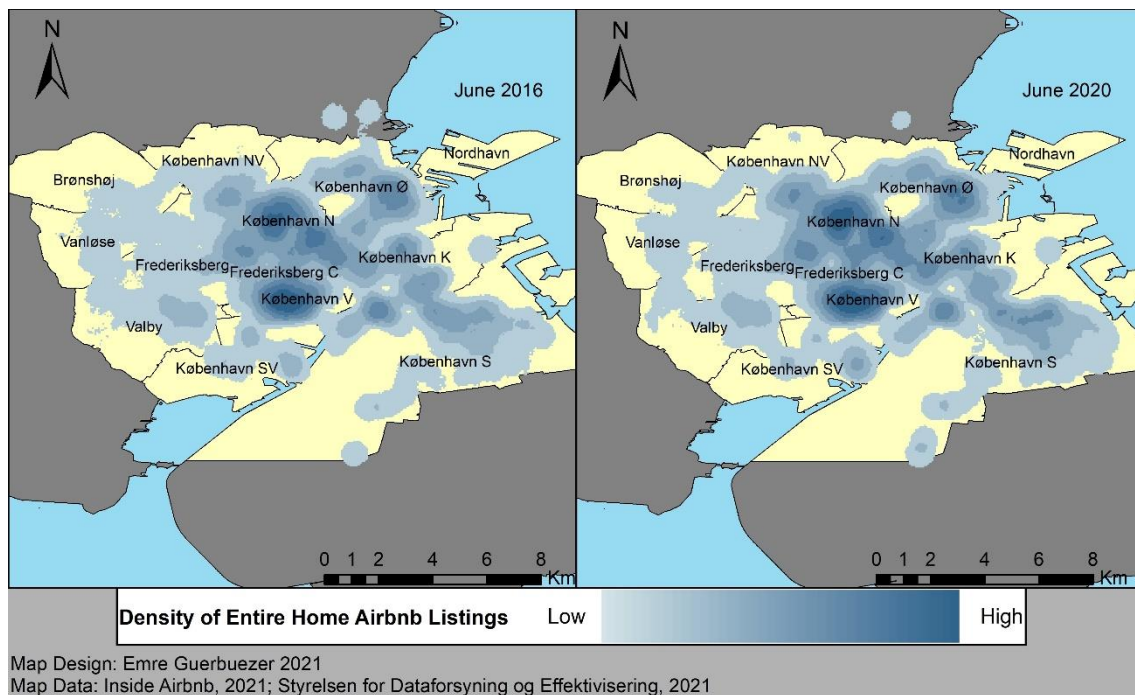## 5.1.1 The Spatial Distribution of Entire Home Airbnb Listings in Copenhagen

Figure 3: The Spatial Distribution of the Entire Home Airbnb Listings in June 2016 & June (own contribution)

Figure 3 presents density maps of the spatial distribution of entire home Airbnb listings in June 2016 and June 2020. The areas with the highest concentration of entire home Airbnb listings is highlighted by darker colours in Copenhagen´s districts (yellow). The comparability of these two datasets is strong as they were generated around the same date but 4 years apart which also takes the seasonality of tourism into account.

In 2016 the spatial distribution of the entire home listings was generally even in Copenhagen but differed in their concentration. A lower concentration could be found in the outskirts of the city like Brønshøj, Vanløse, København SV and also in bigger parts København S. Due to the scattering of the location on Airbnb´s website as well as different city borders of Copenhagen used by Inside Airbnb, the southern part of Hellerup (north of København Ø) is also included in the dataset and implements that it is attractive

for hosts to offer listings outside of Copenhagen with good transport infrastructure to reach the city centre (i.e. Hellerup St. train station). In Valby, København SV, København NV and København S there are parts that show a higher concentration of listings which are generally laying closer to the inner city. København Ø does illustrate a high concentration along the coast where the UN-City and touristic highlights like the little mermaid are located. The city centre København K does have a high concentration of listings, but the concentration is lower compared to København N and København V which are the hotspots for entire home Airbnb listings in June 2016. The only district that did not have any listings was Nordhavn which was during that time still in the development processed and firstly finished in 2017.

The spatial distribution in June 2020 looks similar to the one of June 2016 regarding the widespread location of entire home listings in Copenhagen. But the concentration in the hotspots København N, København V, København Ø and København K increased displaying the area with even darker colours of the colour spectrum. The borders of the districts also experienced an increase of the listings showing a better 'connection' to the other hotspots of the districts. In København S the listings also increased in former areas in which the concentration was respectively high. The density of the listings in the outskirts of the city decreased even though the numbers of listings rose by roughly 86%, suggesting that the increase in the hotspots was higher than in the other districts decreasing the density slightly in districts like Brønshøj, Vanløse, Valby or the southern part of the adjacent district Hellerup. In June 2020 there were no listings in the freshly developed and still developing Nordhavn district.

The hotspot maps are indicating the concentration by darker colours in the different districts, a look into the percentage share of entire home Airbnb listings in relation to the housing stock is beneficial to get a picture of how many listings there are and how much of a share they take. The share is the comparison of the entire home listings with the numbers of dwellings published by Københavns Kommune and DST (Appendix B). In the hotspot areas of June 2016 entire home Airbnb listings had a share of 6,3 % in København K (1.797 listings of 28.525 dwellings), 5,63% in København N (2.310 listings of 41.038 dwellings) and 6,4% in København V (2.072 listings of 32.385 dwellings). Over the time period of 4 years the share increased to 10,71% (3.242 listings of 30.262 dwellings) in København K, 10,45% (4.393 listings of 42.044 dwellings) in København N and 10,05% (3.764 listings of 37.459 dwellings) in København V. Indicating that every 10th dwelling in Copenhagen´s central districts is listed or at least registered on Airbnb.

This clearly indicates that many hosts try to profit from short-term tourists visiting their city. Every other district also experienced an increase of the share with for example København Ø´s increase from 1.384 listings (3,37%) to 2.609 (6,1%) or København S from 2.046 listings (3,19%) to 3.965 (5,54%).

The only districts with a smaller share of Airbnb listings in relation to the total dwellings of 5% in June 2020 were Valby (989 listings equalling 3,26%), Vanløse (651 listings equalling 3,14 %), Brønshøj (421 listings equalling 2,07%) and København NV (1.151 listings equalling 3,82%). In total the share of the entire home listings on the dwellings in Copenhagen increased from 4,25% (12.916 listings to 303.887 dwellings) to 7,38% (24.026 listings to 325.337 dwellings) which represents an increase of 86% in listings
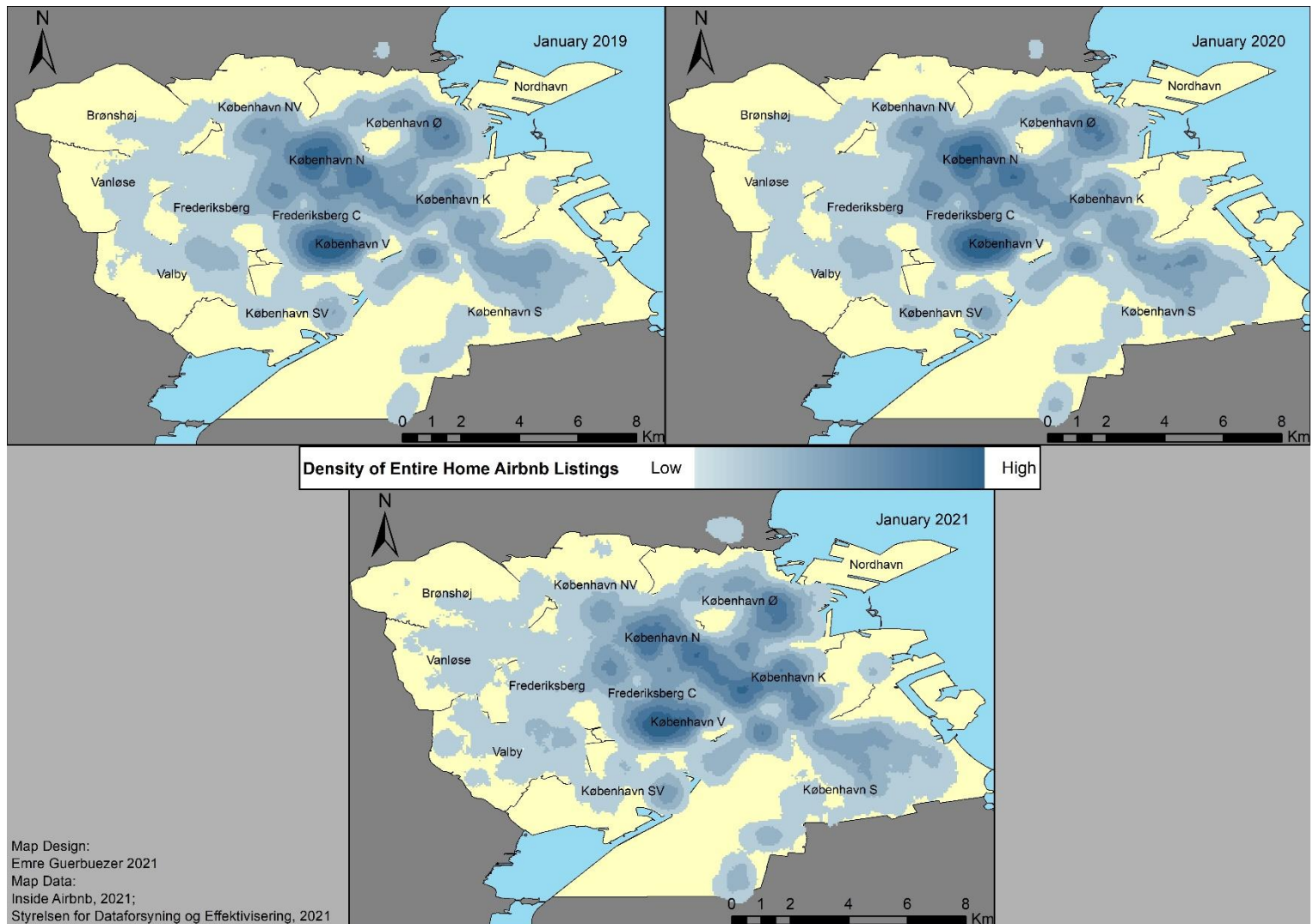
Figure 4: The Spatial Distribution of the Entire Home Airbnb Listings in January 2019, 2020 & 2021 (own contribution)

Figure 4 presents density maps of the spatial distribution of entire home Airbnb listings in January 2019, January 2020 and January 2021. The comparability of these three datasets is strong as they were snipped around the same date but 1 year apart from each other which also takes the seasonality of tourism into account. Another influence that needs to be taken into account is the Covid-19 pandemic that actively effected Denmark in the beginning of 2020 until today. Therefore, the datasets of January 2020 and January 2021 can be used as an indicator of the situation before and after Covid-19's influence on Denmark and the tourism sector.

In 2019 the spatial distribution of the entire home Airbnb listings was similar to the distribution in June of 2016. Generally, the distribution is even in Copenhagen, but the concentration differed. In 2019 lower concentrations in the outskirts of the city in bigger parts of København S, København SV, Brønshøj and Vanløse could be found. The density in southern Hellerup (north of København Ø) is still on the map, but smaller in size. The trend that higher concentrations in the outer districts like Valby, København SV, København NV and København S is higher when they are generally located closer to the inner city is also reflected in this density map. København Ø with its attractive location also has a high density, similar to København K, but København N and København V are also during touristic off-season time the hotspots in Copenhagen for entire home Airbnb listings. The spatial distribution in January 2020 looks almost similar with the same hotspots and only a little higher concentration of listings in the districts at the city border like Valby, southern København S, and København SV.

A look into the percentage share of entire home Airbnb listings to the housing stock reveals that only a small and almost same increase occurred during the 12 months. København K increased its number of listings from 2.977 (9,92%) to 3.212 (10,68%), København N from 4.162 (10,02%) to 4.355 (10,36%), København V from 3.442 (9,53%) to 3.718 (9,93%). The share of entire home Airbnb listings on dwellings in Copenhagen increased from 6,88% (21.960 listings to 318.992 dwellings) to 7,31% (23.791 listings to 325.337 dwellings) which represents an increase of roughly 8% in listings.

Comparing the same time frame from January 2020 to January 2021 a different picture can arise. The density map looks a bit scattered in the West of Copenhagen as the number of listings in relation to the hotspots rose. Vanløse and Valby have higher densities at the city borders as before and the concentration in already concentrated areas in København SV and København S increased. Former hotspots still remain, but

the density in the area around their district borders towards the city centre increased, especially the area between København N and København K. Also, south Hellerup around the train station shows an increased density in 2021. The district Frederiksberg and Frederiksberg C remain a constant concentration of listings throughout 2019 to 2021. Nordhavn does not present any density throughout the datasets which can be traced back to its status as newly developed or still developing district where not many listings are set in the region especially with regards to the hotspots which already experienced their first listings after Airbnb offered their platform in Denmark around 2009.

In regards to the 'differences' of 2019 to 2020 it may seem that not much changed in the time from 2020 to 2021, but taking a closer look into the numbers of listings and the percentage share of entire home Airbnb listings in relation to the total dwelling numbers in Copenhagen reveals that a lot changed on the platform and that the fairly similar distribution map of 2021 in regards to 2020 is of interest. Mainly driven by the worldwide Covid-19 pandemic and the regulations of the Danish government there is a decrease of almost 70% of the entire home listings on Airbnb for Copenhagen.
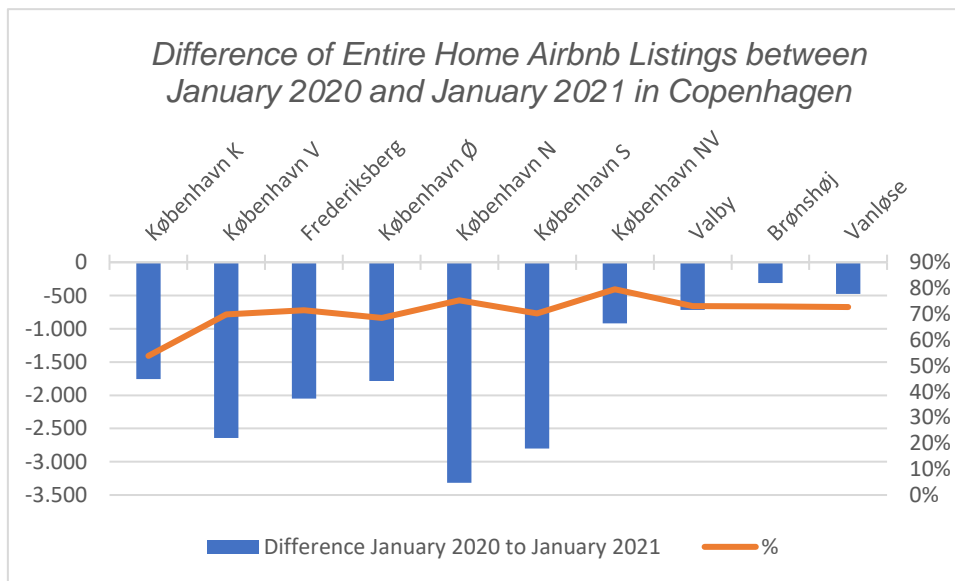

Figure 5: Difference of Airbnb Entire Home Listings between January 2020 and January 2021 in Copenhagen (own contribution based on Inside Airbnb (2021))

Figure 5 provides an overview of the total amount of entire home Airbnb listings that decreased per district as well as the percentage share of that amount in relation to the total amount of entire home Airbnb listings in January 2020. Especially the hotspot regions København N and København V, which are still the hotspots in 2021, lost 75,29% and 69,85% of their listings resulting in a decrease from 4.355 listings to 1.076 in København N and 3.718 listings to 1121. The third highest loss recorded has København

Ø with 68,44% less listings. Surprisingly the other hotspot København K experienced the smallest loss of 'only' 53% of its listings. This may be due to its location and that the demand for accommodation was better sustained in the city centre. With the reduction of the total amounts of listings, the percentage share relating to the total dwellings changed as well. København K decreased from 3.212 listings (10,61%) to 1.484 (4,89%), København N from 4.355 (10,36%) to 1.076 (2,55%), København V from 3.718 (9,93%) to 1.121 (2,91%) and København Ø from 2.608 (6,1%) listings to 823 (1,91%). In total the number of listings decreased from 23.791 to 7.255 which makes up 2,2% in relation to the total dwellings. The exponential decrease likely has been caused by the regulations around border controls and caused the hosts to offer the listings to rather long-term contracts than short-term, as it is likely that less short-term visitors were able to visit Copenhagen and the competition of the listings internally increased. This does not mean that the listings have necessarily long-term tenants in their space, a study of Waldersee (2021) about Airbnb in Lisbon during Covid-19 suggested that many hosts rented their listings out for a duration of 6 to 12 months in the hope of easier restrictions in the future (post-Covid-19) where renting out their listings is more profitable (Waldersee, 2021).

5.1.2 Effects of Airbnb on the Housing Market and Gentrification Processes in Copenhagen
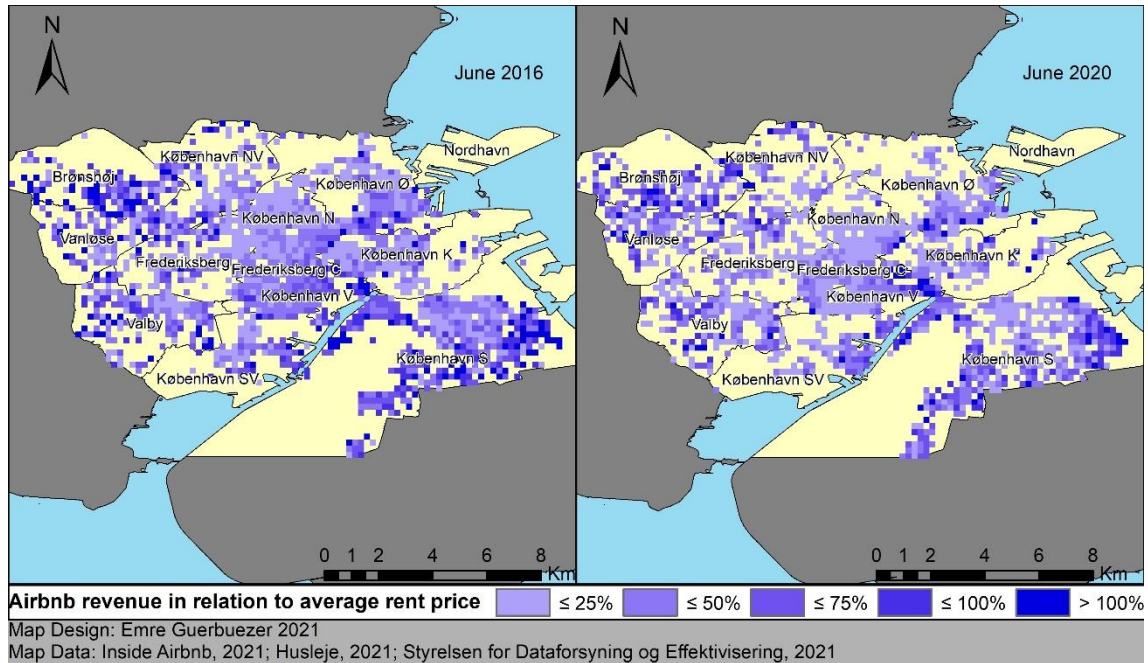
5.1.2.1 The Short-Term Rent Gap

Figure 6: The Short-Term Rent Gap in Copenhagen in June 2016 & June 2020. The Short-Term Rent Gap is the gap that arises between the Capitalized Ground Rent (proxy: average rent prices per district) and the Potential Ground Rent (proxy: occupancy model with 60% occupancy in a year) (own contribution)

Figure 6 presents the short-term rent gaps that emerged in June 2016 and June 2020. To calculate the short-term rent gap, the proxy for the capitalized ground rent (in this case the average rent price per district) and the potential ground rent (in this case the potential rent that each listing can achieve based on the occupancy model) are compared. The difference between those two proxies is understood as the proxy for the short-term rent gap (Wachsmuth and Weisler, 2018).

