Moving in the city:

Residential mobility and housing choice within a metropolitan area

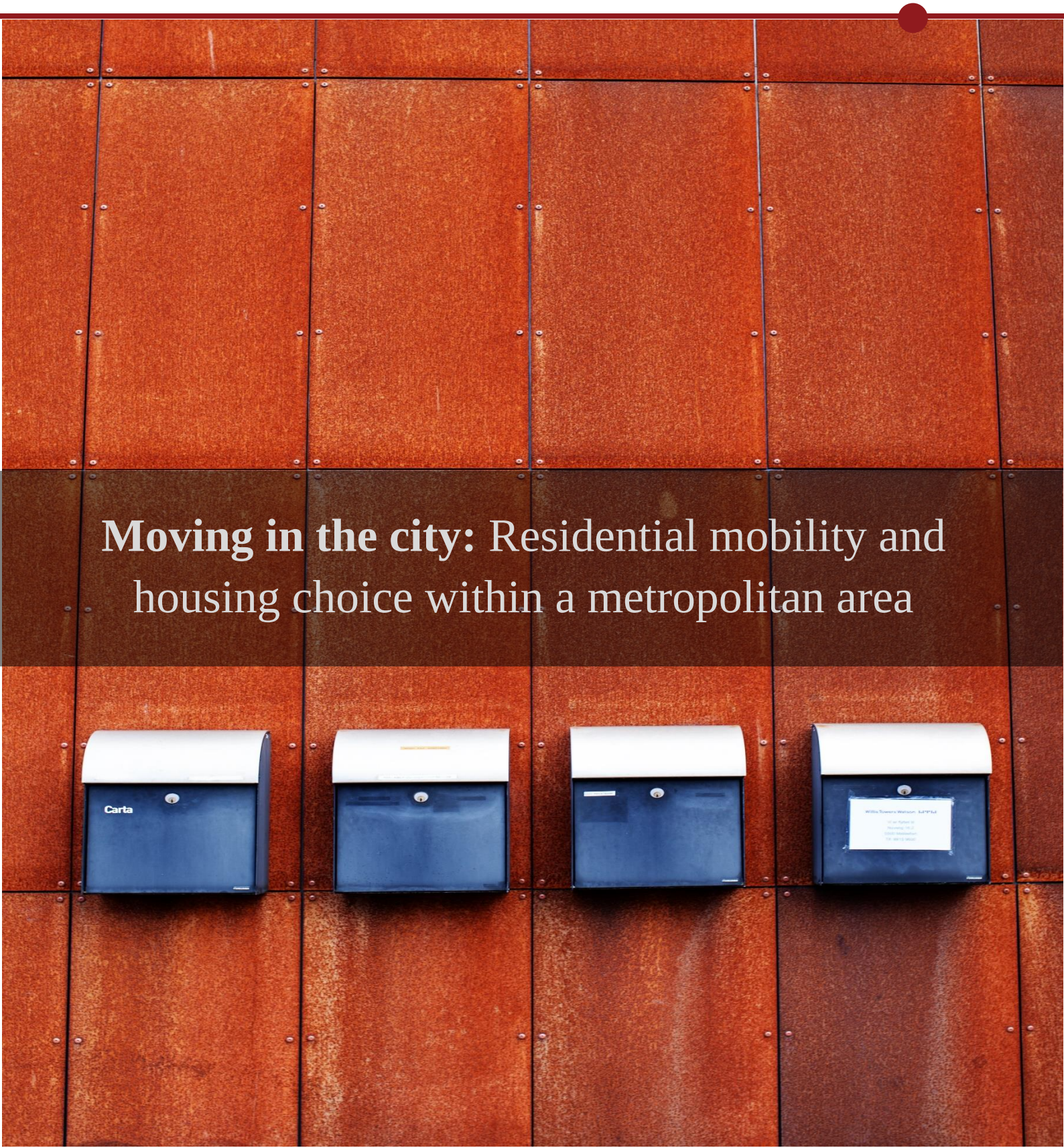
Egsgaard-Pedersen, Aske; Winther, Lars; Hansen, Høgni Kalsø

Publication date:
2021

Document Version
Accepted author manuscript, peer reviewed version

UNIVERSITY OF COPENHAGEN
FACULTY OF SCIENCE

Moving in the city: Residential mobility and housing choice within a metropolitan area



Moving in the city: Residential mobility and housing choice within a metropolitan area