Generally, there is a high profitability of Airbnb listings in the outskirts of Copenhagen. This can be explained by the comparably lower average rent prices in these districts and the good transport connections to the city centre that increases the attractiveness towards short-term visitors. It is important to highlight that in districts where less listings are listed, the listings which are above average in their size or considered in the more luxurious segment of the listings influence the data more than in the hotspots where more data is available to calculate an average. Another reason for this effect is that the average apartment size of these districts is lower than in the other districts resulting in lower average rent prices. Therefore, the gap can even be bigger with listings that are average priced in relation to the hotspots.

In June 2016 there were high short-term rent gaps in the city centre, especially the hotspots København V and København Ø had big short-term rent gaps in which an increase of more than 75% of the rent in relation to the capitalized ground rent were dominant. A higher concentration of short-term rent gaps with more than 100% can be found in Brønshøj, Valby and København S. Most of these short-term rent gaps in København S are located further away from the city centre. In contrast, in Brønshøj most of the short-term rent gaps with more than 100% profitability are located closer to the city centre.

In June 2020 the short-term rent gaps are slightly more scattered than in comparison to June 2016. The short-term rent gaps decreased in general all over Copenhagen and especially in København N and København V, the main hotspots, mainly short-term rent gaps with up to 25% could be found, meaning that in comparison to 2016 it is less profitable to rent out in these districts on average. This can be caused by the bigger competition on Airbnb in Copenhagen generally, as the numbers of the entire home listings increased during that time, the higher average rent prices or that the dataset of June 2016 was too small. Therefore, the dataset from June 2020 could present a more accurate version of the short-term rent gaps as there is more data to analyse from and more accurate average rent prices. Otherwise, Covid-19 travel restrictions were already for 3 months in power at that point which may have caused the hosts to lower their asking prices per night to keep competitive in the weakened tourism market. Nevertheless, two districts in Copenhagen remained with big short-term rent gaps. The first is Brønshøj where big short-term rent gaps are present in the centre of the district and the second in København S around the south-eastern city border of Copenhagen with short-term rent gaps that can exceed more than 100% in relation to the average rent price.
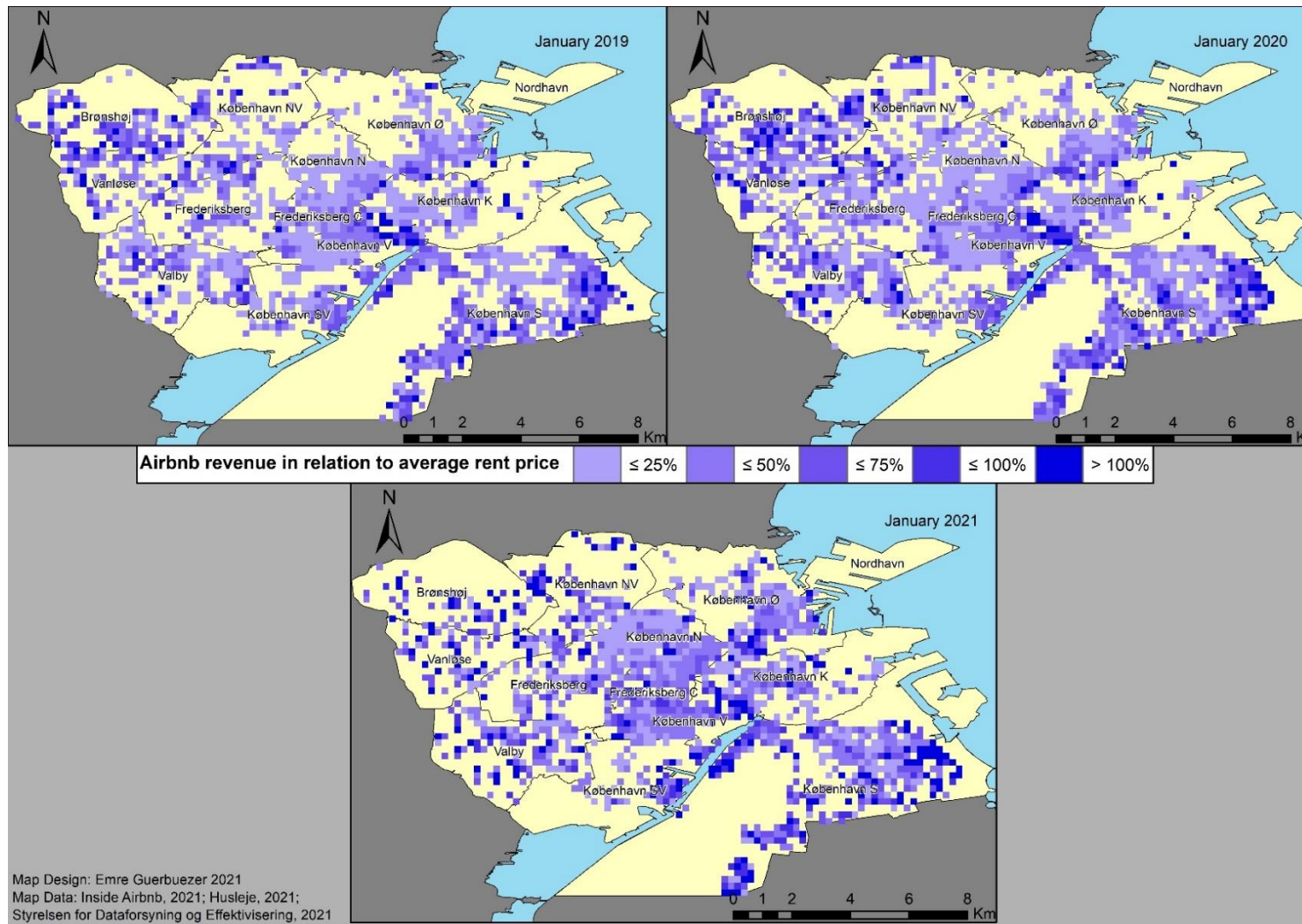
Figure 7: The Short-Term Rent Gap in Copenhagen in January 2019, 2020 & 2021. The Short-Term Rent Gap is the gap that arises between the Capitalized Ground Rent (proxy: average rent prices per district) and the Potential Ground Rent (proxy: occupancy model with 60% occupancy in a year) (own contribution)

Figure 7 displays the short-term rent gaps, which is explained above, in January 2019, 2020 & 2021. Overall, there is a similarity of the short-term rent gaps in Figure 7 with the ones that emerged in June 2016 and 2020 (Figure 6): The outskirts of the city seem to be the most profitable ones. But the eastern part of København V in the city centre is also amongst the most profitable areas in Copenhagen. The area is located south of the train station København H. The location of the area is attractive for short-term tourists as they do not need to wander around in the city to find their apartment, they rather have to take the train from the airport to the city and are already close to their accommodation or just leave the train and have a short walk to their accommodation. But not only the location is important to highlight in this analysis. The rent prices used for København V are generalized over the space of the district and leaving out important factors like good transport infrastructure close by. Therefore, the rent prices at that particular area of the district can be higher than the average ones that are used in this analysis for the whole district. This would result in lower short-term rent gaps in reality. København S and Brønshøj remain districts in which high short-term rent gaps are predominant. In January 2020, Valby and København SV also increased their rent gaps leading them to have similar situations like København S and Brønshøj. The city centre, which already consisted extensive short-term rent gaps, increased the space in which short-term rent gaps are existing from 2019 to 2020. Most of the raster remains in a scale of up to 25% more potential rent as an Airbnb listing. The increase of space leading to a bigger coverage of the central districts can be explained with the higher number of listings in that area in 2020.

A trend that can be seen when January 2021 is compared with January 2020 is that the short-term rent gaps are more widespread than before as well as that the remaining short-term rent gaps seem to be higher than before. This can have a multitude of reasons. After living in a pandemic with changing border regulations many landlords may have tended to rent their apartment out to long-term residents as they display a more stable source of income which the decreased number of total listings would suggest. Another reason could be that mainly the average listings decreased in the districts leaving the listings left that are the more luxurious or bigger ones that charge more per night. This would affect the value of the raster cell as the average potential ground rent would be increased and resulted in displaying a higher short-term rent gap in that cell. The rent gap in reality would be smaller, as the average rent used as a proxy for the capitalized ground rent would be higher for such listings. Especially København V, København N, København K and Frederiksberg C profit from less competition on the

market as the rent gaps increased in these districts, especially the closer they are situated to the city centre. København Ø also experienced an increase in the short-term rent gaps around the UN-City. Another district that has higher short-term rent gaps is København S with a lot of them being located on the eastern or the south-western side of the district while the spatial distribution remained almost the same.

5.1.2.2 Airbnb and the Housing Market in Copenhagen

In the interview with Curt Liliegreen the findings of this study were discussed and set into relation to the housing market in Copenhagen. As the interviewee had previously published an article about Airbnb in Copenhagen a similarity was found in the spatial distribution of the Airbnb listings which are heavily concentrated in the so-called Brokvarter (Danish for bridge area). These areas were originally working-class neighbourhoods which experienced a huge gentrification since around 1995. In a historical analysis of socio-economic segregation, migration patterns, income trajectories and impact of settlement in disadvantaged neighbourhoods that the interviewee was involved in together with DREAM (the Danish Research Institute for Economic Analysis and Modelling), the researchers were able to identify disadvantaged neighbourhoods in a consistent and automatic way over time from 1986 to 2017 (Appendix G). In the study, DREAM (2019) developed a Socio-Economic Neighbourhood Index (SNI) which combined four socio-economic variables: labour market participation, income, education, and severe crime. The SNI was calculated with an algorithm in relation to the closest 1.000 neighbours. With the use of a cluster analysis DREAM (2019) was able to identify the areas of the most vulnerable groups in Denmark. In the case of Copenhagen, the deprived areas changed a lot in the 32 years that the study investigated. The deprived areas have tended to move away from the centre, including København V and inner København N, towards areas like Brønshøj. In the Brokvarter the deprived areas were very prominent in the late 1980s, but already in 2007, after major urban regenerations projects in the 1990s and 2000s in those areas, the deprived areas could not be found in that area anymore. But the general trend in Copenhagen is that some of the deprived areas have remained stable over time. This is the case for the areas in København N, København NV, the inner København S and København SV (DREAM, 2019). The interviewee explained that the Brokvarter generally finished its gentrification process before Airbnb arrived in Copenhagen in 2009 and that nowadays the characteristics for that area are ethnic restaurants or cafes. In addition, the real estate prices experienced a heavy increase during the last decades in the Brokvarter. To the surprise of the

interviewee some areas of Copenhagen had a higher density of entire home Airbnb listings than he would have expected as Airbnb was seen critically by politically biased people, especially the ones voting for the left-wing. But even in areas where this description fitted, there was a high concentration of entire home Airbnb listings leaving the interviewee to speculate that either Airbnb became mainstream and a cultural change is going on or that the population may have changed due to gentrification in those areas. After the Brokvarter experienced its gentrification, the gentrification processes moved to other areas in Copenhagen. But the interviewee raised doubts if these areas will also be 'Airbnb territory' like København V and København N as they are located further out of the city centre.

The interviewee explained that Copenhagen generally is a city that is under gentrification, but that in København V and København N a peculiarity of Copenhagen's housing market can be found. These districts are dominated by cooperative housing. Almost 40% of the housing is cooperative housing and only 10% in that area are owner-occupied flats. Copenhagen municipality generally has the lowest ratio of owner-occupied housing (28%) in Denmark. Therefore, it is likely that most of the listings in that area are cooperative apartments which have regulations around renting out the flat as short-term rentals. The tenants of those cooperative apartments are likely to rent their flats out on only a short-time basis, for example when they are at vacation themselves. Historically, a lot of cooperatives were created from the 1970s on in Copenhagen resulting in a housing market in which a third of the housing supply are cooperative housing which is more than the owner-occupied apartments. In contrast to the similar markets in Scandinavia, the cooperative housing market is still regulated which impacts the effects that Airbnb can potentially have. With the regulation in power, Airbnb cannot affect the prices of cooperative housing as they do not get traded for market prices. The private rented market does have regulations in power as well. The so-called Housing Control Act covers all apartments that are built before 1992. The apartments that were built from 1992 onwards on, have agreed rent which is negotiated freely between the tenant and the landlord. But once agreed the rent cannot change as it is regulated after that point. In the hotspots København N and København V apartments that are built after 1991 make only a small share of the housing. If the apartments are renovated, they are included in the Rent Control Act, paragraph 5.2 meaning that it is possible to lift the apartment out of the Housing Control Act into a more "general type of legislation" (Curt Liliegreen, 26.04.2021). Normally, the price for the rent will increase around 100% if the Housing Control Act is lifted. The owner-occupied apartments are traded for the market

price, but with a share of only 10% of the housing stock only a small fraction is affected directly by the housing market development. As the housing market in Copenhagen is not an owner-occupied market, the interviewee mentioned the difficulty to measure the effect of Airbnb as only a small fraction is being affected and many other factors are impacting the market as well.

The interviewee stressed the importance of the different kinds of tenure in Copenhagen to analyse the housing market and the effects on it. In the context of Copenhagen and its highly regulated market, it is difficult to find data about cooperatives as that kind of data is not officially collected. This challenges the investigations about the effects of Airbnb on the housing market, especially as one part of it, the cooperative housing, does not only have not market prices, but there is also generally no data about it. In regard to the private rented market, the interviewee raised doubts if the landlord would allow the use of the apartment for this reason to the tenant as the landlord would have no benefit of it. The only scenario where the landlord would allow the use of his apartment as a short-term rental would be if a part of the revenue was shared. But the interviewee also granted that some tenants may not respect the regulations and have the apartment offered on Airbnb whatsoever. He also included that he thinks that there is a black market as well as professionals using Airbnb, but these developments are considered in the grey zone and the people using it in that way try to avoid attention resulting in an unclear picture about it.

Regarding the results of the short-term rent gap, the interviewee raised awareness that the behaviour of the hosts is likely to be different from the assumption that was given to calculate the potential ground rent. Most of the people in Copenhagen use Airbnb as an additional revenue while being away on holiday rather than have a flat to rent out the whole year around on Airbnb. The type of people using Airbnb does not fit the expectation to be house flippers like in America nor do most of them have a second home. Also, with the new legislation in power, the maximum days that someone is allowed to rent their flat out was set to 70 days. But this is not tracked by the government. It is more up to the tenant and neighbours to check. Recently, many discussions were held about the nuisance of Airbnb guests in Copenhagen as they behave loudly and create a source of conflict with the residential neighbours of the listings. In addition, offering the flat for more days on Airbnb would mean that the tenant would have to have a second flat as their own home would be occupied at least 60% of the time. The people that use Airbnb are therefore likely using it to get additional revenue which they may even feel forced to as

the prices in Copenhagen went up and the tax for the income over Airbnb is generally low, resulting in higher revenues. Therefore, hosting an apartment on Airbnb does not only hold negatives effects for the hosts.

After considering the points that were raised during the interview, the interviewee summarized the situation about the analysis of Airbnb and its effects on the housing market like this:

> *"You're stuck with condominiums: The owner-occupied apartments. And it's only a small part of the areas where you have most Airbnb. Because it's such a small part I think it will be difficult to identify the effect of Airbnb because what you are seeing would be the effect of lack of supply and huge demand. And it will also have everything, so you have the effect of the extremely cheap financing and then to make things worse you will also see the effect of different kind of macro potential regulation taking place. And it's not easy to see how it is working out right now, but it should actually be a problem for a lot of first-time buyers."*

He added that due to the widespread of Airbnb people may factor it in when they are buying the apartments. Therefore, an increase of the transaction prices for owner occupied apartments in areas with high Airbnb concentrations may result as the people already expect to yield some revenue with Airbnb while being on vacation.

Taking the current situation around Covid-19 into account and how the future of Airbnb in Copenhagen may look like, the interviewee stated that the prices for short-term rentals on Airbnb are likely to be higher than hotels that are not designed for business tourists, given that the location of the listing is right. In addition, the interviewee raised interest in seeing what will happen after 2021 when the restrictions ease as he expects that Airbnb is coming back to Copenhagen as Denmark will be considered as a safe country to travel to as there has been comparably less infections with Covid-19. Therefore, the interviewee thinks that an even wider spread of Airbnb in Copenhagen is possible.

To analyse a possible trend in the realized transaction prices for owner-occupied apartments which was raised during in the interview, the next part will analyse the data offered by Finans Danmark (2021) in 'BM011: Property prices in housing market by postal code, property category and prices of completed transactions'.
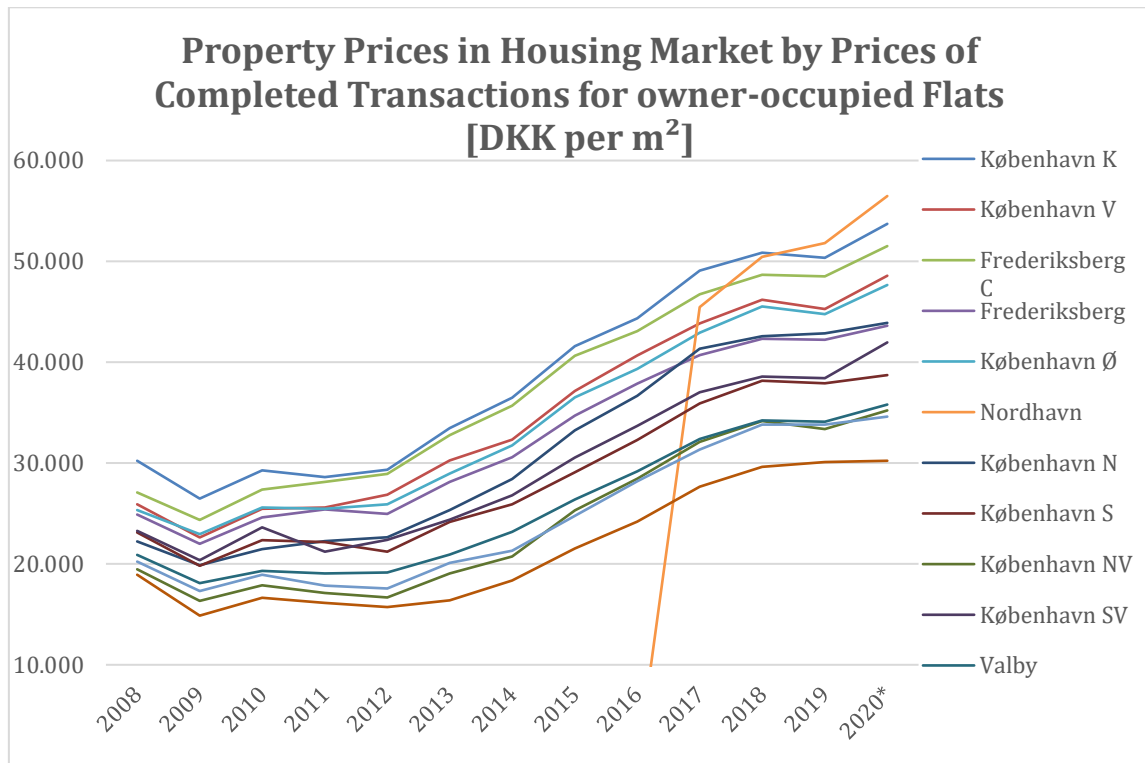
5.1.2.3 Effects on the Real Estate Market

*Figure 8: Property Prices in Housing Market by Prices of Completed Transactions for Owner Occupied Flats [DKK per m²] (own contribution based on Finans Danmark (2021)) *2020 only includes 3 quartiles*

Figure 8 presents the completed transaction prices in DKK per m² per district between 2008 to 2020. The dataset of 2020 only includes 3 quarter as the data about the last quartile is not published yet. Generally, all districts experienced a huge increase of the realised transaction price per m². The newly developed district Nordhavn has the highest price per m² to this date which is remarkable as even the first transaction recorded a higher price than popular districts like København V or the adjacent København Ø. Nordhavn is followed by København K and Frederiksberg C, both hotspot districts for Airbnb listings, as the most profitable districts in 2020. Other hotspot districts like København V and København Ø did experience a similar development in which both districts are following the ones closely. København N, as one of the major Airbnb hotspots in Copenhagen, does realise average prices and out of the hotspots the lowest ones.