PhD Thesis

Aske Egsgaard-Pedersen

Marts 2021

Principal Academic Supervisors: Professor Lars Winther, Section of Geography, Department of Geosciences and Natural Resource Management, Faculty of Science, University of Copenhagen; and Associate Professor Høgni Kalsø Hansen, Section of Geography, Department of Geosciences and Natural Resource Management, Faculty of Science, University of Copenhagen

This PhD thesis has been submitted to the PhD School of Science, Faculty of Science, University of Copenhagen

Photo by Torben Nielsen

Table of contents

List of Papers

1. Egsgaard, Aske, Høgni Hansen and Lars Winther 2021: Resurgent cities and the socio-economic divide: the young, educated, and affluent city of Copenhagen. Working paper.

2. Egsgaard, Aske, Robert Andersen, Lars Pico Geerdsen and Anders Holm 2021: Airbnb and residential mobility in Copenhagen, 2008-2016: The impact of home ownership and size of residence. Submitted to journal, February 2021.

3. Egsgaard, Aske. 2021: The price to pay: Airbnb's influence on the housing market in the Greater Copenhagen area. Working paper.

4. Egsgaard, Aske. 2020: Home after widowhood: a longitudinal study of residential mobility and housing preferences following a partner's death. Submitted to journal, November 2020. Under revision.

Acknowledgements

This thesis consists of four separate papers investigating how demographic changes and the introduction of new types of short-term subletting affect the match between people and residences in cities. The thesis was written between December 2017 and February 2021 and is the result of countless interactions with many different people, all of whom have contributed to increasing my knowledge of the field of geography and my views on residential behaviour, and without whose support I would never have completed these papers or this thesis.

I would especially like to thank my supervisors, Professor Lars Winther and Associate Professor Høgni Kalsø Hansen, Section of Geography, Department of Geosciences and Natural Resource Management, University of Copenhagen, for their excellent and inspiring supervision and for helping me acquire a broader understanding of urban and economic geography and research in general.

I also thank the Kraks Fond - Institute for Urban Economic Research for financing the research and for giving me the opportunity to explore and immerse myself in a subject I am very interested in. I would also like to thank the Department of the Built Environment at Aalborg University for welcoming me so warmly and openly during a period of great turmoil. In this regard, I would like to thank all my colleagues, both old ones at Kraks Fond and new ones at Aalborg University, as well as those at the University of Copenhagen, for their valuable feedback and encouragement during this whole process.

I would also like to extend my gratitude to my co-authors Anders Holm, Robert Andersen, Ismir Mulalic, Lars Winther and Høgni Kalsø Hansen for providing inspiration and a creative work environment, as well as for many critical and constructive comments.

Finally, I owe a special debt of gratitude to my wonderful girlfriend, Julie, and our loving daughter, Augusta, who have both been more understanding and flexible than anyone could have hoped for and for providing unlimited support, as well as putting up with me during this whole ordeal.

Abstract

This thesis examines how changing demographic trends and emerging technological innovations that allow for a more flexible utilization of residences influence the match between people and residences in Denmark, primarily within urban areas. The thesis consists of four papers investigating different aspects of these developments in relation to changes in either residential mobility or housing choice to various degrees.

The thesis addresses these themes at a time when urban areas have become an increasingly important factor in regional development, attracting many new businesses and residents, and creating the need for greater emphasis to be placed on the match between people and residences. Potentially this can lead to an unequal development of urban areas, with some groups of people losing access to increasingly larger parts of the city. In this light, changes in both demographic composition and the emergence of new types of technology may play an important part in how the future match between people and residences is shaped.

In order to analyse and explain the motives behind changes in residential mobility and housing choice, the thesis combines the frameworks of the life course and housing consumption. The four papers each incorporate their own analytical approaches depending on their respective research questions regarding: i) what characterizes the changing demographic composition of Copenhagen; ii) how sharing economies affect the residential mobility of city dwellers; iii) Airbnb's influence on housing choice and residential prices; and iv) how family dissolution through the death of a partner affects the survivor's residential mobility and housing needs.

The relationship in the match between people and residences is not a steady-state phenomenon but is always in flux. However, the findings of the respective papers show that changing patterns in the city's demographic composition and new technological possibilities are both disrupting current patterns of residential mobility and housing choice, thereby altering the future relationship of the match between people and residences both within and outside urban areas.