In the time frame that the datasets are from (2016 to 2020) the outskirts of Copenhagen had the highest increase of the realised transaction prices for owner-occupied apartments. Districts like Brønshøj experienced an increase of prices of 24,86%, København SV of 24,50%, København NV of 23,75%, Vanløse of 22,71% or Valby of

22,66%. Looking at the development from 2008 to 2020 a clearer image presents itself with the Airbnb hotspot districts being the ones profiting most of the development of the real estate market. København N could increase the realised transaction price by almost double (97,52%), Frederiksberg by 90,23%, København Ø by 88,01% and København V by 87,49%. From the hotspots only København K had an average increase by 77,70% which can be explained by the already high realised transaction price in 2008 whereas the increase is still remarkable as only the newly developed district Nordhavn has higher realised transaction prices to this date. The districts with the highest increase of the realised transaction price between 2016 and 2020 are either currently gentrified (København SV and København NV) or still gentrifying (Brønshøj, Vanløse, Valby). Generally, the prices are increasing throughout Copenhagen, but lately traditional working-class areas like Valby and Vanløse experience the increase the biggest, indicating that the districts with the highest increase between 2008 and 2020 already have been gentrified and now other areas are in the focus of redevelopment.

The hotspots of Airbnb listings tend to overlap with the districts that had the highest percentual increase from 2008 to 2020 in Copenhagen. Therefore, the pattern seems that district which experience gentrification processes lift their attractiveness and besides increase their real estate value are the main areas where entire home Airbnb listings can be found. Other factors like good transport infrastructure or offices of big companies or organisations (like the UN-City) or proximity to an airport may increase the attractivity for landlords to convert the flat to a short-term rental as well. Airbnb does hold the power to further increase the existing trends in the real estate market by switching residential units into short-term accommodation for visitors and stressing the housing stock even more, but not only the conversion of residential units can influence the real estate market. The short-term visitors who stay in Airbnb listings can actively change the neighbourhood with their spending behaviour that differs from typical residents as they seek different experiences which can change the offers in the districts to be tailored towards tourists to increase their attractiveness and profits (Balampanidis et al., 2019). The hotspot districts gain overall in popularity, increasing the demand whereas the supply may shorten due to increased Airbnb entire-home listings.

6. Analysis & Discussion

6.1 The Spatial Distribution of Entire Home Airbnb Listings in Copenhagen

The spatial distribution of entire home Airbnb listings in Copenhagen is widespread throughout the city and the listings can be found in every district other than Nordhavn, which is a newly developed district. The seasonality did not impact the general distribution of Airbnb listings, suggesting that the listings are active on the platform all year around. The districts with the highest concentration of entire home Airbnb listings are København N and København V which are located around the city centre (København K). Both districts experienced gentrification in the late 1990s and the beginning of the 2000s caused by major urban regenerations projects led by the city of Copenhagen. København K, København Ø and København S are also popular districts for Airbnb listings regarding the distribution. The proximity to the city centre as well as good transport infrastructure can be a few of the reasons why tourists may book their short-term rental in the districts København Ø and København S. København K and København V were districts that also formerly hosted tourists and have many different hotels in their area. Both of the districts have a high concentration of entire home Airbnb listings nowadays as well.

These findings are in line with previous research (Wachsmuth and Weisler, 2018; Cócola-Gant, 2018) arguing that especially two kinds of neighbourhoods are affluent to Airbnb guests. Neighbourhoods that traditionally hosted tourists like København K and København V and neighbourhoods with well-connected transport infrastructure, leisure amenities and strong cultural values. The last type of neighbourhood can be found in recently gentrified or still gentrifying areas like København N, København Ø or København S. In a former working class-areas like Valby, there can also be found a part that has a high concentration with entire home Airbnb listings throughout the time frame of this study. As Valby is a district that experiences gentrification processes it could indicate that these areas are getting more interesting for short-term tourists, but due to their distance to the city centre it is likely that the districts will not be as affected from Airbnb as like København N or København V after finishing their gentrification process.

The travel restrictions around the worldwide Covid-19 pandemic did decrease the number of listings by about 70%. Nevertheless, the distribution of the listings did not experience a major change. The distribution with its high concentration in København V,

København N, København Ø and København K remained resistant, implying that listings with the right location can still be present on Airbnb. It is important to keep in mind that availability on the platform Airbnb does not equal traffic. There is no official data available on how often these listings are booked but having the listings active on Airbnb indicates that the hosts think they have a chance to yield a revenue.

At the peak in case of numbers of listings in June 2020, districts like København K, København V and København N had a little more than 10% of their total dwellings in the district offered on Airbnb. The percentage share indicates that Airbnb became mainstream in Copenhagen and that many hosts see a chance to yield revenue out of the platform even if it's their own flat which will likely be booked just for a couple of weeks in a year. Districts in the outskirts of the city like Valby, Brønshøj, Vanløse or København NV had lower percentage shares than 4%. This can be partly explained with the distance to the city centre as well as that most of those districts are still in the gentrification process and characterised as 'working-class' areas. Therefore, the districts around the city, which already have been gentrified, are more attractive to tourists. In addition, the condition of the Airbnb listings should also be taking into account. In a gentrified neighbourhood, the neighbourhoods are more likely to be up to date than in other districts that were not redeveloped recently. The newly renovated flats and new cafes or restaurants are more attractive to tourists as they seek a nice and authentic stay in the central area of the city.

6.2 Airbnb in Copenhagen: The Short-Term Rent Gap, Gentrification & the Housing Market

To analyse to what extend an effect of Airbnb on gentrification processes and the housing market can be seen, it is important to highlight the unique housing market in Copenhagen. It is a market that is dominated by cooperative housing which has regulations in power regarding the rent prices. Especially in the Airbnb hotspots København V and København N the cooperative housing has a share of roughly 40% of the district's housing markets. The cooperatives behind the housing have individual regulations which are likely to be in the legal frame of the government, meaning that these apartments cannot be rented out longer than 70 days per year. The assumption made to calculate the proxy for the potential ground rent in the short-term rent gap exceeds this limit by far as it was assumed that hosts are capable of filling their flat 60% of the year with short-term visitors, given that the flat is rented out throughout the year and the fact that the government does not have the possibility to control the amount of days. Due to lack of depth in the data provided by Inside Airbnb about the listings, it is

impossible to distinguish which listings are associated with which type of tenure. This has crucial effects on the interpretation of the findings concerning the short-term rent gap. The possibility to switch an apartment to one that hosts short-term tourists all year around is only given in certain scenarios. One scenario is that the apartment is owned by an individual and the individual owns more than one apartment. Therefore, the individual has a vacant apartment which is hosted on Airbnb as the owner prefers to rent the apartment out to short-term tourists rather than long-term residents with the hope to generate more income. Another scenario is people that speculate with the apartment and hope to re-sell it in a later time are hosting these apartments on Airbnb and hope to yield a surplus with renting it out in the meantime to short-term tourists. Taking a closer look into the situation in Copenhagen, the picture arises that many of these listings will not fit either one of these scenarios as most of these apartments are likely to be cooperative apartments where actors would be more likely to get caught if the apartment is only hosting short-term tourists. A similar situation can be found with the private-rented market where tenants will need permission from the landlord to rent the apartment out on Airbnb in general. And given that this permission was granted it would likely not exceed the 70 days maximum. If the tenant would not respect the agreement with the landlord, they would risk a lawsuit and in the worst-case scenario an eviction. Therefore, the only scenario where the short-term rent gap can be applied to is the host being the owner of the apartment and willing to risk a fine by putting their apartment on Airbnb all year around. This can be the case in owner-occupied apartments as well as apartments where tenants move out and the landlord is facing an empty apartment and has to choose to take the risk to share the apartment on Airbnb or take a new long-term tenant into the apartment.

The short-term rent gap takes into account the average rent that an apartment in average size would pay (proxy for capitalized ground rent) and the rent that could be achieved through having the apartment all year around on Airbnb with the occupancy of 60% equalling 219 days (proxy for potential ground). Both these numbers are used as proxies in the framework with the aim to indicate how big the short-term rent gap in these areas is. As the proxy for the capitalized ground rent is the average rent price of that exact year, it is to assume that tenancy contracts made before that year would be lower, resulting in bigger rent gaps. Throwing a tenant out of the unit is difficult for a landlord as the rent is agreed and cannot be changed and laws being in place that strengthen the position of the tenant. Making it unlikely that tenants have to fear of being thrown out of

their apartments as the landlord would need a sufficient reason and convince a court that an eviction is rightful.

Therefore, the short-term rent gap can only be applied to a certain type of tenure: The owner-occupied flats. In Copenhagen, 28% of the housing market fits that description. Generally, the framework created by Wachsmuth and Weisler (2018) is better suited for cities in which the housing market is mainly a deregulated one or generally one where the market is powerful and can change the housing market significantly. In addition, to see Airbnb's whole transformative power, the legislation around the housing market should be one that is characterized as capitalistic as possible. Meaning that it is not concerned about tenants' rights, where rents can be changed almost freely, and tenants evicted if necessary. A setting in which gentrification can easily and rapidly happen. The case in Copenhagen is completely different from that as the housing market is regulated and dominated by cooperatives which are based on the use value rather than the exchange value. The market can only change certain components, making it difficult to identify the effects that Airbnb holds on gentrification processes and the housing market. Especially in highly regulated districts like København N and København V where only 10% of the housing is owner-occupied, it is almost impossible to analyse the effects as only a small share of the housing can be influenced.

Nevertheless, the use of the short-term rent gap is useful to analyse how big the incentive for apartment owners can be to turn their apartment into a unit for short-term tourists given that they have the possibility to do so. Generally, the results of the short-term rent gap analysed in this research are higher in the outskirts of the city. This can have different reasons. One, is that the average rent costs are lower in the districts out of the city centre and that in some cases not only apartments, but also houses are included. Whole houses are more likely to be found in distance from the city centre due to the building development. This can influence the data even though 2.5 percent of the top listings are excluded of each district to counteract huge discrepancies in the analysis. As the whole city of Copenhagen has a share of 28% of owner-occupied apartments it is likely that most of them are outside the city centre given that København N and København V only have a share of 10% in their districts. Especially most of the working-class districts like Valby and Vanløse have high rent gaps. In these districts only a few percent of the total housing stock are registered on the platform, but the short-term rent gap indicates that there is a huge incentive for hosts to get active on Airbnb as it promises a huge revenue. It is important to keep in mind that there is a likelihood that hosts who rent their own flats

out for only a couple of weeks charge higher per night prices to maximize the revenue in that little time. Due to the lack of data depth the availability of the flats could not be included in the analysis which could result in a rent gap that is higher on the map than it is in reality as the hosts do not intend to find a price where the assumption of a 60% occupancy is necessary. But hosts still have to remain competitive in the Airbnb environment which results in prices that are likely to be in proximity to the average as otherwise it could be difficult to fill the apartment with short-term visitors.

Regarding the short-term rent gap in January 2021 and the border regulations that are still in power in May 2021, it is unlikely that the occupancy assumption can be met in the short-term rent gap. But the short-term rent gap of 2021 is interesting to compare to the years before as roughly 70% of the listings were not shared on the platform anymore in a time frame of one year. The short-term rent gaps increased generally in every district even though some of the hotspot districts lost over 80% (København N) or over 70% (København V) of the listings. This indicates that the listings which are still active on the platform are from the high segment as the hosts charge more per night which therefore increases the short-term rent gap. Furthermore, it could indicate that the majority of the hosts that are still active have a second home as it has become difficult to travel to another country and therefore the listings available on the website are vacant or can be vacant given that short-term tourists book it. One of the scenarios on why that number of listings decreased is that people are restricted to travel into other countries and sometimes even in their own country. Therefore, having their own apartment on Airbnb is not beneficial as there is no time that their flat is vacant. The remaining 30% of the listings in comparison to January 2021 could be therefore flats that are vacant most of the year. In the outskirts of Copenhagen there are still many listings available in relation to the number of listings in January 2020. Especially Valby, Vanløse, Brønshøj and København NV had the smallest decrease of listings in comparison to January 2020 with having more than 80% of the listings still available on the platform. Keeping in mind that it is likely that there are more owner-occupied apartments in these districts, this could indicate that these listings may be vacant all year around.

One possible effect of Airbnb on gentrification and the housing market is the possibility that buyers calculate the additional revenue from Airbnb in when they are on vacation and offering their flat on Airbnb during that time. This could result in increased transaction prices for owner-occupied apartments. A look into the realised transaction prices reveals that the prices in fact increased in every district. In the last 5 years the prices especially

in the working-class districts Vanløse and Valby experienced the highest increase in Copenhagen. Both districts were areas in which high short-term rent gaps could be found. It indicates that people in fact may calculate the additional revenue in when buying an apartment, as the income as a short-term rental on Airbnb is low-taxed. But Airbnb will not be solely responsible for the increased real estate prices in Copenhagen, it is rather one factor that influences the overall development. Other factors are the financing, which is considered to be one of the lowest in the world with negative interest, or the lack of supply compared with a huge demand. Therefore, Airbnb holds the potential to increase real estate prices in Copenhagen´s districts causing challenges for first-time buyers and socially or economically disadvantage people as owning a home is getting more expensive and for some even impossible. This is a form of displacement that Marcuse (1985) defines as 'exclusionary displacement' (ibid.). The costs for housing are increasing and getting unaffordable for disadvantaged groups and first-time buyers and therefore excluding them from being able to live in those districts. Direct displacement is unlikely to happen due to the laws that are in power in Denmark and the idea of cooperative having a use-value rather being a commodity.

In the case of Copenhagen, it is not a tourism-led gentrification process that is taking place. It is a gentrification process that the city itself is generating by implementing major urban regenerations projects that cause former residents of the area to move out of the district. This is especially apparent in København V (Appendix G). In the 1980s the district was run-down until the city of Copenhagen invested a lot of money into an urban regeneration project causing a change of population where the socially disadvantaged people moved out of the district, leaving København V as one of the most affluent areas in Copenhagen with residents who have a higher socio-economic status than before. Nowadays, it is filled with ethnic restaurants and cafes and considered *hip*. It is also one of the two hotspots of Airbnb where more than 10% of the dwellings were active on the platform until Covid-19 changed the situation around tourism. In the other hotspot København N a similar development was experienced with the difference that an area in the north of the district still hosts socially disadvantaged people, but the centre of the district also experienced a change in population. Other actors than the city have a difficult time investing into the area as there is a strict legislative around the housing market in Copenhagen. Blackstone, for example, tried to use a loophole in the Danish system and offered apartments after renovations for a higher price. But the Danish parliament decided to stop their activity (Curt Liliegreen, 26.04.2021). Therefore, the case of tourism gentrification in which a gentrification is driven by short-term tourists that change the

place they are visiting, is not met in Copenhagen. In the best case the tourists add only a small factor to the development in Copenhagen. The housing market is too regulated to be hugely influenced by short-term tourists. It is important to mention that there will be a grey zone around Airbnb and a black market. But neither of these are trackable resulting that these actions fly under the radar of the government. Nevertheless, also these actors in the grey zone can have effects on processes around the housing market.

The effect that Covid-19 had on Airbnb in Copenhagen needs further attention. The datasets used in this analysis are in general young and regarding Covid-19 even younger and the pandemic is at no means at an end. The worldwide pandemic is still ruling in the majority of the world and changing the formerly known lifestyles. It is likely that once travelling into foreign countries is possible that the activity on Airbnb in Copenhagen will increase again. It is speculative if the situation will reach or exceed the one Copenhagen experienced before the pandemic. Factors like the safety of tourists in regard to Covid-19 can shift tourists to new destinations. Denmark and Copenhagen could profit from that as the situation around Covid-19 was more efficiently managed than in other tourist destinations for example in southern Europe. The people in Copenhagen may also be forced to offer their flats on Airbnb during the summer to yield revenue as the pandemic influenced the labour market and some people had less income than before or were counting on the additional income already in 2020. Regarding the effect of Airbnb during Covid-19 on the housing market and gentrification it is premature to draw the conclusions. Similar to the situation before Covid-19 it is difficult to identify certain trends in a housing market that is regulated and where these effects can only be analysed in a small setting like the owner-occupied flats in Copenhagen.

7. Conclusion

This research used a mixed methods approach with the short-term rent gap framework introduced by Wachsmuth and Weisler (2018) as one part and one additional online expert interview with Curt Liliegreen as the other to analyse the effects of short-term rentals on gentrification processes and the housing market in Copenhagen, Denmark.

Airbnb is widespread in Copenhagen and in the hotspot districts København N and København V more than every tenth dwelling of the districts was listed on the platform in June 2020. This indicates that Airbnb became mainstream in Copenhagen and that the citizens are seeing Airbnb as a way to yield additional revenue. Other districts that have a high concentration of entire home Airbnb listings are København K, which

traditionally also hosted tourists, København S and København Ø, which are gentrified districts close to the city centre. These findings go in line with previous studies (Wachsmuth and Weisler, 2018; Cócola-Gant, 2018) about the characteristics of areas where a high concentration of listings is expectable due to the district being gentrified, meeting the taste of the short-term tourists with new ethnic restaurants and cafes.

The only part of the market that can be investigated to see Airbnb's effects on the housing market and gentrification processes are the owner-occupied apartments. The possible way that Airbnb influences this part of the market is that buyers are already calculating the additional revenue from Airbnb in when buying their apartment. This could result in an increase of the realised transaction prices. In fact, did the realised transaction prices rise during the time frame of this study, but this cannot be solely be caused by Airbnb. Other factors like the cheap financing and the lack of supply connected with huge demand are also influencing these prices. Airbnb, therefore, holds the power to aggregate to these factors and affect the realised transaction prices in Copenhagen. The effect that Airbnb holds is generally difficult to measure as the housing market in Copenhagen is unique. Especially in the neighbourhoods with a high concentration of entire home Airbnb listings the housing market is characterised by cooperative housing with almost 40% of the percentage share of the housing stock in these districts. Cooperative housing is based on being of use value rather than exchange value. Therefore, it is a highly regulated market in which regulations are into place to strengthen the tenant's rights and in which the market has no power to influence rent prices. The same applies to the private rented market where an agreed rent is fixed after signing the contract with a landlord. Due to these regulations in power, Airbnb does not hold a lot of power to change the structures of the housing market.