Keywords: migration, residential matching, residential mobility, housing choice, housing consumption, urbanization, demography, family dissolution, health, life course, sharing economies, youthification, academification,

Dansk sammenfatning

Denne afhandling undersøger, hvordan ændringer i den demografiske udvikling samt fremkomsten af nye teknologier, der gør det muligt at udnytte boligen på en mere fleksibel måde, kan påvirke matchet mellem mennesker og boliger i Danmark - primært i urbane områder. Afhandlingen består af i alt 4 papirer, der undersøger forskellige aspekter vedrørende disse udviklinger i relation til ændringer i boligmæssig mobilitet og boligvalg i varierende udstrækning.

Afhandlingen håndterer ovenstående temaer, eftersom urbane områder er blevet en stadig mere afgørende faktor i den regionale udvikling. De seneste årtier er mange nye virksomheder og beboere blevet tiltrukket til de urbane områder, og herved skabt behov for øget opmærksomhed på matchet mellem personer og boliger. Potentielt kan dette fører til en ulige udvikling af de urbane områder, hvorved nogle grupper får dårligere adgang til byen. I det lys kan ændringer i den demografiske sammensætning og opkomsten af nye typer af teknologier skubbe til den eksisterende balance, der er i matchet mellem personer og boliger.

Afhandlingen kombinerer rammerne inden for livskurs- og boligforbrugsteorierne til at analysere og forklare de bagvedliggende motiver til ændringer i personers boligmæssige mobilitet og boligvalg. De fire papirer indarbejder hver især deres egen analytiske tilgang afhængig af forskningsspørgsmålene indenfor; i) hvad der karakteriserer ændringerne i den demografiske sammensætning i København, ii) hvordan deleøkonomi påvirker byboeres boligmæssige mobilitet, iii) Airbnb's indflydelse på boligvalg og boligpriser, og iv) hvordan opløsningen af familien i forbindelse med en partners død kan påvirke den efterladtes boligmæssige mobilitet og boligbehov.

Forholdet i matchet mellem personer og boliger befinder sig ikke på et stabilt leje men er altid i forandring. Imidlertid viser resultaterne fra papirerne, at både ændrede mønstre i den demografiske sammensætning samt nye teknologiske muligheder kan lede til en disruption af både den boligmæssig mobilitet og i boligvalg. Hermed er de med til at ændre, hvordan matchet mellem beboere og boliger i urbane områder udformer sig i fremtiden.

Emner: Migration, boligmatch, boligmobilitet, boligvalg, boligforbrug, urbanisering, demografi, familieopløsning, helbred, livskurs, deleøkonomi, ungdomificering, akademificering.

1. Introduction

This thesis investigates how the match between people and residences is being affected by changes in the demographic composition of cities and the introduction of new types of short-term subletting allowing more flexible housing utilization. The thesis does this by exploring the impact these factors are having on residential mobility and housing choice in Denmark.

Cities have become the powerhouse of regional and national development, driving a still larger proportion of economic growth (OECD 2019). This has attracted both businesses and people alike, and for centuries the agglomeration of social and economic activities has been synonymous with city development (Kotkin 2007). However, in the past thirty years the pace at which people have moved into city areas has increased significantly, and more people now live in urban areas than ever before[1] (Storper et al. 2015; United Nations 2019). This development has caused the competition for land to become an increasingly important issue for policymakers and urban planners to try and solve as they strive to accommodate both old and new residents. One way to accomplish this is to try and plan the city's development so that the actual housing supply matches people's residential preferences. However, changes in the demographic composition and new innovations allowing a more flexible use of residences through short-term subletting can disrupt the balance in the match between people and residences.

Although residential mobility to urban areas has always existed, the pace of this process of urbanization has increased significantly in recent centuries (Kotkin 2007). However, urbanization is not only to be defined as the difference between the influx and outflow of people towards urban areas: it also entails a transformation of the city itself through urban planning and the built environment, as well as changes in the dominant cultures, lifestyles and behaviour of the city's residents. While some argue that urbanization and urban growth can be attributed to the amenities that are available in urban areas (Glaeser et al. 2001; Florida 2002a, 2003), others, like Storper and Scott, argue that the pull factor towards cities is rather a matter of the concentration of firms and knowledge (Storper and Scott 2009). However, urbanization is not a stable one-way process. In the last decades of the twentieth century some urban areas started to witness a process of counter-urbanization, as the movement of people shifted from population-dense urban areas to less dense suburban or rural areas (Fielding 1982; Escribano 2007; Lindgren 2003; Hansen and Aner 2017; Lindgren 2003; Herslund 2012). Although there still is some movement from urban

[1] Despite debates in the literature concerning what exactly constitutes an urban area and how the borders between urban and non-urban should be defined, the trend has been towards increasing urbanization, whatever its exact definition (Weeks 2010; Cohen 2006; Kotkin 2007).

to suburban areas, this trend has slowed down and again been exceeded by the influx of new residents into population-dense urban areas (Glaeser and Gyourko 2005; Scott 2008b).

In recent years, the process towards more urbanization has started to encounter criticism, as the unintended consequences of this process are becoming clearer (Florida 2017; Rodríguez-Pose and Storper 2019; Glaeser 2020). Unregulated growth in urbanized areas can increase inequality in housing and the gentrification of urban areas, as certain groups are pushed to the outskirts of the city due to increasing housing costs (Florida 2017; Rodríguez-Pose and Storper 2019; Scott 2008a). Likewise, housing policies that promote and sustain more liberal housing markets may also contribute to rising gentrification, especially during periods of economic boom (Hedin et al. 2012). Although urbanization can increase housing costs, it does not necessarily lead to increased wages, with the result that those with fewer skills and less educational training find it difficult to afford to live in the city (Scott 2014; Glaeser 2020).

Thus, urban scholars such as Micheal Storper (2015), Richard Florida (2017) and Edward Gleaser (2020) have pointed out that one consequence of a poor match between residents and the city's housing supply is that over time the city will grow more unequal, as access to it becomes more limited. Poor and even middle-class households risk being gradually pushed out of certain areas of the city as the scarcity of properties that match their housing needs increases as prices go up and housing aimed at more affluent households starts to take over (Östh et al. 2018; Reardon et al. 2008; Atkinson 2008; Musterd and De Winter 1998; Hansen et al. 2001). This increases spatial segregation within the city, with people living in socioeconomically homogenous neighbourhood enclaves that are socially isolated from each other, creating what Florida and Adler call a 'patchwork metropolis' (Florida and Adler 2018; also Hedin et al. 2012). Therefore, if city legislators wish to ensure that the city is open to all its residents and has a broad social mix, they need to ensure that the supply of housing matches the residential needs of all actual and potential residents, no matter what their economic, social, or cultural backgrounds (Scott 2019). By assuring that the match between people's residential needs and the available housing supply are aligned, the city will find itself in a better position to overcome the challenges of future urbanization patterns.

By investigating how new phenomena are disrupting residential mobility and housing choice, this thesis can be situated within the growing body of literature on migration (Coulter et al. 2016). However, unlike most of the migration literature that focuses on macro-scale migratory patterns across national and regional borders, I, in this thesis look at the movement of people between different residences at a lower geographical scale and on a more micro-level. The geographical scale of the present research does have an influence on the knowledge that can be

extracted from the phenomenon in question (Reardon et al. 2008; Lan et al. 2020). A focus on very localized phenomena at the most micro-level can mean that the bigger picture linking a specific case to other similar cases in other locations is at risk of going unnoticed. Likewise, a macro-focus on a global perspective potentially leads to smaller nuances at the local level being overlooked. The risk of missing either the bigger picture or the nuances is always present when exploring phenomena that are rooted in specific geographical areas (Lee et al. 2008; Brown and Chung 2006). Therefore, how well the match between people and residences is perceived also depends on the geographical scale at which it is viewed.

The rest of the thesis is structured as followed. Chapter 2 delivers a brief overview of the Danish setting of each paper and its empirical case study and describes the overall content that binds the papers together and the individual research objectives of each of the four papers. Chapter 3 sets out the theoretical foundations of the thesis, which includes a literature review of the research history on residential mobility and a theoretical description of the life course and housing consumption frameworks used in the thesis. Chapter 4 describes the critical rationalism framework which supplies the thesis's philosophy of science and provides an overview of each paper's research design. Chapter 5 contains concluding remarks, a summary of the findings of each paper and an overall conclusion to the thesis, as well as making suggestions for future research. Finally, following Chapter 5, Papers 1 to 4 will follow in numerical order.