In this analysis, the short-term rent gap can only be applied to the owner-occupied market as there is a sufficient lack of data for the cooperative housing market and the assumption made with the occupancy model will not be met due to strict regulations around the cooperative housings. Generally, the assumption made is only met by people who own more than one house, who have the possibility to live during the time when the flat is rented out on Airbnb at someone else's place like their partners or landlords who do not fill their apartments with long-term residents. This research suggests that many hosts on Airbnb rent out their cooperative apartments as the hotspots of entire home Airbnb listings are located in København N and København V, where that type of tenure is dominating. Therefore, the hosts rent their apartment out when they are out of their

apartment, for example during their vacations. The short-term rent gaps in that scenario are not existent as the apartment is otherwise in their own use and under the strict regulations in power. Regarding the owner-occupied market, which is generally higher outside of the city centre, there is a huge incentive for owners to transform their apartments into short-term rentals as the short-term rent gap implies that in the outskirts of the city there is a big short-term rent gap which could be exploited. Especially the districts København S, Vanløse and Valby. The last two of these are currently in a gentrification process and characterised as working-class areas. Another factor that reduces the effects of Airbnb are the new regulations from the Danish government in regard to short-term rentals in which a 70 days cap was introduced. Most owners will be scared to break the law even though the government only receives the information about the income from Airbnb and cannot prove how many days the apartment was rented out. Generally, the way the short-term rent gap is used in this study implies how big the potential effect of Airbnb could be, especially if the market would be more deregulated.

Covid-19 did impact the available listings on Airbnb significantly as a 70% decrease of listings was investigated in comparison from January 2020 to January 2021. Nevertheless, was the spatial distribution similar in those two datasets. This implies that the distribution of entire home Airbnb listings is resistant. In regard to the realised transaction prices no effect was detected as the prices kept increasing. In the future, Airbnb may even be more widespread in Copenhagen as Denmark handles the spread of Covid-19 better than other tourist destinations and the people in Copenhagen may be forced to yield additional revenue to counteract to the impacts that Covid-19 had on the labour market.

This study aimed to investigate a case of tourism gentrification. The findings suggest that Copenhagen is not subject of tourism gentrification. Due to the regulated market and the regulations around short-term rentals in Denmark, there is no gentrification process underway that is led by short-term tourists that are visiting the city. The gentrification that happens in the city was implemented by the city itself by implementing major urban regeneration projects. Especially both Airbnb hotspots København V and København N experienced this kind of gentrification where socio-economic disadvantaged people were pushed out of the district in the late 1990s and the beginning of the 2000s. The effect that Airbnb has on gentrification processes is that due to the additional revenues buyers may take that additional income into account when buying an apartment resulting in higher real estate prices causing exclusionary displacement. The increased costs for

housing are getting unaffordable for disadvantaged groups or first-time buyers and therefore excluding them from being able to live in the districts with a high Airbnb concentration.

This research faced some gaps which further researchers could potentially fill. Generally, to be able to better understand the role of Airbnb in the housing market and gentrification processes in Copenhagen it is necessary to characterize the Airbnb listings towards their type of tenure. This would enable the researchers to distinguish in the dataset between owner-occupied flats and cooperative housing to have a more detailed analysis. Furthermore, it would enable researchers to investigate what kind of listings were taken off the platform between January 2020 and January 2021. Possible scenarios are cooperative apartments in which the tenants are not able to go on vacation anymore because of the travel restrictions or owners that were illegally using Airbnb to offer their apartment all year around on the platform and with the decrease of tourist numbers were forced to rent their flat out to long-term tenants. Another factor that could strengthen future research is to identify how often listings were rented in a year or month. This would enable future research to go into more detailed analyses and more exact short-term rent gaps.

8. Bibliography

AIRBNB. 2021. Home Sharing in Denmark [Online]. Available: https://www.airbnb.dk/d/homesharingdenmark?fbclid=IwAR3Vb7DIUmhKp7StATjxMc8bYMedJuRI0nGh1JVxxmS_exXkTnCPNbAzQj4 [Accessed 22.04.2021].

ALSUDAIS, A. 2021. Incorrect data in the widely used Inside Airbnb dataset. Decision Support Systems, 141, 1-7.

ARCGIS. 2021a. Point Density [Online]. Available: https://desktop.arcgis.com/en/arcmap/10.3/tools/spatial-analyst-toolbox/point-density.html [Accessed 04.05.2021].

ARCGIS. 2021b. Punkt in Raster [Online]. Available: https://desktop.arcgis.com/de/arcmap/10.3/tools/conversion-toolbox/point-to-raster.html [Accessed 22.04.2021].

ARCGIS. 2021c. Polygon in Raster [Online]. Available: https://desktop.arcgis.com/de/arcmap/10.3/tools/conversion-toolbox/polygon-to-raster.html [Accessed 22.04.2021].

ARCHIBALD, M. M., AMBAGTSHEER, R. C., CASEY, M. G. & LAWLESS, M. 2019. Using Zoom Videoconferencing for Qualitative Data Collection: Perceptions and Experiences of Researchers and Participants. International Journal of Qualitative Methods, 18.

ARDURA URQUIAGA, A., LORENTE-RIVEROLA, I. & RUIZ SANCHEZ, J. 2020. Platform-mediated short-term rentals and gentrification in Madrid. Urban Studies, 57, 3095-3115.

ARIAS-SANS, A. & QUAGLIERI-DOMÌNGUEZ 2016. Unravelling Airbnb: Urban Perspectives from Barcelona. In: RUSSO, A. P. & RICHARDS, G. (eds.) Reinventing the Local in Tourism. Bristol, Blue Ridge Summit: Channel View Publications.

BALAMPANIDIS, D., MALOUTAS, T., PAPATZANI, E. & PETTAS, D. 2019. Informal urban regeneration as a way out of the crisis? Airbnb in Athens and its effects on space and society. Urban Research & Practice, 1-20.

BRYMAN, A. 2016. Social Research Methods, Oxford, Oxford University Press.

CLARK, E. 2005. The order and simplicity of gentrification —a political challenge. Gentrification in a Global Context.

CÓCOLA-GANT, A. 2016. Holiday Rentals: The New Gentrification Battlefront. Sociological Research Online, 21, 112-120.

CÓCOLA-GANT, A. 2018. Tourism gentrification. In: LEES, L. & PHILLIPS, M. (eds.) Handbook of Gentrification Studies. Cheltenham, Northampton: Edwar Elgar Publishing.

CÓCOLA-GANT, A., GAGO, A. & JOVER, J. 2020. Tourism gentrification and neighbourhood change: an analytical framework. Reflections from Southern European cities. In: OSKAM, J. (ed.) The Overtourism Debate. NIMBY, Nuisance, Commodification. Bingley: Emerald.

DST. 2021a. BOL101: Dwellings by region, type of resident, use, tenure, ownership and year of construction [Online]. Available: https://www.statbank.dk/statbank5a/SelectVarVal/Define.asp?MainTable=BOL101&PLanguage=1&PXSId=0&wsid=cftree [Accessed 22.04.2021].

DST. 2021b. BOL106: Dwellings with registered population (average) by area, unit and use [Online]. Available: https://www.statbank.dk/statbank5a/SelectVarVal/Define.asp?MainTable=BOL106&PLanguage=1&PXSId=0&wsid=cftree [Accessed 22.04.2021].

FINANS DANMARK. 2021. Boligstatistik [Online]. Available: https://rkr.statbank.dk/statbank5a/default.asp?w=1504 [Accessed 22.04.2021].

FÜLLER, H. & MICHEL, B. 2014. 'Stop Being a Tourist!' New Dynamics of Urban Tourism in Berlin-Kreuzberg. International Journal of Urban and Regional Research, 38, 1304-1318.

GONZÁLEZ-PÉREZ, J. M. 2019. The dispute over tourist cities. Tourism gentrification in the historic Centre of Palma (Majorca, Spain). Tourism Geographies, 22, 171-191.

GOTHAM, K. F. 2005. Tourism Gentrification: The Case of New Orleans' Vieux Carre (French Quarter). Urban Studies, 42, 1099-1121.

GRAVARI-BARBAS, M. & GUINAND, S. 2017. Introduction: Addressing tourism-gentrification processes in contemporary metropolises. In: GRAVARI-BARBAS, M. & GUINAND, S. (eds.) Tourism and Gentrification in Contemporary Metropolises. International Perspectives. London & New York: Routledge.

GRAY, L. M., WONG-WYLIE, G., REMPEL, G. R. & COOK, K. 2020. Expanding Qualitative Research Interviewing Strategies: Zoom Video Communications. The Qualitative Report, 25, 1292-1301.

HUSLEJE. 2021. Vores huslejestatistik [Online]. Available: https://husleje.dk/statistik [Accessed 22.04.2021].

INSIDE AIRBNB. 2021. About [Online]. Available: http://insideairbnb.com/about.html [Accessed 22.04.2021].

KØBENHAVNS KOMMUNE. 2021. KKBOL1: Dwellings by district, ownership, year of commissioning, type of use and number of rooms [Online]. Available: https://kk.statistikbank.dk/statbank5a/default.asp?w=1504 [Accessed 04.05.2021].

KØBENHAVNS KOMMUNE. 2021. KKBOL3: Dwellings, m²s and residents by district, ownership, year of commissioning and type of use.

LARSEN, H. G. & LUND HANSEN, A. 2016. Wohnen als öffentliches Gut auf dem Prüfstand. Wohnungsreformen in Dänemark und Schweden. Geographische Rundschau, 6, 26-31.

LEES, L. 2003. Super-gentrification: The Case of Brooklyn Heights, New York City. Urban Studies, 40, 2487-2509.

LEES, L., SLATER, T. & WYLY, E. 2008. Gentrification, New York &London, Routledge.

LILIEGREEN, C. 2018. AirBnB: Deleøkonomi, ny teknologi eller en forbandelse [Online]. Available: https://www.bvc.dk/almen-formidling/airbnb-deleoekonomi-ny-teknologi-eller-en-forbandelse [Accessed 22.04.2021].

MARCUSE, P. 1985. Gentrification Abandonment and Displacement: Connections, Causes, and Policy Responses in New York City. Journal of Urban and Contemporary Law, 28, 195-240.

MERMET, A. 2017. Airbnb and tourism gentrification: critical insights from the exploratory analysis of the 'Airbnb syndrome' in Reykjavík. In: GRAVARI-BARBAS, M. & GUINAND, S. (eds.) Tourism and Gentrification in Contemporary Metropolises. International Perspectives. 1 ed. London & New York: Routledge.

ØSTERGAARD IVERSEN, A., ZANGENBERG HANSEN, J., FRANK HANSEN, M. & STEPHENSEN, P. 2019. Udsatte boligområder i Danmark - En historisk analyse af

socioøkonomisk segregering, flyttemønstre, indkomstforløb og effekt af bosætning i udsatte boligområder. København: DREAM.

PARSONS, D. 1980. Rural gentrification: The influence of rural settlement planning policies, Brighton, UK: University of Sussex.

SMITH, N. 1979. Toward a Theory of Gentrification. A Back to the City Movement by Capital, not People. Journal of the American Planning Association, 45, 538-548.

SMITH, N. 2002. New Globalism, New Urbanism: Gentrification as Global Urban Strategy. Antipode, 34, 427-450.

STYRELSEN FOR DATAFORSYNING OG EFFEKTIVISERING: 2021. Danmarks Administrative Geografiske Inddeling 1:10.000 [Online]. Available: https://download.kortforsyningen.dk/content/danmarks-administrative-geografiske-inddeling-110000 [Accessed 04.05.2021].

WACHSMUTH, D. & WEISLER, A. 2018. Airbnb and the rent gap: Gentrification through the sharing economy. Environment and Planning A: Economy and Space, 50, 1147-1170.

WALDERSEE, V. 2021. Pandemic tames Airbnb in Europe's tourist hotspots - for now [Online]. Reuters. Available: https://www.reuters.com/article/us-airbnb-europe-cities-insight/pandemic-tames-airbnb-in-europes-tourist-hotspots-for-now-idUSKBN2B014R [Accessed 12.05.2021].

YRIGOY, I. 2019. Rent gap reloaded: Airbnb and the shift from residential to touristic rental housing in the Palma Old Quarter in Mallorca, Spain. Urban Studies, 56, 2709-2726.

ZUKIN, S. 1993. Landscapes of Power. From Detroit to Disney World. Berkeley: University of California Press.

9. Appendix

Appendix A: Average rent per district per m² per year (own contribution based on data from husleje.dk)

ZIP Code	District	Price per m² per year [in DKK]	Number of announces
1000-1499	København K	2.496,85	1007*
1500-1799	København V	1.961,26	501**
1800-1999	Frederiksberg C	1.993,96	277***
2000	Frederiksberg	1.911,40	1252
2100	København Ø	2.045,42	2450
2150	Nordhavn	2.147,55	415
2200	København N	1.995,54	1175
2300	København S	1.825,37	9574
2400	København NV	1.958,06	976
2450	København SV	1.825,17	3908
2500	Valby	1.812,59	3402
2700	Brønshøj	1.653,42	398
2720	Vanløse	1.844,11	578

Table 2: Average rent per district per m² per year (own contribution based on data from husleje.dk)
*Zip Codes: 1100, 1130, 1151, 1200, 1210, 1220, 1250, 1253, 1256, 1260, 1264, 1270, 1300, 1306, 1317, 1358, 1400, 1422, 1432, 1458, 1470
**Zip Codes: 1550, 1553, 1561, 1577, 1600, 1606, 1620, 1624, 1632, 1656, 1700, 1718, 1799
***Zip Codes: 1800, 1807, 1813, 1818, 1820, 1850, 1870, 1879, 1900, 1912, 1914, 1915, 1954, 1958, 1962, 1964

Appendix B: Percentage Share of Entire Home Airbnb Listings in Relation to Dwellings per District (own contribution based on data from Inside Airbnb, Københavns Kommune & DST)

District	Housing 2016			Housing 2019			Housing 2020					Housing 2021		
	Dwellings	Entire Home Listings (06/16)	%	Dwellings	Entire Home Listings (01/19)	%	Dwellings	Entire Home Listings (01/20)	%	Entire Home Listings (06/20)	%	Dwellings	Entire Home Listings (01/21)	%
København K	28525	1797	6,30%	30003	2977	9,92%	30262	3212	10,61%	3242	10,71%	30342	1484	4,89%
København V	32385	2072	6,40%	36125	3442	9,53%	37459	3718	9,93%	3764	10,05%	38471	1121	2,91%
Frederiksberg*	54696	1625	2,97%	55641	2612	4,69%	56175	2806	5,00%	2849	5,07%	56175	801	1,43%
København Ø	41015	1384	3,37%	42312	2336	5,52%	42753	2608	6,10%	2609	6,10%	43167	823	1,91%
København N	41038	2310	5,63%	41541	4162	10,02%	42044	4355	10,36%	4393	10,45%	42136	1076	2,55%
København S	64200	2046	3,19%	68985	3536	5,13%	71547	3913	5,47%	3965	5,54%	73785	1165	1,58%
København NV	29359	574	1,96%	30023	1091	3,63%	30111	1140	3,79%	1151	3,82%	30137	233	0,77%
Valby	26889	530	1,97%	29043	859	2,96%	30063	989	3,29%	981	3,26%	31327	266	0,85%
Brønshøj	20165	219	1,09%	20330	353	1,74%	20385	410	2,01%	421	2,07%	20394	111	0,54%
Vanløse	20311	359	1,77%	20630	592	2,87%	20713	640	3,09%	651	3,14%	20733	175	0,84%
Total	303887	12916	4,25%	318992	21960	6,88%	325337	23791	7,31%	24026	7,38%	330492	7255	2,20%

Table 3: Percentage Share of Entire Home Airbnb Listings in Relation to Dwellings per District (own contribution based on data from Inside Airbnb, Københavns Kommune & DST)
*Source: DST

Appendix C: Proxy for Capitalized Ground Rent (own contribution based on data from husleje.dk, Københavns Kommune & DST)

ZIP Code	District	Price per m² per year [in DKK]				Average Apartment Size				Monthly average rent [in DKK]			
		2016	2019	2020	2021	2016	2019	2020	2021	2016	2019	2020	2021
1000-1499	København K	2.062,14	2.340,56	2.496,85	2.496,85	102,5	103,6	103,5	103,6	17.614,13	20.206,82	21.535,33	21.556,14
1500-1799	København V	1.641,62	1.828,53	1.961,26	1.961,26	78,3	80,8	81,4	81,5	10.711,55	12.312,10	13.303,88	13.320,22
1800-1999	Frederiksberg C*	1.667,11	1.877,65	1.993,96	1.993,96	89,3	89,3	89,3	89,3	12.406,09	13.972,88	14.838,39	14.838,39
2000	Frederiksberg*	1.660,06	1.850,45	1.911,40	1.911,40	89,3	89,3	89,3	89,3	12.353,59	13.770,40	14.224,00	14.224,00
2100	København Ø	1.687,80	1.921,95	2.045,42	2.045,42	84,4	85,8	85,8	85,8	11.870,86	13.741,97	14.624,75	14.624,75
2150	Nordhavn	0,00	1.970,71	2.147,55	2.147,55	84,4	85,8	85,8	85,8	0,00	14.090,57	15.354,98	15.354,98
2200	København N	1.667,23	1.948,04	1.995,54	1.995,54	75,3	75,6	75,5	75,7	10.461,86	12.272,64	12.555,27	12.588,53
2300	København S	1.521,94	1.786,81	1.825,37	1.825,37	76,05	77,65	78,25	78,4	9.645,27	11.562,17	11.902,93	11.925,75
2400	København NV	1.581,80	1.855,63	1.958,06	1.958,06	66,3	66,3	66,3	66,5	8.739,46	10.252,33	10.818,28	10.850,92
2450	København SV	1.465,98	1.670,99	1.825,17	1.825,17	78,3	80,8	81,4	81,5	9.565,51	11.251,31	12.380,74	12.395,95
2500	Valby	1.477,73	1.726,86	1.812,59	1.812,59	72,4	74	74,1	74,5	8.915,64	10.648,99	11.192,74	11.253,16
2700	Brønshøj	1.324,21	1.646,41	1.653,42	1.653,42	72,3	72,5	72,6	72,7	7.978,39	9.947,06	10.003,19	10.016,97
2720	Vanløse	1.502,82	1.801,28	1.844,11	1.844,11	69,1	69,4	69,3	69,4	8.653,73	10.417,41	10.649,74	10.665,10

Table 4: Proxy for Capitalized Ground Rent (own contribution based on data from husleje.dk, Københavns Kommune & DST)
* Average Apartment Size based on DST who publish the data per city

Appendix D: Interview Guide

Ask for permission to record the audio of the interview – transcript afterwards to check.

- To begin our interview with I would like to ask you if you could elaborate on why you choose to publish an article about Airbnb on the website of The Knowledge Centre for Housing Economics in 2018.

Share: [Figure 1] – the **development of the entire home listings of Airbnb** in Copenhagen

[Figure 2] – The **spatial distribution** of the listings in Copenhagen

[Table 1] – **Percentage share of the listings** in relation to the total dwellings in Copenhagen.

- What are your first thoughts after seeing these tables and figures?
- Which area do you think experiences the highest shortage of housing in Copenhagen?

Now I would like to present you my results about the **Short-Term Rent Gap** which describes the gap between the capitalized ground rent, in this case I use as the proxy the actual rent, and the potential ground rent, in this case the proxy is the rent that is possible to achieve through Airbnb. The data for the proxy for the capitalized ground rent is from husleje.dk who publish average rent prices per m² per year per postal code which I multiplied with the average apartment size per district according to Kobenhavns Kommune and DST. The proxy for the potential ground rent is the price of the listing per night multiplied to a year with 60% occupancy.

Share: [Figure 3] – **Short-Term Rent Gap**

- Again, I would like to ask you about your first impressions about the results.
- Do you think the results are reasonable? Are you surprised about some results?
- Why do you think is the gap bigger in the outskirts of Copenhagen rather than in the main hotspots?

Let´s shift the focus slightly away from the distribution and different profitability's of **Airbnb** to what effects these listings can have on the **gentrification processes** as well as the **housing and real estate market.**

- What effects do you think can Airbnb potentially hold on the gentrification processes?
- And in what ways does Airbnb effect the housing and real estate market?

Policy regulations

- What do you think about the new legislation that included the 70 days cap for Airbnb listings by the Danish government?
- How efficient do you think is the legislation?