2. Content-setting and research objectives

Given that the main focus of the thesis is on the match between people and residences and how demographic changes and innovations that allow for a more optimal use of housing can affect this relationship, the thesis investigates changes in residential mobility and housing choice in a Danish setting. This chapter will first briefly outline the situation of urbanization in Denmark and attempts to secure adequate residences in Copenhagen which all four papers use as their empirical starting point. Following this, the chapter will go on to describe the common denominator of the four papers and what distinguishes them from one another, together with the overall research question, as well as the respective research questions posed by each individual paper.

2.1. The Danish setting

Historically urbanization increased significantly in Denmark from the middle of the nineteenth century and continues up until the present day. Although there have also been brief periods when the flow have gone towards decentralization and counter-urbanization, as was the case in Copenhagen in the late 1980s and early 1990s, a period characterized by reindustrialization and movement out of urban areas (Andersen et al. 2011). However, despite these periods of re-urbanization, the main trend that has characterised internal migration patterns in Denmark during

the last 150 years has been towards increased urbanization, which has caused the city's population to increase considerably (Christensen 2017). In 1850, the city of Copenhagen had about 135,000 residents and covered an area of just nine square kilometres; in 2020 the city had close to 635,000 residents and covered ninety square kilometres. Taking all the area labelled Greater Copenhagen – which, besides Copenhagen city itself, also includes the municipality of Frederiksberg, as well as the suburban municipalities surrounding it – the total sum of residents is close to 1.5 million people in an area over 600 square kilometres. It is estimated that Copenhagen will increase by 10,000 new residents a year over the next ten years (Copenhagen municipality 2020).

The city of Copenhagen has long actively tried to secure a good match between its residents' housing needs and the available supply of housing. One of the strategies to achieve this has been urban renewal: over the past 150 years, the municipality of Copenhagen has actively planned to renew its housing stock either through demolition and rebuilding, or more recently through modernization (Lemberg 1979; Andersen 1998). This was done to provide suitable housing for the increasing number of residents who came to the city at the end of the nineteenth century. Most of the new residents were working-class families who moved to the city during the second industrial revolution. This led to a shortage of available housing, as the housing stock in the city was not sufficient to house all the new residents, leading to overcrowding and people living in low-quality housing the city authorities considered slums unfit for human occupation (Københavns Kommune 1992; Larsen and Hansen 2008). Besides demolishing and rebuilding new residences, another way of securing adequate housing is to construct new and affordable residences in under-used areas. This strategy formed the background to the creation of social housing associations at the start of the twentieth century, which in the century to come were a key component in ensuring that there was enough housing as Copenhagen expanded (Rasmussens 1994; Andersen 2006). Both of these strategies have been continued up until the present day, but as the space available for constructing new residential buildings is becoming increasingly scarce, it also becomes more important to ensure that the matching of residential needs with housing supply is adequately met.

2.2. Common denominator and research question

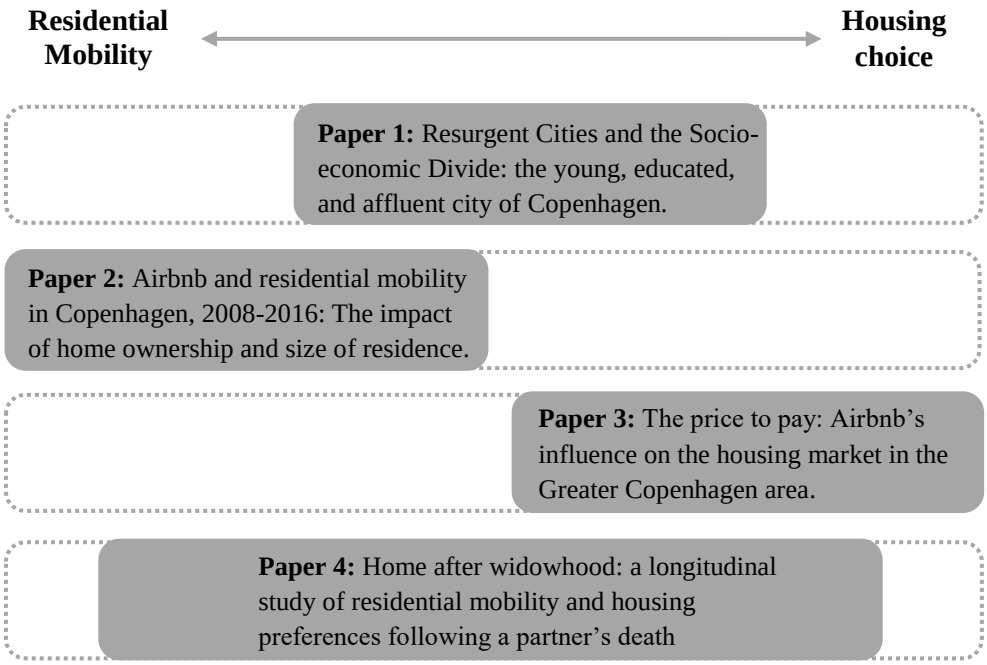
The common denominator for the four papers in this thesis is how changes in the match between people and residences can be understood through societal changes affecting residential mobility and housing choice. By residential mobility, I refer to the duration that people live in the same residence and the frequency with which they change their actual residential locations. For the purposes of this thesis, residential mobility therefore covers both short- and long-distance residential moves, exclusively those that happen within national borders, thereby excluding