At this point I would like to shift the focus away from my findings to a discussion of the **housing market** in Copenhagen **generally**.

- How would you describe the current situation in general?
- What dynamics can you identify?
- How would you describe the development of the housing market in Copenhagen from 2009 to today?

Ending the Interview

- Is there something that you would like to add to our discussion that I may have forgotten or not been given enough attention to?

Then I would end the interview here and once again thank you for taking your time for this really interesting discussion around short-term rentals and their influence on the housing market.

Appendix E: Supplementary Data to the Interview

Dear Curt,

In the following pages you can find an overview of my results that I would like to discuss with you about during our interview on Monday.

Figures 1 presents an overview of the development of entire home Airbnb listings in Copenhagen throughout my five datasets in a time frame from June 2016 to January 2021 (Figure 1). Complementary to that figure, I created a table to display the percentage share that the total numbers of entire home listings have in comparison to the total numbers of dwellings that I extracted from Kobenhavns Kommune and DST (Table 1).

Figure 2 is a compilation of Heat Maps displaying the spatial distribution of the entire home listings in Copenhagen throughout June 2016, January 2019, June 2020 and January 2021. I decided to exclude the dataset from January 2020 as there were no substantial differences to June 2020 and to keep the maps on one page to make it easier to compare the maps with each other.

Figure 3 presents short-term rent gaps in Copenhagen. The short-term rent gap is a theory that relies on the wider rent gap theory. In a nutshell, it describes the difference between the capitalized ground rent (in this case the normal rent of a long-term resident for an apartment) and the potential ground rent (the rent possible with short-term visitors). As a proxy for the capitalized ground rent, I use the average rent price per m² per year per postal code (published by husleje.dk) multiplied with the average apartment size per district (published by Kobenhavns Kommune and DST). For the potential ground rent I created a simple occupancy model with the assumption that each of the listings are rented out 60% of the year (219 days), given the assumption that the listings are all converted to short-term rentals:

(Listing price per night) x (a year= 365 days) x (0,6 = occupancy rate) = Potential ground rent (per year)

The difference that arises between these two proxies is understood as the short-term rent gap.

I will also display the figures during our interview with the screen sharing feature of Zoom, but I would appreciate it if you could find a little time to already have a look at them, so that we can smoothly discuss them.

Kind regards,

Emre

Figure 1: Development of Entire Home Airbnb Listings in Copenhagen (own contribution based on data from Inside Airbnb)
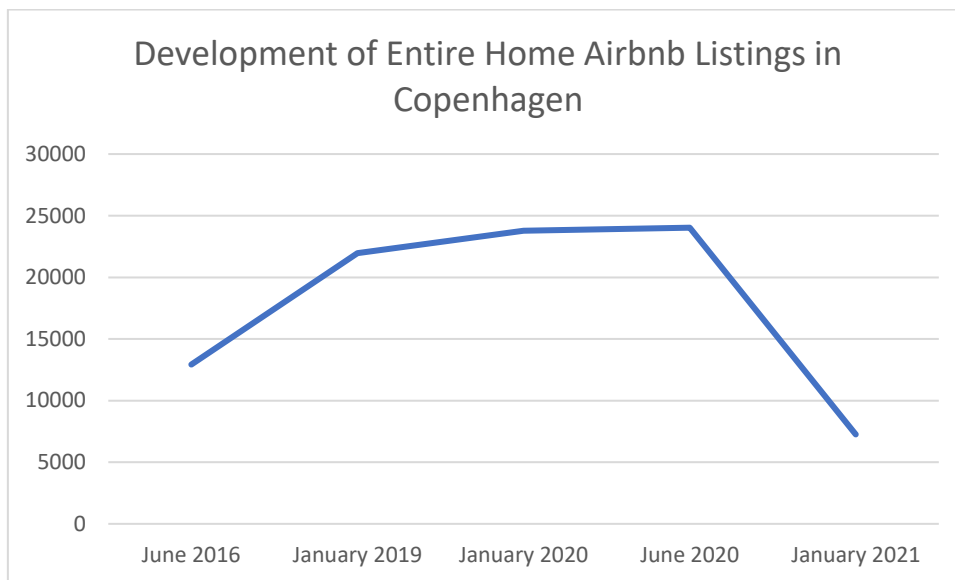
Table 1: Percentage Share of Entire Home Airbnb Listings in Relation to Dwellings in Copenhagen by District (own contribution based on data from Inside Airbnb, Kobenhavns Kommune & DST)

District	% - June 2016	% - January 2019	% - June 2020	% - January 2021
København K	6,30%	9,92%	10,71%	4,89%
København V	6,40%	9,53%	10,05%	2,91%
Frederiksberg*	2,97%	4,69%	5,07%	1,43%
København Ø	3,37%	5,52%	6,10%	1,91%
København N	5,63%	10,02%	10,45%	2,55%
København S	3,19%	5,13%	5,54%	1,58%
København NV	1,96%	3,63%	3,82%	0,77%
Valby	1,97%	2,96%	3,26%	0,85%
Brønshøj	1,09%	1,74%	2,07%	0,54%
Vanløse	1,77%	2,87%	3,14%	0,84%
Total	4,25%	6,88%	7,38%	2,20%

Figure 2:
Spatial
Distribution of
Airbnb Listings
in Copenhagen
(Heat Map)

(own
contribution)
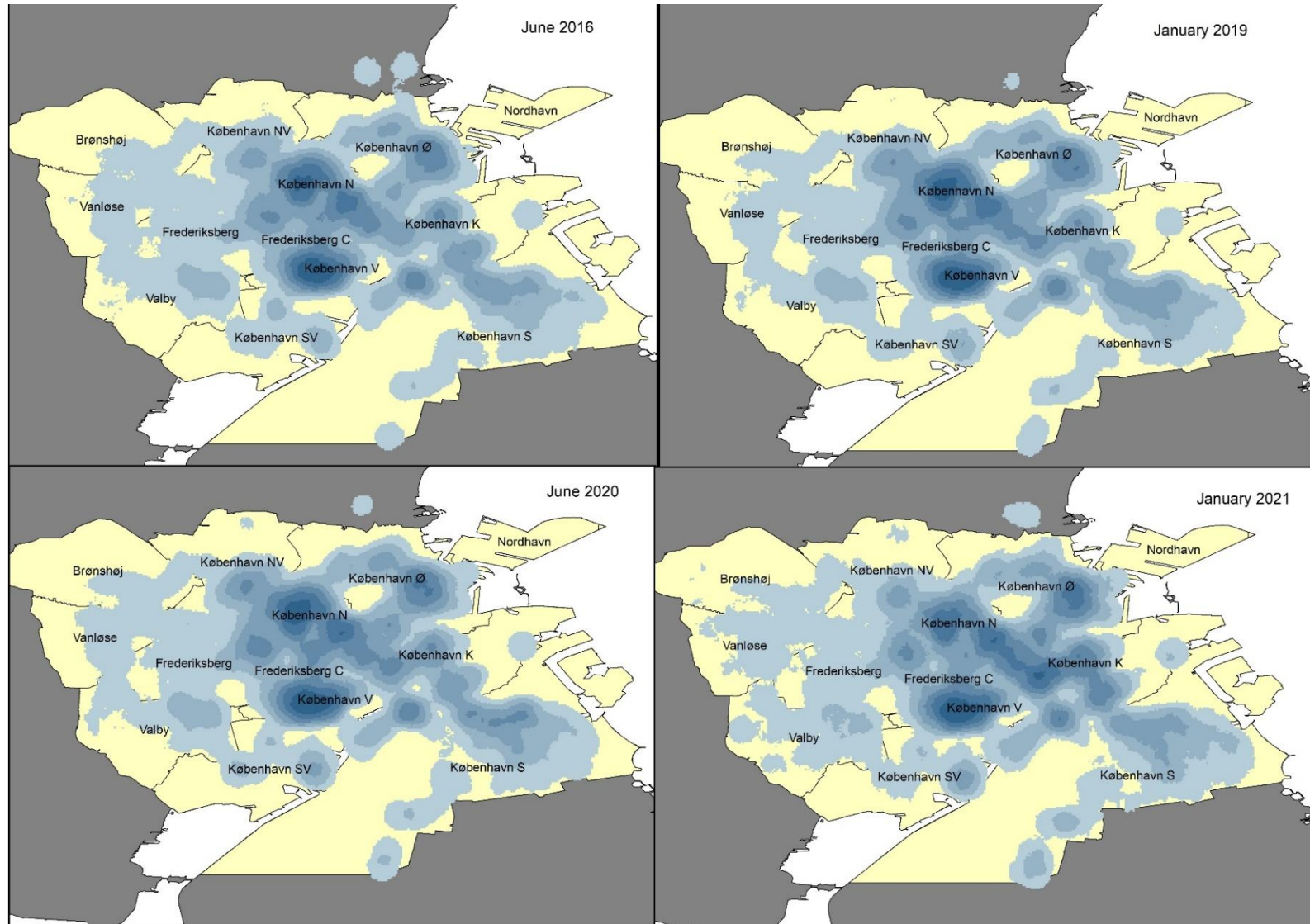
Figure 3:
Short-Term
Rent Gaps in
Copenhagen

(own
contribution)

Legend

Short-Term Rent Gap

by % to capitalized ground rent

- up to 25%
- up to 50%
- up to 75%
- up to 100%
- more than 100%
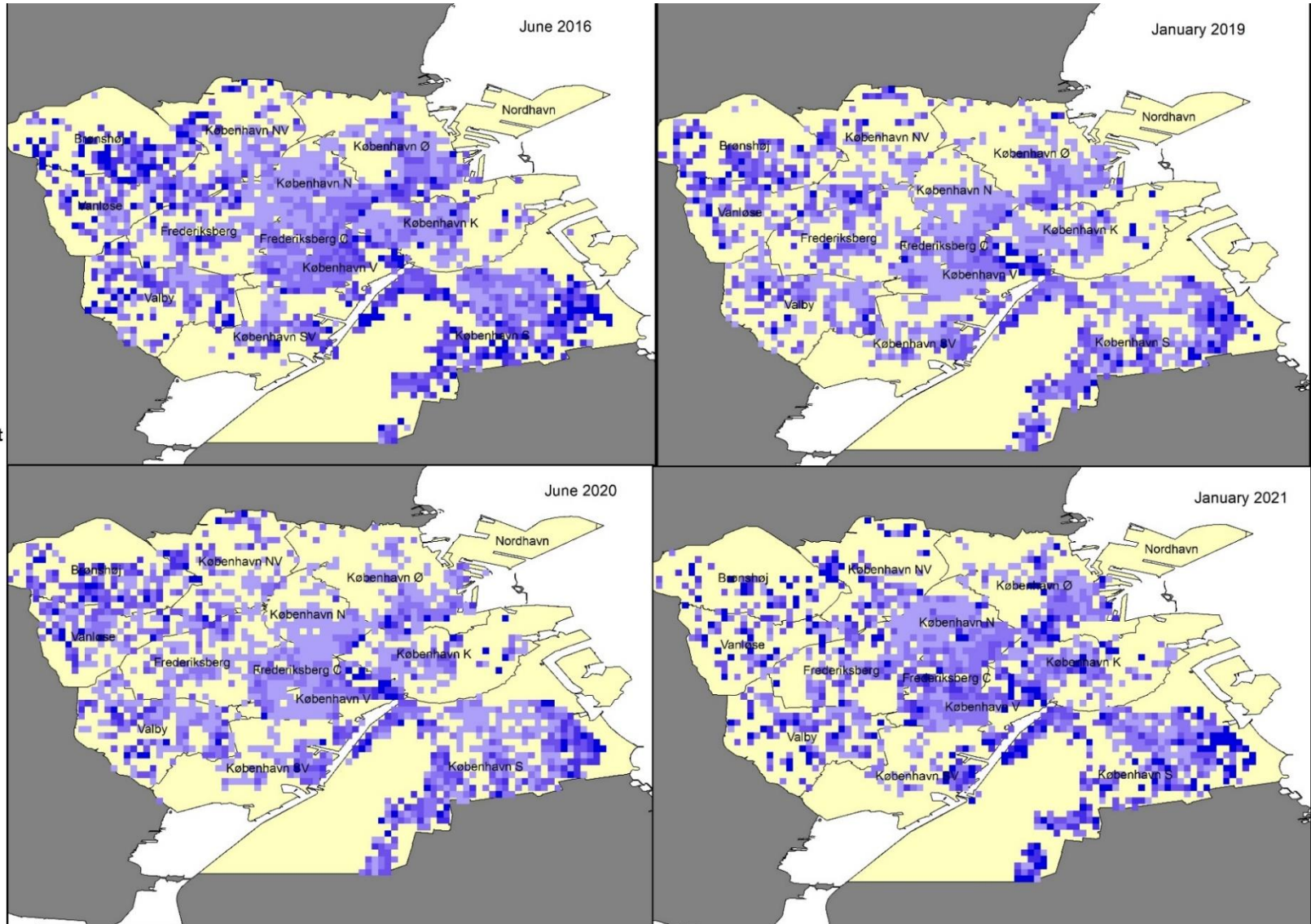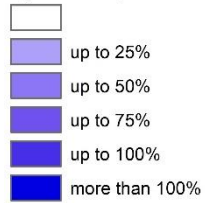
Appendix F: Interview Transcript

Interview with Curt Liliegreen – 26.04.2021

Part 1: 11:00 – 11:45

Emre: Recording. Alright, maybe to begin our interview with, I would like to ask you a bit to elaborate why you decided three years ago to write an article about Airbnb and the housing market in Copenhagen.

Curt: Well, I'm the CEO of an institution specialized in housing economics. That is the sole purpose of our initiative. And right now, we have a discussion about affordability and the problems with housing, housing supply in the greater Copenhagen area. This is an area that has been under demographic alteration for quite some time. We have seen an increase in population, also a household split. And we have seen that plasticity of supply lacking it behind. And therefore, we have also seen rents being driven up. We have seen an increase in housing prices. Even more so during the Corona pandemic. Of course, like other countries like Sweden where you are right now, I understand.

Emre: Correct.

Curt: And this discussion is not that much different from what you will see in other major cities in Europe. But we have a number of economic models in a number of research projects with different institutions focusing on the problems in Copenhagen, and we also act as a sparring partner for municipalities and politicians from time to time when they're talking about the problems connected with economics, housing, economics. So, what we're dealing with is the economic part of this and not the social, logical and development. We are not a political or commercial initiative. We do not accept grants from other than Realdania. We do not perform consultant tasks whatsoever. We are solely funded by Realdania and our mission is to analyse the development without being biased by commercial or economic or political interest. Now seeing Airbnb coming about in Copenhagen. And this is of course a thing that has been discussed in the media by politicians by organisations, also. The organisation for hotels and restaurants of course seeing them as a competitor, but we're more interested in the impact on the supply of housing and of course also the impact on rents and prices in Denmark and that is why we have discussed this. But we also have to realise that this discussion started out about Airbnb, but you have other platforms working and the system developed by Airbnb will have competitors. They will not be alone already. Now we see more traditional competitors gaining ground and taking a bigger market share. And we also see that many Danish citizens they accept Airbnb. They're using it themselves when they go abroad.

Yeah, so and again. Also, many Danish citizens use them to gain some revenue here. Some extra additional income when they're living in Copenhagen. Airbnb is also spreading out of Copenhagen to the whole country. We cannot just see this as a problem. You also have to acknowledge that this is now deeply established and rooted in the Danish society. We will have to find models to live with Airbnb and then we have to then also live with the effects of Airbnb just like we live with the effects of demographic changes, the extremely low interest level, the lack of new building land in Copenhagen and so on. It's just another problem being added to all the problems that existed before

in this city, so that is the reason we have been looking at it. And taking part in discussions about it also, I have been talking at conferences organised by the hotels and restaurants organisation at the People's Meeting in Bornholm. You have the same almadale, I think it's called in Sweden, a meeting for all politicians and about 100,000 people will go to Bornholm and take part of this. It's a Democratic tradition. They have also discussed Airbnb.

So, this has been our role, but we have not started out any research projects with regard to Airbnb. I had formally employed a civil engineer from Portugal who worked with Airbnb when she was employed by the International Federation for Housing and Planning IFHP. And she has originally been working in this in Portugal, where she came from, and there you will see a clear impact from Airbnb in the mediaeval part of the old part of the city. It's just one problem, especially for Lisbon, but she did not continue that work with me. We have another project, there is focusing on financialization and there is a broader problem you can say. And Airbnb is a minor problem, compared to the overall changes in in the whole financial environment, the framework around the housing market. So, that is the background for why we got interested in Airbnb. One of my jobs is to talk to the media and I'm doing so a lot, on a daily basis and the media will be asking me questions about Airbnb like they ask me questions about all aspects of the housing market. I have been in radio for the last five years 700 times and in Danish television almost 200 times.

Emre: That´s impressive.

Curt: So yeah, this is simply it's one of the reasons why we were established. So, I have to take part of course. It's also interesting, but that is why I will from time to time comment on a thing like Airbnb simply because it's my job and the journalist know me, so they will call me and ask me about all kinds of stuff. One day it will be Airbnb. You know the next day this effect from Corona pandemic, the next day it is the Housing Control Act, you know legislation, and so on and on and on. We cover it all. So, that is why you will see my name from time to time connected with a newspaper article or a web article about Airbnb.

Emre: Yeah, you were actually the only one I could find who did publish something about Airbnb in Copenhagen. That was also one of the backgrounds why I decided to do research on it because there was a gap and I thought it's quite dominant in Copenhagen. As you also wrote in your article.

Curt: Yeah, it has come very quick. And in the beginning, it was slow. I think Danish citizens were conservative with regard to this this platform, this American invention. But then there was a breakthrough and it really accelerated. And now it's widespread. It started out in Copenhagen, but just before the Corona pandemic hit us, I could see it was spreading also. In other parts of the country and spreading away from the flats in Copenhagen to summer houses, you know the whole more traditional area for tourists. So, it's quite interesting how a platform like that can gain ground, but of course it started in Copenhagen and that's what we're seeing here is traditional Airbnb in territory that will be what we call Brokvarter. That is the old originally working-class neighbourhoods at a little bit outside of the Copenhagen Centre. Very close to it, Nørrebro, Vesterbro, Østerbro, Amagerbro, the Brokvarter. Danish for bridge. In those neighbourhoods there

has been a lot of gentrification going on since about 1995. Before some parts of it like Nørrebro and Vesterbro they were really low standard, very poor housing quality. But it went through urban renewal. And billions of Danish kroner in invested in this rather small area actually. So about 80 billion Danish kroner got invested in urban renewal in Denmark from about 1985 until 2005. And, Vesterbro was an area that went through this renewal. It used to be abominable area. In one of my projects with the Danish Research Agency DREAM, Danish Rational Economic Agent Model. That's a model building scientific group working under the Ministry of Finance, but with their own power. They are my main partner; I have to say. We made a project about the vulnerable area. Focusing on social housing actually, but also analysing all kinds of housing, private owner-occupied whatsoever from 1987 to 2017. And there we have been able to identify the most vulnerable. I think in Swedish you will call them almännyttig. But area in popular language called like a ghetto.

Emre: Uh huh.

Curt: And we can see they were quite distinctive in the late 1980s, and now they are completely gone. Because it has been gentrified. And that is due to the high level of investments in those area. It's an area I have been interested in before in the project many years ago. In my former job analysed that with the Danish architect institution called DAC with their managing director. And the changes that is an early example is Kreuzberg in Berlin. You can see that or like Hell's Kitchen at Manhattan. This is a very good example of quick and total gentrification of an area. So now you have many interesting ethnic restaurants, for instance cafes and so on. It is totally changed, and the prices went up. I have just here this morning gather some price data for you and zip codes. And there you can see the different parts of Copenhagen and how they have increased on a quarterly basis in average price per square metre. And then here during the Corona pandemic. Areas like Vesterbro or Nørrebro areas they've gone up not so much as other areas that are a little bit outside of town. And that is because the gentrification is already done, it's over. Vesterbro and Nørrebro has been gentrified. So now it's new areas that's going up a little bit outside of the town and not areas, like Vesterbro that 25 years ago was a place, you couldn't go there; you would get assault you know, and you have drug abusers everywhere and look terrible.

Emre: It was also the red-light district, right?

Curt: It's still a red-like district.

Emre: Oh okay.

Curt: But not so much anymore. I think you cannot really use that phrase in Denmark anymore. That was in the 1960s when the legislation regarding pornography was changed in Denmark and everything was deregulated and then it was known as a red-light district, just like Amsterdam is today. But if you walk in the area, you will not really feel that, only this: Some of the shops are still there, but no one more would be moved out and you will see cafes and restaurants coming in their place instead. We still have social problems. We still have people gathering in that area, but they are, I would say, not living there. They just come there because you have the main station close by. So, it

is a gentrified area and the prices are quite high and you have rather fancy restaurants and bars. Now I don't know if you ever walk there, have you been there?

Emre: Yes, I've been in Copenhagen quite a lot. And I mean, we're quite close here in Lund, right? Before Corona it was just an hour train drive. I've been there couple of times, yeah, and that's also where I got my inspiration, because in August 2020 we were allowed to actually travel to Copenhagen. There were no tourists and it was a complete changed city.

Curt: Yeah.

Emre: And so, I picked up on that and thought how maybe this platform could have changed during that time.

Curt: And in the last I would say about three or four years, an area called the Kødbyen. The white meat city. Used to be a slaughterhouse. It's a big, very big area and its built-in architecture ready distinctive from the 1930s like Bauhaus architecture. It is now preserved. And in that area, we would now have a lot of bars and restaurants. It's totally; its jam packed with young people. In the weekends. You cannot move around there and now even though we have Corona, it's totally packed now because they have east on the restrictions. So, and this is an area that was totally empty of that kind of activity that everything was empty. And only a few years ago, it is really a change that is substantial from on a very short time basis. I've seen that. In Nørrebro to the North, this happened over a long period of time. It started in the beginning of the ages already, but Vesterbro it has come lately and been very quick in succession. So, in that area you will see that that price there are up now. They have already gone up. They are still going up, but now that the price changes they are moving a little bit outside of Copenhagen to the South and to the West. The price is going up everywhere, of course, but not that much to the North. In the North, in areas like Hellerup and Charlottenlund, you have very expensive areas. And they're still expensive, but they're not going off that much. What is happening now is at gentrification process taking part, go into the West out of the central part of the innermost part of Copenhagen, to Valby and Vanløse of its traditional Labour working class areas, little bit outside. Still have a large tub of detached housing also, and from there moving further out to the municipalities, neighbouring municipalities of Hvidovre and Rødovre. And they have seen substantial changes, so this is now quite costly areas. And they used to be, I would say, not for the middle class, but for the working class. So, we have a city that is under gentrification, but in Vesterbro and Nørrebro you also have to notice a peculiarity for the Copenhagen housing market, and that is that the number of owner-occupied flats is very small. The percentage is down to about 10% of the supply in those areas. Now Copenhagen is the municipality in Denmark with a lowest ratio of owner-occupied housing whatsoever. It is for the whole municipality, 28%.

Emre: Why is that?

Curt: Well, it's for historical reasons. Because this used to be private renting housing, all of it. And when they deregulated the laws about this, some of them, they got turned into owner-occupied apartments way back in the 60s. But that gap in legislation was stopped because it was low quality apartments and it was seen as speculation. Then you were left with a lot of private rented apartments of poor quality. But there was a change in the

law about this type of apartments. Then if you'll sell them, if the owner, the investor, sell them to another, first, he will have to offer them to the tenants so they can take over and create it as a cooperative. Now in the old days we had few cooperatives in Copenhagen. We had some created about 1900, 1910 mostly houses. This is part of Danish history with regards to the housing market, but that type of cooperatives it stopped completely. So now all of a sudden from about 1970 and on a lot of new cooperatives got created. So, what you see in Copenhagen is a housing market dominated by cooperatives. This is very interesting because it's not like that in Arhus, Aalborg or Odense and you'll find this in Copenhagen where about 1/3 of the total housing supply will be cooperatives. That is more than the owner-occupied apartments. If you look at social housing, it's down to about 20%. That is, even below the average for the country. And that is because social housing is concentrated in what we call the concrete belt West and South of Copenhagen in municipalities like Ballerup or Glostrup or whatsoever. So, you have a lot of cooperatives. That is the same as in Stockholm. In Sweden you call them Bostadsrätt. And the owner-occupied apartments, you call them äganderätt. But actually, that has been illegal in Sweden to create owner occupied apartments in Stockholm. So, you have very few. What you do have is Bostadsrätt. In Danish Andelslejlighed, in English cooperatives, but in Sweden traded at a market price and that is the difference between Denmark and Sweden and Norway because you also have deregulated this market. This is a very important thing because it has an impact over to the whole discussion about Airbnb. Now in Sweden you have a market price and you know the prices for Bostadsrätt they have gone up quite a lot in Sweden and especially in Stockholm. It was deregulated in Sweden in 1968 and in Norway in 1988. When you had this right-wing government on the call. But in Denmark it was never deregulated, so we still have a regulation into place. Um, it's difficult to find this in other places in the world, but I would compare it to New York, actually. Because in New York you have more cooperatives than owner occupied. It's a very special thing, but I think not so uncommon for major cities and in New York you also have CU equity and equity cooperatives. CU equity means that you're not allowed, you cannot get capital gain on the cooperative. You can actually do that in Denmark, but it's a little bit complicated. Like everything regarding housing and in law, and especially in Denmark, it is hugely complex, not easy to understand. Unless you really use some time to look at it because it's so different from Sweden, so different from England also.

Now if you look at Airbnb coming into such an area, you would like to see will this impact the prices. Will this impact the price? But what you do have, is this housing market where you don't have a market wind and you don't have a market prices for a lot of apartments because it's only 10% that will be owner occupied apartments, so you cannot go out and say, oh, I can see the effect of Airbnb, its capitalised, and the price is going up. Simply because it's not an owner-occupied market. A very small fraction in the municipality in Denmark with the lowest ratio of owner-occupied housing. If you go outside Copenhagen, you can find in his appearances with 75% on occupied housing in the suburbs like Ydre, where I live you find 75% or in the countryside you find 75% but inside Copenhagen it's different for the historical reasons I went through just before.

So now, if you look at the private rented market, you cannot see an effect in the rent. And that is because it will be regulated. And that holds true for all apartments built before

1992. They will be under the Housing Control Act. In Denmark we have different rules, different types of legislation for different parts of the private rented market. So, everything before 1992 will be regulated to some extent, and it's going to be a lot more complicated than that. But if you look at apartments built after 1991, that is from 92 an and up to now, they will have what is called agreed rent in Danish aftalt husleje known in Europe as a generation free rent control system. And that means when you make the contract between the landlord and the tenant you are free to set the rent as you want. But after that you cannot, then it is regulated. You cannot just force him out and put up the rent. This is a very common scheme in Europe, but in Denmark it only is into place for apartments built after 91. And there's not a lot of them. In the old part of Nørrebro and Vesterbro is very few. You will see the new private rented housing in Orestad, in Amager, in Nordhavn, the North Harbour, in the areas down in the Harbour where they build a lot there you will see this and all those apartments will have a very high rent because its agreed rent. So, it's close to a market rent but it's not exactly the same as a market rent so you should not confuse it with the market rent, we call it aftalt husleje but it's very common in Europe.

Now if you look at the old private rented housing in and there's a lot of that in Vesterbro and Nørrebro. You do have the problem that some of it will be regulated by the Housing Control Act. And that kind of housing will have apartments with very low rent, but some will be renovated. And then they come under different system called the Rent Control Act, paragraph 5, Dot 2. And that means that you can lift the fixation of the rent out of the Housing Control Act and over to another more general type of legislation. In practise it will create an increase around 100% in the rent. It will still be lower than the market rent. But it has gaining ground to keep getting closer and closer and closer to the market wind all the time and therefore we had a new legislation. In order to stop this process and especially the big investors coming in, the hedge funds from America like Blackstone coming in. And so, our Parliament stopped that. By some very technical changes in the way you can use 5.2, it's still there, but you cannot use it as easily. And even more technical to control the spill over effect on the cooperative market. Because the cooperatives can actually, uhm, they will have their valuation of their value changed if you change the legislation concerning the private rental housing and that is why I said before. If you really want to understand this, you got to invest quite a lot of time. Now cooperatives, they are the major part of housing in Copenhagen. They can be valued in three different ways.

And it's up to the property themselves to decide. Which of the three they want to use? You can take the cost when it was created. It's very few that are using that. That is one method that will be low, of course, because maybe it's a very old association. Or you can take the public valuation. But it has been suspended since 2013 and now it will be suspended forever. Because it is said is too complicated to value the land. In this innermost part of Copenhagen, we don't have enough transactions. We can do that, so therefore we will stop all kind of puppet valuations of this kind of estate forever. The Minister of Housing has said he will then create a different way of affixing the value. But this value the public valuation. It has traditionally been very low compared to any type of market value. So therefore, cooperative apartment in Copenhagen, there's totally different value than cooperative apartment in Stockholm. Very big difference between a

condominium, owner-occupied flat and cooperative flat in Copenhagen. Not in Stockholm, but in Denmark. And this is why I say: Look at New York. You can also find cooperatives in Zurich in Switzerland for instance, you can find them in Canada also, it's quite widespread, but you cannot compare to Sweden. Then you're making a huge mistake. So now comes the complicated part, and that is the third method and that is to take a person that's educated in valuation of a real estate called valuar in Danish. And he should assess the value of the cooperative as if, and this is mandatory by law, as if it was a private rented building.

Emre: Yes.

Curt: And therefore, if you change the law concerning the rent in the private rented sector, it will also change the way that you value this cooperative. And when the change the paragraph 5.2, it is a major political issue in Denmark I have to say, a major political issue, but now it is has gone through parliament. It's into force. If you change that, then there was a risk that the cooperatives might fall in price and therefore we had to make some very technical changes and that has secured that they will not fall. And actually, I think they have gone up. Now, the way it's working is that this is this valuar set value that in fact will create some kind of maximum price for the cooperative. But this valuer, he can work in different ways. The interpretation of the law is not 100% straight forward, so therefore they have made very different valuations and in effect you have seen that cooperatives they've gone up and followed the private rented apartments. The rent has been fixed, but the estates have gone up in value. So, when the investor like Blackstone buys one, it would be more and more expensive even though the rent is the same all the time and fixed. And that is because Blackstone, with the calculated that in the future we can use Paragraph 5.2 and then we can lift the apartments out of the old rent fixation scheme and over into another one and have a huge capital gain on the estate.

That is why they came in heavily here, and I think they really did not understand Danish culture or Danish legislation. But because it ended up in in this political change like you have seen changes in Lisbon or Berlin. And the Senate in Berlin tried to stop this, it has now been found at the Federal Court, the Constitutional Court, but not in Denmark. Here it has gone through. Now, because these cooperative apartments don't have a market price, you cannot go out an calculate the effect on Airbnb. I would say really a lot of the listings of Airbnb they would be cooperatives because they are in Vesterbro and Nørrebro. And because I know that they are, because it has been a major discussion at the General Assembly in those cooperatives. There's been a lot of fighting and discussion about it. Because Airbnb created nuisance, noise been drinking, behaving like young tourists would do in a big city and the neighbours want to sleep and there's been a lot of discussions about this. So, this is something that we have seen everywhere in Copenhagen in those kind of apartments, but you cannot really go out and see the effect of Airbnb on the prices on cooperatives because it's not like in Sweden, but you can see the market price. You cannot do that here. Actually, we don't have a statistic, don't have any data about the prices of cooperatives. It has been deemed too technical to create that, but we are involved together with some of the organisations and the Ministry of Housing in creating a system now and you will in the future see a price index for it. We have worked with that before for more than one year with statistics Denmark.

And then you will see the data also back in time because it's worthless just to start now. So, we have gathered historical data and we will be able to see it back in time. So, but I think you cannot see the effect of Airbnb because there would be too many other factors impacting it. And first of all, they have been following the private rented housing up in price. And the private rented housing, they went up the cause of paragraph 5.2 and investors like Blackstone and others that really went into this area. Also, Danish pension funds have been heavily involved in this paragraph at 5.2 renovation. So, what you see with cooperatives these million effects of something totally different, and that is the renovation of this old stock of the private rented flats. I hope this is not too complicated, but I can. We can talk about this later and then I would actually be willing to take time to most discussions about this because it's important for me that you understand this system. We made a book some years ago with the London School of Economics and Campus University about the private rented regulation in Europe. You can find that on my web page. I would think it's a good idea to go into that. There's a chapter about Denmark also, but it's not easy to understand the system, just the one chapter. I can tell you lawyers working with this for a whole life. They still make mistakes.

Emre: I can believe that, yeah, it sounds complicated.

Curt: It´s complicated and what I'm explaining here is only a small fraction of it. Because there's a lot more to it and a lot of loopholes, and some of those investors they have been trying to take advantage of those loopholes. But your problem here will be that you cannot really go out and find data and say that substantiates the effect of Airbnb. Because its showing something completely different. You cannot really find price data. Because it's only a small fraction of the housing and they will be impacted by a lot of other factors like especially financing, we have the cheapest financing in the world. We have negative interest, you know.

Emre: Mhm-Mhm.

Curt: Now you can interest only loan without any, eh, you don't have to pay off for 30 years. And you have. I have negative interest myself on my loan, for instance. So, you get money for living and that will create an effect. Also, and then we had a lot of growth in the population. In Copenhagen it usually went up around 10,000 inhabitants every year. And now it's down to 5800 in 2020 because the people who are moving out of Copenhagen. But still, there's a lot of growth, and of course there is something that will stimulate housing prices, because supply is lagging behind and that is especially true for smaller apartments. In a part of Copenhagen. If you look at two rooms, and that's not two bedroom it is not in an American or English definition but apartments with two rooms in total, [its] not too big. Room for two rooms. We now have the same amount as we had in 1980, the same number. Because we did not build a lot of them to build bigger apartments, but we also demolished a part of them, and a lot were put together to create bigger apartments. So total number is not going up for 40 years.

Emre: But did the demand did rise for them? I read that in Scandinavia…

Curt: The demand is gone up here. The demand has gone up a lot because Copenhagen is growing that much and I don't want to be too technical, but I can see that in the difference between the number of single person, family and single person households.

Now I'm going into statistics because that is what I'm working with, but one person living in one apartment that would be a single person house. But one person living together with another person in an apartment without any kind of relationship, no sexual relationship, no family relationship. There will be two single person families living together in a two-person household and when you see that the number of one person households. Is not going up actually falling and the number of one person families are going up again. Then you know that there's a lack of housing in Copenhagen, and we have a lot of discussion about that now. It's just been. There's been a report from the Nordic Council about that. You can find that on my webpage also. I wrote the chapter about Denmark and then you can see it's about Copenhagen. Actually, problems about affordability and supply of affordable apartments. This is not an easy thing I have to say.

I would like to break at 11:45 because of the Corona restrictions. Here I have to be in the cantina. I cannot go down later, but we can go on after actually do have time to talk later in the afternoon, available tomorrow. It's not a big problem because I think it's important that you understand these things. And there's an interesting study about seeing the effect of Airbnb, a lot of articles about effecting in America. I think you have easier access to data that will show you something from the free market, but here everything is so breaking related, so it will be difficult to find an effect. It's very widespread, this Airbnb when the world assumes the normal, when the Corona will be over you will see it again here. And I think a lot of people also use it. It's not so much professionals, I fear they are here and hiding out of sight for the municipality. It's not easy to control. We don't have any official for that, but a lot of ordinary people will bring out to Airbnb when they go on holiday themselves. And because the prices have gone up in Copenhagen, I think also they will feel a little bit forced to do so. But for some people it's also like their sport and the see it as a positive thing, and they want to meet people from other countries and they don't feel bad about someone living in their own home for some period of time. And they do that themselves. They go to Florence, for instance, and so on. Its young people living in those enables Copenhagen, making this the youngest municipality in Denmark. If you look at the average age. This has changed completely also over the last 30 years. So, people would be doing this, and they were renting out for very short time. They don't want it out in the weekend. They went in out in the summer holiday, for instance, for only maybe 14 days or three weeks. That's very typical. And then they take advantage of the new tax rules. So, they will in fact pay no tax. You know there was an agreement between Airbnb and the Danish government.

Emre: Exactly, that's the 70 days cap and they raise the tax-free amount to 24,000 Danish, I guess.

Curt: I think that is a little bit more and then you pay only cheques of some part of the income over. So, in reality you don't pay tax, it's almost nothing. And therefore, Airbnb should also report this and then we have better data, but I think there will be a black market besides the shadow market, and I've seen all kinds of changes in Copenhagen now. It's difficult for me when I don't have data. This is not something I'm used to, but I know we have problems with... Now, we have a lot of people coming in. And from other countries and even other continents working as delivery boys for instance, and they can get quite a high salary if they work, it´s like is almost inhuman like slaves I would say,

but close too. But then they get quite a high salary in their own currency, and they live together in apartments, almost like in the prison. So, I would say huge numbers here in very middle of Copenhagen. There's been some cases. I think it used to be office buildings and now they sleep there in dormitories. I've seen dormitories in Singapore you have dormitories for foreign labour, and they are living here in something that was resembles that or what you would see at the building site. It's so people can rent out the small room and having huge rent because they these people they are forced to have one place to stay and then they don't have the family with them. They are only one person coming here for work for short period of time. So that is a new market coming up, difficult to control and I think it will be quite a high income you will get from these people. It's like a hotel really, I would say. But this is some part of the market that is not really investigated, is up to journalists or Labour unions. They go into this kind of stuff. I think the police they don't have any interest in in. They have a lot of problems already and this is something that's never been given any priority. And also, it's not so clear if this is legal or not. You cannot say the certainty that it is not legal, so at least it will go to court to decide that and the police will not give priority. But this is something totally different. You know. Also coming up, not tourists at all, but people working here as delivery boys. For pizza or whatever it is, all kind of food. Yeah, this is something completely new also.

Emre: Sounds interesting. I just know the case, I'm actually German, so we had the case that many foreign people couldn't come back to Germany to help harvest some of our agricultural products and like a price of a pepper I guess was like €0.40 in January last year. This year was €1.10 or something because they couldn't harvest enough because the people who couldn't come because of Corona restrictions. So, I think it's a very international development of like people abroad coming to work.

Curt: Yeah. It is sure, especially in agriculture we haven't strawberry pickers, for instance. I know we have the same problem in England. This is something a little bit different because that used to be seasonal work. We had a lot from Romania coming to pick strawberries in Denmark is very hard labour, but you can have quite a high salary, but now they're living inside the completeness ability already along. So, it's not just a season now. Because they eat pizza all year long. I think basically it's necessary to look at the different kind of tenure in Copenhagen always when you analyse the housing market you should start with finding out, mapping out what kind of tenure do we have here in this city because they will be different from city to city and some will be regulated and some will not and the data you can get with typically be from the part that has a market price or market rent. There you will see it from the realtors, Census Bureau and so on. The regulated part that is not easy. And that's where we traditionally had very poor data and I have to go down and eat now. But I can talk more until more about the data, also from Ministry of Housing because it's not official data they have for rent. But it's quite interesting, so we take a break now.

Emre: Okay.

Curt: We could try to talk again… What about 3:30?

Emre: 3:30, sure. I can send you the link for that.

Curt: Yeah, 3:30 we will be talking okay.

Emre: Ok thanks so much. Have a good lunch. See you later.

Part 2: 15:30 – 16:30

Emre: Alright.

Curt: Continue?

Emre: Yes.

Curt: The Ministry of Housing, they have data about the rent levels in Copenhagen. Now this is not an official statistics Denmark data. It's rather complicated to calculate it. We don't go out and obtain data the way it's done is competition from the housing allowances. Because people who receive that, of course they have to register what is the rent. Now, then you have to assume that that the rent level in those apartments will be the same in in the rest of the building. That is not true. Because in the same building you have different rent levels because some of the apartments might be renovated due to paragraph 5.2 and some might not and typically people receiving this elements as they are sitting in the cheap apartments and are elderly, most of them. So, you have this kind of problem. We have used this method ourselves about eight years ago. It is possible to use them in such a way so you can remove the bias from that you haven't over representation of the elderly. We have done that, and that is quite possible. So, if you do that, you can obtain some kind of social statistics for the rent level, but you have to remember it's not a complete recording of the rent level. But you can see that on their website they have a special website for that called Boligstat. Boligstat, s, t, a, t in one-word dot DK. And if you do that, you can take Copenhagen out and then you can also choose. Choose different kind of private rented apartments. You have then to choose what kind of year they were built and that will heavily influence the rent level because of the differences in legislation I explained to you before. So, you can see you can also divide them in the build up to 91 and after 1991. There you can see the difference is also due for the differences in legislation. They are huge. Yeah, but it's also the average rent and there will be variations of course, but that could be a source. You can only see that for the whole municipality of Copenhagen. It has not gone up so much in the newly built apartments. I think maybe they are hitting like the ceiling.

Maybe they are getting up to a level where they are too expensive and because of the very cheap financing in the owner occupied sector, maybe some people will choose to leave the rented sector after a while and finding owner occupied apartments in order to have a capital gain in there. If they buy, it's very expensive in Copenhagen. Or maybe they will seek out of town to get something that is cheaper. If you look at the old apartments, they are getting more expensive, but the problem is that this might be due

to the fact that some of them are paragraph 5.2 apartments and you cannot see that from the data. That is a problem. Because the difference will be 100%. It has been renovated the price is twice as high. I think about 85 to 90% higher. So, you will have a problem there, so you cannot really find out what's going on. But anyway, this rent is fixed, so if there's an Airbnb in those areas it will not influence the rent, not one home. Because, it's not a market rent in anyway. Also, the income will go to the tenant and not to the landlord. The landlord will have to accept that there's an Airbnb in the apartment and that holds true also for cooperatives. There the Association will have to accept that and, in the owner-occupied sector. I think many associations will not accept it anymore because we've had so many problems with Airbnb. But still I think some people will not respect that and try to have Airbnb rentals whatsoever. But that will lead to conflict with the association, and we 're beginning to see that before everything changed with this pandemic, so but if you want data for something that is influenced by the market and where you can see the revenue from Airbnb capitalised, you will have to stick with the owner-occupied apartments of course, and you will have to look at them. At an in-depth analysis of what is going on with the cooperatives. In this situation, I think it's impossible to analyse it, but you might consider a situation where the market is not so over heated as it is right now and there the possibility of getting a revenue from Airbnb might influence some bias of a co-op and make them more attracted to this kind of cooperative. And therefore, they would be more willing to pay the maximum price. Else you might consider that in some cases people will not pay the maximum price because it's too expensive. A small part of the cooperatives is very expensive and can have problems. Due to bad financing from earlier years, we have like swap agreements. You know a swap agreement on the loan. You aware of this?

Emre: Yes.

Curt: Some of these co-ops, if they have this problem and they're not much sought after, of course, because there's a lot of debt in those, but there the possibility of an Airbnb additional revenue might attract some people, but I think you will not be able to find it in data and you cannot find data right now you have to wait until we make better statistics concerning the price of cooperatives. So, it's not easy for you to go out and cheque what's going on. You're stuck with condominiums: The owner-occupied apartments and it's only a small part of the areas where you have most Airbnb. Because it's such a small part I think it will be difficult to identify the effect of Airbnb because what you are seeing would be the effect of lack of supply and huge demand. And it will also have everything, so you have the effect of the extremely cheap financing and then to make things worse you will also see the effect of different kind of macroprudential regulation taking place. And it's not easy to see how it is working out right now, but it should actually be a problem for a lot of first time buyers and we have a demand now that you should have a down payment on 5%, that's very small. Should not be a problem. But then it has been a problem in cooperatives, but I'm not going to go into that. But then we have different rules concerning the loan to income ratio, and if you go over there and you will do that for many young people, and certainly for everybody in the lower middle income area, they will go over that ratio. Then you need to have 10% in equity. The wording is that you should tolerate a fall in 10% in the house price and still have a positive equity. And that means that when you buy it, you should in cash have about 10%.

Now if you go over 5 in loan to income, the LTI ratio, then you should have 25% in each iniquity. 25% is a lot because it's difficult to find them apartment in let's say Nørrebro under 2.5 million Kronar. So young people don't save so much and will have problems with that. That should influence the price, but we cannot really see it. So, when you make like you wanted to make some kind of regression analysis of this, identifying the default factors, which one will be significant? Which one will not? You have a lot of different factors, some of them the correlation between them. It's going to make things difficult for you, so I think it's not that easy. So maybe a qualitative analysis would be better. In this case I think else will be bogged down by a lot of data problems. I think Airbnb have been getting so widespread in those areas, so people are more or less factoring it in when they are buying the apartments. It is going to be mainstream now, before it was not. I think it was like, some American idea in this political segment with many hipsters, so on, something they would say, oh, this is just like Uber. Uber in Denmark is not tolerated. They were kicked out. Some young people accept Uber and some more left side of politics will not. But maybe they would still use it in some cases and with Airbnb, I think this political divide in the segment, you know Copenhagen that is a socialist city, and with a very strong far left party called Enhedslisten is very strong. And big actually. But I think it really doesn't influence the situation around Airbnb that much, I think a lot of people will still do this. I think they will. Maybe they will look different between their own private finances and the more abstract political point of view regarding platform economics like Airbnb and Uber. I think they will separate between them. Because everybody is doing that in those areas, it's getting more and more acceptable socially. Still I am a little bit amazed cause it's not just that we have like 5% on the far left. We have really dominating in those areas. So, it's rather strange, but maybe because of gentrification going on. And maybe people also feel that there are renting out someone like ourselves and this is nothing to do with Airbnb. This is more like a private partner talking to a private partner. I'm not sure, but anyway, it's really spreading. And I think now it is effective when people consider this. Still they are not doing it professionally, it's something that they are doing in their own holiday.

Emre: Yes. I think…

Curt: Yeah, we have a lot. I think we have a black market also or someone who's doing this professionally, but I don't know anything about it because you know things like that they will go on in a grey zone and the people responsible avoid any kind of attention. But it's just hearsay. I hear about this stuff, so I think it's going on. But I have no data about it. It's not a thing that we're really into here. We're not going to monitor it if we're not… the idea about our whole initiative was not that this is something that we should you analyse. Then we should have a different setup. We're more working with new kind of economic modelling supporting that. And demographic forecasting and more abstract and more oriented towards economics. So, we're not going to act like some kind of watch dog and looking what is happening in the fringes in the corners of the Copenhagen market. But I think it is going on. And I think in reality, what you are seeing will be some kind of parallel housing market for the most vulnerable. Like people like working on a daily basis for something like hungrig.com, you know?

Emre: I don't know this website.

Curt: They are delivering food to you at your home. You order it on the website. It's delivered at home for very small cost and they have been exposed in the media for treating their employees, most of them foreigners or I think almost only foreigners, extremely bad. Still they make quite a high income, especially compared to countries where they come from, but they are really treated like slaves, have no time to go to the toilet, for instance during work hours. They have only a few seconds to get each item, and they are penalised. Either use too much time. Well, it has been kind of a political scandal in Denmark. Actually. In the last few days. So, some municipalities are saying we're not going to cooperate with them anymore. It is a Danish company and one of the investors is the CEO. The owner of bestseller. And one of the richest persons in Denmark, a billionaire from Joplin. But this is something, we have other you have many different kinds of delivery services where you use cheap labour. You don't need to be scared, you don't need to be able to talk and speak the language at all, so it's easy to get people in. And just like the strawberry pickers and actually they can live in the middle of Copenhagen. Maybe it's funny for young people. They can make a good salary, but it is very hard work. And they are living together these dormitories due to Covid-19 situation. There was fear that they could actually spread Covid-19 there. Say sleeping four persons together in an extremely small room. Maybe, I would say, 3 or 4 square metres, something like that. So, it's smaller than a prison, so in in my country, yes.

Emre: That's crazy.

Curt: And they pay of course quite a lot of rent because they have the money and I need someplace to sleep so they're taking advantage over. I think that this kind of shadow market. I think this will come into play. It's not easy to investigate. There's no resources for that. I think the organisation they will know most about this would be the tenant's organisation called LLO. They are aware that, but they can really not do anything about it.

Emre: I actually reached out to them concerning rent prices, but I never heard back.

Curt: I know them quite well. I know that if I go to their CEO and I've been working with them in some cases, but they are seen as politically far left, so I have to keep some distance to them. The same with the landlord's organisation. I also keep them at arm's length because they are politically biased. Both partners, and I have to be independent. But I don't think that they will have any research about this. I think it's hearsay, some people will come to them with the case and then we'll take that case up and go to the media. But it's not really something they can do anything about themselves. They cannot go to the police. I think it's not easy to find out if something is illegal here. And they aren't part of the case. I think they know something about it, but I don't think they really have an overview of how much is going on. And I think Airbnb will not be involved with this. I think this is just something parallel going on. We had this for some years in construction. Those construction workers where they used people called arme-ben-virksomhed. Arme-ben-virksomhed, that means arms and legs companies and that is a one person actually at work, but he's formally a company. He is registered as a company. Then you can save social person to pitch like pension and monitor holiday and it's you only pay the salary to him. So, this is a method of saving cost for the company. So instead of hiring say 100 people to hire 100 companies, but they're not companies, it's pro former. Often,

they are housed in very poor surroundings. Very bad quality and they have to pay a lot in of rent. So, the benefit they get out of the work is small, enough to pay for food and for housing. This has been Eastern European workers, some from Romania. We've had very strange cases also, where it has gone much further and where it has been also fraud actually, but normally it's not, they are just hard working and pay relative high rent for very poor housing. And they're being used, and that has been going on for quite some years. So, it has nothing to do with Airbnb. This is just private Danish contractors. Typically, very small, taking advantage of them, but sometimes the biggest contractors in the country have been involved because they have hired some of the smaller as subcontractors and there was a scandal also concerning at that time it was the biggest contractor. A very proud old company, long tradition. More than 100 years old. It went bankrupt. Now it has been re-established again, but they were actually involved in this and they had some people employed as arme-ben-virksomhed. So, you can see it's not difficult, but not easy to fight this, because it's widespread and they're hiding with a series of middlemen, sometimes 5,6,7 between them and the workers. So, it's not easy to see that the client, say a municipality for instance, or social housing Association. They cannot find out because it's hidden in this way. So that is also of course part of the housing market, but it's not Airbnb, and it has been going on for many years, for 10-15 years, 20 years. I would say I've heard about this about 20 years ago. The Labour union, called EAT. They have cases about this and that they have been fighting this and acted on a European arena because they have strong European cooperations. This is a problem in most of Europe actually and therefore you had also the discussion about the minimum wage. Something we don't want in Denmark cause it's seen as sabotage against the special Danish model of collective agreements. But this is not understood very well in most of the European Union. But you it is a problem, this kind of labour. When this happens and it's quite a lot of workers were talking about like the subway, the metro is filled by foreign Labour, Italians, Albanians and so on. Then this will grow up, you will see this alternative housing market also. I think you can find the same in America with immigrants because they have a lot of the legal and illegal immigrants of sorts. So, this is a different version of your Airbnb problem. But there you will not be able to see it. Maybe you can see the value of some house and the countryside just outside of Copenhagen. Because now it has a value. Now you can use it for something else. It would not have any value whatsoever. We have seen some strange transactions where companies have bought these houses. I thought they would be demolished, but they actually bought them for a price. And I had a cooperation with a newspaper about this, we couldn't really find out what was going on. But that was quite a lot of states all over Denmark, bought by group of investors of ill repute, I would have to say. So, but that is something different from your Airbnb. But that kind of contractor will also be active here and maybe some of them will actually be renting out their housing most of the year. This is not allowed. You have to stay there for 180 days. In Denmark, it's not written down anywhere, but this has been a practise at the course. It is rule that derives from the Rent Control Act, actually. So, you have to stay there, and if you don't, at the end the municipality actually have the right to go in and forcefully rent out the empty apartments or empty house to those in need. I don't think they really check this, but they have begun to investigate it. And I know they have used data about the consumption of electricity, so they can see if anyone is living there or not. There's been more focus on this. But it's not

really effective, but I think maybe some people have begun to rent out. Maybe half year actually, maybe actually in some cases most of the year. It was some almost like a hotel in Copenhagen. This is only hearsay. I'm not interested in getting my cases out. Because, I think this could be a problem for them. Yeah, but I hear things. I know this is going on, actually. I would say that, but I cannot go public with my information and I don't know to what extent it's going on. I just know what's going on, but I cannot say if it's 1000 or if it's 5000 apartments or rooms in Copenhagen. That's not possible for me to say.

Emre: Yes, I think very, very interesting dynamics right now in the housing market. But if we could maybe draw a bit more back to Airbnb that will be a bit more hopeful. Maybe also with a view on my analysis. Maybe about the rent prices and the assumptions I'm taking with the rent gap.

Curt: Yeah, but you cannot. You cannot look at the rent because it is not impacted by Airbnb. The rent is fixed due to the totally different legislation in this country.

Emre: But generally, like in the rent gap, it's not really mattering to a certain extent how the rent is made. It's more about the gap, and if it's like steady, you could even maybe argue that overtime with the popularity increase in Airbnb, the gap would be even bigger because it's like a fixed rent, but then again it's about the contract on if the landlord would even allow it to be like an Airbnb or subletting it on Airbnb.

Curt: Pardon? Yeah, if the landlord will allow?

Emre: Yeah, to sublet it over Airbnb, but I mean I don't have any information to that. I think it's difficult. It's also just used as proxies. It's not really like, it's not a really, really practical tool. It's still quite abstract and just trying to analyse spatial trends.

Curt: I'm not sure if the landlord will allow it always. But I think a lot of people will do it anyway.

Emre: Yeah, that's also my argument with the policy in Denmark that when they say 70 days and up to the to the landlord or whatever, or the host, I don't think people will necessarily stick to those maximums.

Curt: They will not, but the idea is the neighbours will check. Because they have a lot of nuisance from the users. I know for a fact that in social housing you have the problem that people rent the apartments out there, not allowed to do that. But we have had extreme cases where one apartment was rented out to 20 workers from Eastern Europe, but they didn't live in it, they just used it as a base, changed clothes and went took a bath and so on. So, one thing is what people are allowed to do, another thing is what they will do. And I think you will see that in many cases people go quite far. But the rent in those parts, if it's a private rented apartment, the rent is nothing to do with whatever is going on. The landlord's rent would be fixed. And it will be quite detailed legislation about how to calculate it. So, there's no room for any individual changes and you can go to court and have the rent diminished if you think that it is above what is legally correct. This is not happening always. And I know for a fact that in some cases the rent is quite high. This LLO organisation they have cases where the landlord is just trying to see if it is possible if people will accept it or not because the rent is artificially low. Sometimes

people will accept a higher rent because it will still be cheap for them, compared to the alternative. And so, this is a grey zone. We don't have any data for that. Formally the rent was fixed in a very old type of legislation which originates back to 1939. And it has been revised later, but it's not a market rent in anyway. And it's not supposed to be. So, it's very strange that the landlord would accept anyone renting out full Airbnb it's only a problem for him because then there's a lot of wear and tear on the building. And, you might expect in some cases, maybe that he will want to have part of the revenue in some way, because why should he accept it is only problem for him? It would actually cost him money. But I don't have any cases for that. I'm just saying it's very strange if any private landlord would accept this.

Emre: Yeah, I understand that. I also know that. I searched hours and hours to find anything data related, but it's kind of grey zone and difficult to even find anything which measures anything with doing Airbnb, and I don't even have like access to how often the listings are actually rented out or something, so I built in assumptions.

Curt: No, that's true. There's a lot of listings is not the same as activity. This is not the same as transactions. And one thing is we know there is black money in this market when people want apartment attendants. We know some cases they pay money under the table, as we say in Denmark. Now we have no data for that of course. I know in Sweden there was an investigation. There was a commission looking into black money in the Swedish market and they found out it was a huge problem and that organised crime had moved into this market in the last few years. I don't think that has happened in Denmark and I don't think the problem is so big in Denmark as it is in Sweden, but there is a market with the strange things going on, so there might be some cases where the landlord is saying: You can rent it out, but I want part of it and that would be an incentive to rent out more than the 70 days of course and then. Also, to begin to use other platforms, maybe just Facebook. I think this is something I would be aware of that if people have this. If this is their consideration, they the result of the Danish agreement with Airbnb will be that people will try, some of them, will try to seek other ways. And that might be Facebook, and that's not easy to control in anyway. So, then we just lose track of it all. But the back to the rent. just have to say you cannot see anything in the rent.

Emre: Yeah.

Curt: And then on the prices, yes, there you should be able to see it.

Emre: On the Airbnb prices per listing or which prices? On the real estate prices?

Curt: You should be able to see an increase in the prices of the apartments in the Airbnb areas because people will factor in the revenue from Airbnb rentals when the buy an apartment. Oh, this one is a bit pricey, but I know for sure I can rent it out anytime. Any time in the summer holiday, I'll be able to get additional revenue, if it isn't one of the very attractive areas of Vesterbro or Nørrebro. Dead certain you could just do that. And I think that might begin to factor in.

Emre: Well, what about my assumption? I have the assumption in my analysis that I argued that 60% of the year people could rent their flat out if they wanted to. I mean, there wouldn't be living there obviously, but.

Curt: I saw some graph you sent me some graphs and maps.

Emre: Exactly, I can show that if you want to talk about it. [Showing Fig.1 & Table 1] So this is what I sent you, right? Exactly, so I just showed the development of the entire home Airbnb listings in Copenhagen from June, which was like the first day just said to January 2021, the last one. And you can see like an effect of Corona probably. This just important to keep in mind if looking at like distributional maps or something like that. Then I had like the percentage share of the Airbnb listings in relation to the dwellings in Copenhagen by district.

Curt: Yeah.

Emre: And yeah, I just thought it was interesting to see that in the city centre basically 10% of the of the houses…

Curt: Yeah, this is Nørrebro. Here you are in the so called Brokvarter. So, this used to be a labour, working class environment. Very much so until about 1995. There was a huge urban renewal in this area, so this is outside Copenhagen Centre. The Copenhagen centre is København K here. København K here in the top, that is the centre and Nørrebro that is an area with a lot of gentrification. Now that's been done. It's one of my employees just bought an apartment in Nørrebro, it is a very expensive area now. The price per square metre is one of the highest in Denmark. So that's quite interesting, it's not a wonder that you have a very high percentage of Airbnb. And I know this area myself and I know the areas where you have most Airbnb. And that is an area used to be a very problematic North of the Big Cemetery and that is an area with cooperatives. Actually, there's a huge cooperative in that area. This is an area where you had the shootout between Hells Angels, and other bikers due to the hash market, they still have bullet holes in some of the walls there. It is very trendy now. You have some very 20-year bakery shops and cafes and that in restaurants in that area now. This is Airbnb territory but there you are in the middle of this gentrified area, so it has changed totally. But very few owner-occupied apartments. It is cooperatives.

Emre: I mean, that's also my main issue with like comparing these numbers because it's so difficult to get any data about collectives. So, I'm aware of it and I know that this weakens my analysis, but I couldn't find a way around it, unfortunately. [Showing Figure 2]

Curt: Here you see very evident, you see is the Brokvarter are areas you see Vesterbro, København V, and you see Nørrebro, København N. That's the areas in your analysis in the map. So that is very dominating until January 2021 cause then you can see the effect of the Covid-19, but still København V, that is Vesterbro that is still an area with a lot of activity. So here you are in the areas with very few owner-occupied apartments. It's about 10% of the total housing stock. And it's mostly built about 1880. So, this is a special area. A lot of gentrification going on in those areas. And still have some problems with hash in Nørrebro and some gang warfare, shoot outs like just like in Nørrebro. It is the same here, not in Vesterbro. It's more peaceful and have a hotel district. Also, you know you've seen it. It's close to this what used to be the red-light district.

Emre: Yes.

Curt: You don't have any, it's not an area with a lot of owner-occupied apartment, though the price is, it's not that good actually, to analyse. Yeah.

Emre: Yeah, I just think it's also interesting to see that the distribution didn't necessarily change that much, even though there was a loss of like 60,70% of listings on the website. Just like the hotspots got a bit of like smaller, but other than that it's quite the same.

Curt: Yes, It's very resilient

Emre: Just jumping to my last figure maybe [Showing Figure 3]. So, this is the comparison of the rent price and the rent that they could get if they would like to lend it out 60% of the time to Airbnb. And as I said, this is based on very abstract theories, which is more or less practical.

Curt: You say you rent it out 60% of the time.

Emre: Yes 220 days.

Curt: It's illegal in Denmark.

Emre: I know, I know, but I'm arguing that they wouldn't only use Airbnb they would also use others, and that it would be possible. But I'm not sure if it's maybe too high. Because I know it's illegal, but…

Curt: It's illegal, it's certainly this, but it is also, it's not what people are not doing this in this way they are only renting it out for very short time, but interesting to see how much it could be. Mostly this is people, some of them might have the possibility to live in the summer house or things like that, but I think it will be a problem for them. It's not realistic that it could rent it out for more than a couple of weeks a year because they would need somewhere else to live.

Emre: Exactly.

Curt: Typically, you can see that in other cities, like in Rome, for instance, that people they rent out the apartment in the live outside the city, but you will not see this here. So, I think it's not possible for them to bring it out like that. But still it's the theoretical analysis is interesting, but this kind of people and actually also you have to be aware that it's very small apartments typically here in that part of Copenhagen, its small. They have a lot of small apartments in Copenhagen. But this is an area that this kind of people will not be like speculating in this. You will see people, younger people with good jobs, reasonable education and a lot of people focusing on this area because of the cultural attractions, like hipsters. I think you would call them hipsters, many of them. Hipsters or people with a university degree. And an interest in the multi-ethnicity of this areas. And it is not really the type of people you would expect to, not like house flippers in America, for instance, it is a totally different world here.

Emre: As I said, it's more theoretical to see what ....

Curt: Yes, I know it and it's also interesting for that. We do have a person here in this. In the company Realdania who rents out his apartment to Airbnb possibilities, I can tell you.

And he fills my description from before totally. But from a theoretical point of view it's interesting.

Emre: I'm not trying to say that this will happen, and exactly that way, but that's the theory behind my thesis, basically. But I think it's interesting to see that it's more profitable in the outskirts of the city, which is also a bit due to the data I had. Because of the hotspot, it's rather a smaller gap, in a sense. But, then again. It's highly depending on data.

Curt: Yeah, there's a lot of data problems in this.

Emre: Alright, I would quit sharing it because I'm at the end of my interview guide. I don't have much more questions or any questions. If you would like to add something that I may missed.

Curt: I think now the prices for Airbnb rentals will be higher now than the prices for hotels in some areas. Not business hotels, but the people going to Airbnb. They're not interested in the business hotel. But with the right location the price is getting quite high. So, this is also of course a huge incentive to rent out the apartments now. It's frustrating for me. There's a lot of things going on here and we don't have any data and we will never have because it's in the grey zone. But for sure we can see; we can observe that those areas are really changing rapidly. So, one contributing factor might be Airbnb also. There's a lot of things going on. So sorry, I just have to take this.

Emre: Sure.

[Small break because of a phone call]

Curt: It is not the best place to make an analysis of this. Because of all the regulations into place, it's difficult to find out what you're really observing.

Emre: Yeah, I had the feeling while having the analysis, I was just constantly thinking what actually I am seeing, and it was a bit difficult to say.

Curt: And then I have to say when I look at the Airbnb map, I'm really amazed because I would not expect these areas to be heavily involved in Airbnb. Due to that political bias in those areas, they really left wing. So, I think it's a little bit strange, but I think there's a cultural change going on. Now, it's considered acceptable. I think it would be important also to look into this. So, I think this is cooperatives. You have to look at the cooperatives because there's not a lot of owner-occupied apartments and I think the private rented apartments, I'm not sure about Airbnb there, I think the landlord will not accept it. I cannot see why he should, and one thing is we have these landlords in the grey zone, but a lot of the landlords are more professional companies and they are not involved in anything criminal or in the grey zone. I think, I can't see why those kinds of companies would ever accept Airbnb in their building. They have absolutely no benefit from it, only problems. So, I think you will find it in the cooperative and they are heavy. I think it's about 40% of the apartments in this area of the Brokvarter here, that would be a cooperative. So, I know what's going on and it creates a lot of problems, but I think people there will have this incentive to do this. Because it's easy money for them. In some places quite a lot. Areas that used to be less attractive only a few years ago, all of a sudden you have this possibility. I think that's a huge attraction for them. It is a temptation that they cannot

resist, many of them. So yes, I just wish you good luck with this analysis and trying to interpretation of the data.

Emre: Thank you.

Curt: It will be hugely interesting to see what is going to happen after 2021 when Airbnb becomes back. This is one of the areas in the world. I think people will feel very secure in Europe. Because it's more secure than going to like Brazil, South Africa now and then in Denmark we had very few cases with COVID-19 compared to, say Sweden. And there's France, Italy, so I think also people will feel it's more secure in many ways, so I think it will come back and it will spread even more than before.

Emre: That's interesting actually, because I read a paper about a completely different housing market of course, in Lisbon, and they expect it to have like 15% less listings because people change the use of the apartment. But I mean it's not really the case in Copenhagen it's just interesting to compare because in Lisbon they had apartments just for Airbnb. There were no long-term residents in it, but because of the pandemic...

Curt: Pardon?

Emre: …they didn't have like residents in these apartments they were empty and just for short-term visitors. And then they changed the use and gave people long term contracts because of Covid-19 and not tourists coming in. I'm just saying it's interesting to see how difficult different these places can be. And how different the pandemic will probably influence now.

Curt: But this Lisbon is very different from Copenhagen and in many ways, and now they're getting a totally new legislation in Portugal about housing also. Due to the problems in in this one, actually the Golden Visa programme you know and all the problems it created the gentrification of the innermost part of Lisbon. Does it mean a lot of things there and then will change in government and it came the change in housing policy. Copenhagen is many years ahead of that, because we had our urban renewal starting in about. In the late 1980s. After huge fire in Nørrebro killed some people. And then we had a new legislation. And about 1980 the fire was in 75. Legislation came in 1980 and the funding came for sure and about 1990 was a huge amount of money that was poured into Copenhagen and it was basically over in Nørrebro quite early as many years ago, and from there I'd moved to Vesterbro also, that's not so many years ago it was over maybe 10 years ago. Something like that. It was basically over. So, that's long before Portugal changed made this Golden Visa because they needed capital. They needed investments in this Lisbon because it was really degraded as a city. And that was over in Copenhagen way back. And then at the housing problem in 2006, everything had been gentrified already and it was in good quality in Vesterbro and Nørrebro. So, it's a different setup. And now the people here living in those areas, most of them I would say are rather privileged. It is not an area with the socially vulnerable people. They were squeezed out. And they went to the North West area of Nørrebro. So, a lot of the population that used to live in Vesterbro and Nørrebro, they were squeezed out of Copenhagen to other municipalities or out of the central part of Nørrebro to the area close to the border of the municipality. And now that's a big vulnerable area it's so called Ghetto actually. It's going to be rebuilt completely now. A huge project with private capital

and the former Lord Mayor of Copenhagen has moved in there with a company. So, it's very interesting. But this happened many years ago, so there's really no comparison between Lisbon and Copenhagen. I think also Lisbon had a lot of problems in the outskirts, with the segregation ethnic segregation also.

Emre: Just a question about the change of population in these parts of the city in Copenhagen. So, I was trying to find any information about like indicators like educational background or income. I found income but I couldn't find anything like education.

Curt: Yep, Yep. We have everything. We have a scholar research contract with statistics Denmark and when you have that you can gain access to the CPR data. That means data about health, crime, income, ethnic background for every citizen. Now of course, this is under the law, so you cannot abuse it. You can connect that with the PBR register for all dwelling's and you can also geo code them. So, you can have the spatial distribution. Now we have done that in the project and there we took and combined four factors. That's income, education, labour market participation, and severe crime. And made a principle component analysis, reducing those four vectors into one. A Social Neighbourhood Index, SNI index for every apartment in Denmark. Every house in Denmark. Using the K nearest neighbour algorithm. That is an algorithm computer software that will calculate the average of this social neighbourhood index for the 1000 closest neighbours to each apartment that has been done for all 2.8 million dwellings in Denmark. Each calculated out of 1000 closest neighbours. I have a report about that. We have done that in order to define the vulnerable areas in Denmark. So, it's not a political definition of a ghetto, for instance. But we're not looking at that. We're looking at the errors that when we make a cluster analysis on this SNI index, then we can cluster together the most vulnerable and the most affluent areas. The richest in the poorest and all, and we have done so and, in Vesterbro we have done it from 1987 to 2017, over 30 years. We cannot go back more than 87. We have problems with the C bar register if you do that but 87 is fine because then we can see the huge change from 87 to 2007 in Copenhagen especially Vesterbro. I can send you this. A link to the report and cut out image from it so you can see exactly what I'm talking about, where you can see the vulnerable areas. It's defined as at any moment of time, the 5% most vulnerable in over those income, highest crime and so on and also the 1% most vulnerable. And those areas we can show on a map because we have geo-coded all the dwellings. Then we can analyse the changes in distribution. How big it is, what orientation it has, is it changing from the five to the 1%? And we can see how this part of Vesterbro actually went from being the worst areas, one of the worst areas, to being one of the most privileged areas. In those 30 years it changed totally. And they moved to Northern, North Western part of Copenhagen. We can also see that if it calculates the segregation level in the town, it has actually gone down over the last 30 years. But that's not the same as equality, it's more a spatial concept. So, we made this on the last year was 2017 data, the analysis on 2019. Yeah, huge data problems with this, it is not easy to get access to the data, a long negotiation with statistics Denmark about it. There's a lot of math involved in this. This analysis has been used by the Minister of Housing; he is quite fond of it actually. It does focus on this division of the country between rich and poor and it said: The biggest differences are in the biggest city. Like Copenhagen and Aarhus. There you have the richest and the poorest. And then of course you have some area rather

rich, like Copenhagen, the greater Copenhagen area and rather poor like some of the countryside in the South. But the big differences you will find inside the cities. And very close to each other also. So, you can see that. You cannot get the data that would be illegal. Actually, I can go to jail if I had them. I don't have them, and you have to change them and change the CPR identification number to a mathematical code so it's not personal anymore, you have to transform it right away.

Emre: I wouldn't even need like the CPR stuff, just having like total numbers or percentages per district throughout time.

Curt: We don't have that, I think. Maybe we could get that, but I can show you some of the data. I can send them. You can see it in the report.

Emre: Yeah, it would be great.

Curt: So, it is not but not thought out for this purpose. It was thought out for something completely different. This is only a step towards a calculation of something else. Because we use this to analyse and find what CPR numbers lived at what time in the most vulnerable areas. And after that, we identify the refugees that came to those areas, but didn't find that dwelling themselves. Because then you cannot use them if it should be scientific, we cannot have self-selection, self-segregation. So, they are thrown out and we use this tool to find about 55,000 persons that came and was housed by his organisation, Indio organisation. They stood forward in for some years and then we can analyse the effect of those who came to a vulnerable area compared to a control group of those who were praised in a non-vulnerable area. And then you can see the effect on people's income and crime and education and labour market participation. Depending on, if they lived in the so-called gates or not. In effect, the effect is very small. There's almost no difference. So, this this can be used when it will regard the design of politics because it's a question about the ask if you should change the surroundings or you try to change the people. And we have decided on a spatial model where we searched down some of these so-called ghettos. But actually, we can see that the effect of placing people in those areas is very small. Almost no difference. So, the problem comes from the people and not from the way you place them. So, and this is quite unique data, I think there's not a lot of countries where you have the CPR system and where you can find data like this. It's actually a coincidence this is called: A crazy randomised experiment. And it's solving the problems of indoor energy in a scientific experiment. Cause people they were placed by random and that is the demand. But you can see in the report. But it's in Danish. You have to use Google Translate. It's not going to be easy because there is so much mumbo jumbo, you know so much math, but you can see some of it is quite interesting for you like the Maps of Copenhagen and the changes there taking place over about 20 years.

Emre: And that's exactly what I was aiming for. Other 20 years changes, but also with my young data sets with Airbnb of just five years not even complete five years is very difficult.

Curt: It was all over before Airbnb wasn't it? The problems, they were over long before and that is why Airbnb could get into those areas. So, what I've seen about 2010, it was all over. Then Vesterbro, in the Excel File centre, where you can see the prices. I have

also noted that the orange errors that they have already been gentrified. So now it is moved to other areas and I'm not sure they are going to be an Airbnb territory cause they're too far out from the city centre, but we have a different gentrification process going on. It's spreading out of the city to the South and to the West. And a lot has to do with houses and not apartments. So those houses are going up in price like crazy. And they used to be something almost worthless 30 years ago, and now it's so expensive. So, people don't understand it, because they say: This is not a house, it looks like a summer house, and that's not a good area. Truly you would think like that 30 years ago, but not now. We have a discussion about that. Some politicians they want to have taxes now on capital gains and they are very upset about this, but I think it's a natural process in the major city. This is very much like Soho. This is like Kreuzberg. It's a natural process. Things that are changing. So, Airbnb is just another visible sign that something has changed. Good, but I will email that report to you and show you where you can find the data.

Emre: Thank you so so much for taking the time. I took even an hour more of your time than I expected. I hope it wasn't too much of a struggle for you.

Curt: No, it's difficult to explain. It's a very complex regulation.

Emre: It definitely is. (laughing)

Curt: Yeah, I can tell you I've never met housing economists from another country that could understand this the first time, and especially it's difficult to understand if people come England or America. Because there the system is more like a market. I think maybe people who have background in New York would be able to understand it more. But from England, its people are totally bewildered and sometimes they cannot really believe it's like that and it's so complicated, that cannot be true, but it is. So, like the German Mietspiegel.

Emre: Exactly, but it's illegal.

Curt: Yes, how can you do something like that?

Emre: Yes, they... it's crazy. I have some friends in Berlin who have now to pay everything back, after like a couple of years when it was in power.

Curt: But it's a different system in order to try to fix some of the problems that we fixed in a more general law. But you ended up in something that we call need machine like someone, a mad scientist invented it. And in the Netherlands, you know they have a point system that will determine if an apartment should have a free rent or regulated rent and that point system is just as mad as the Mietspiegel because everything is calculated to smallest detail. But not location. The most important thing is not a part of it. (laughing)

Emre: I think the first lesson in real estate studies: Location matters.

Curt: Yeah. But it's just like the Mietspiegel. It is very, very detailed. They tried to change it, but so maybe then the Danish law is not that crazy, but it's just different kind of craziness. I would say compared to the Mietspiegel and the Dutch system.

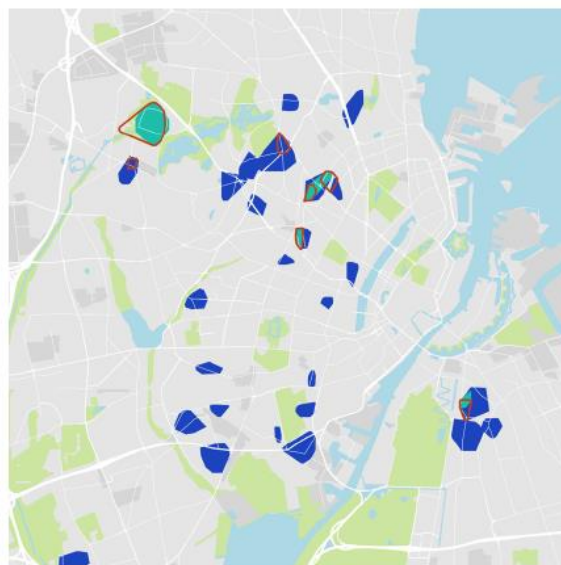Emre: Alright, thank you so much.

Curt: Good luck with it, yeah.

Emre: Thank you!

Appendix G: Vulnerable residential areas in Copenhagen from 1987 to 2017 (source: DREAM, 2019)
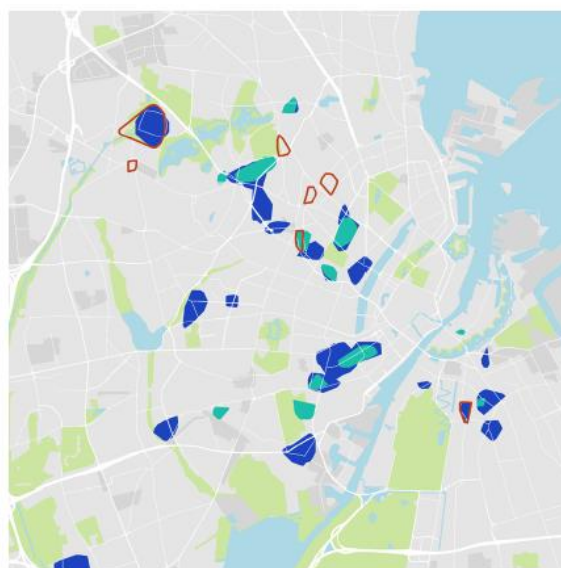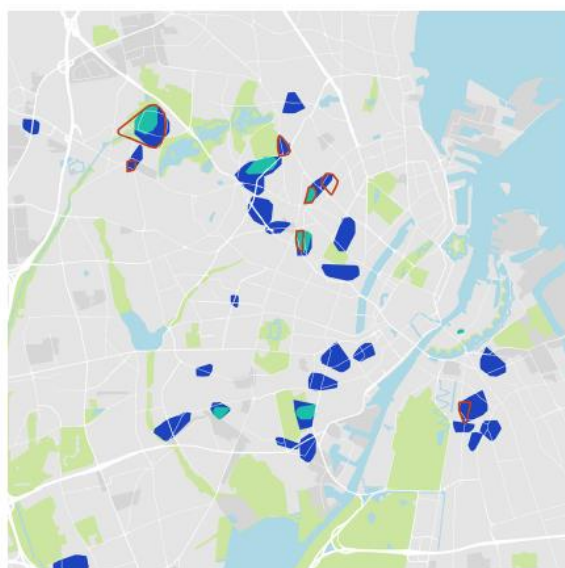

Table 5: Vulnerable residential areas in Copenhagen from 1987 to 2017 (source: DREAM, 2019)

Note: The dark blue areas indicate vulnerable areas, the light blue areas the most vulnerable 1%. The red shells indicate the exposed areas of TBB (Ministry of Transport, Building and Housing) in December 2018. Source: DREAM (2019) based on register data from Statistics Denmark