transnational migration. Similarly, housing choice relates to people's realized preferences concerning the physical attributes connected with and surrounding their current and future residences. As a result, only people's actual choices regarding their places of residence are addressed, not the desires and dreams they have regarding their residence that are not realized. However, given that residential mobility and housing choice are closely interrelated, as they both deal with people's residential preferences by looking at the aspects that make us move and choose a residence, it can be difficult to separate the one from the other. Nonetheless, they also differ on some key aspects, which might cause confusion and even fallacies if not kept apart when analysing the reasons for changes of residence. Residential mobility addresses the aspects as to why a household's current residence is no longer suitable or sufficient in their current situation. This reflects the fact that residential mobility is often related with aspects connected to the physical features of the residence, such as the number of rooms, its financial costs and so on. In contrast, housing choice focuses on the household's choices between all potential future residences, which rather constitute a more hypothetical collection of residences, whereas residential mobility focuses on the current residence. Furthermore, housing choice refers not only to the physical features of the residence, but also the geographical location regarding where households choose to reside, such as jobs or school locations, proximity to social relations and neighbourhood characteristics.

What this means is that, even though the four papers included in the thesis all deals with the topic surrounding the match between people and residences through aspects of residential mobility and housing preferences, they do so at various magnitudes. Some of the papers will be more focused on the residential mobility aspect and give the housing choice aspect only a more implicit role, while others will revolve mainly around housing choice and other still others be placed somewhere in between. Figure 1 shows how the primary focus in each of the four papers is situated between residential mobility and housing preferences.

Whereas residential mobility primarily concerns the about the match between people and their current residences, the notion of housing choice focuses on the matching of people and their future residences – in other words, the aspects that cause people either to move away from their current residence or choose a new one. Besides the orientation between residential mobility and housing choice, the four papers also distinguish between whether the causes of changes of residence arise from events at either the individual or structural level or whether they are internal or external to the household. In the following paragraphs, each paper's connection with residential mobility, housing choice and the external/internal dichotomy is outlined, together with their respective research questions.

Figure 1. Placement of papers regarding residential mobility and housing choice.



Paper 1 explores the changes in demographic composition that have led to the city of Copenhagen, like so many other cities, have become significantly younger from 1993 to 2017. The paper focusses on young adults aged 20 to 29, whose proportion of the population has remained constant over this 25-year period. The paper show that even though at first glance this group seems the same, it has changed dramatically over this period, especially when variation in the socio-economic traits within the group and the links between where they live and where they work are taken into account. The research question for Paper 1 is:

What characterizes the demographic development in Copenhagen over the past 25 years, and how has that had an impact on social-economic inequality?

In relation to Figure 1, this paper takes a middle position, as it places itself exactly between residential mobility and housing preference, as well as between external and internal events. It does so by focusing neither directly on actual changes of residence nor on the action of choosing a new residence. Instead, the paper observes these actions indirectly after they have been made and investigates what effects they have had on the social dynamics of the city of Copenhagen. As a result, the paper does not determine to what extent this development is caused by either external structural events or internal individual events. It therefore also has the most macro-perspective of the four papers included in this thesis, as it investigates the traits of residential development within the city over this 25-year period.

Paper 2 studies how changes in the possibility to enter into a short-term lease for one's place of residence through new technological innovations affects the household's desire to change its residence. With the emergence of peer-to-peer platforms such as Airbnb, it has become easier for people to rent out either a part of or their whole residence for a limited period of time, thus making it easier for them to optimize their housing consumption. After its first introduction to the Copenhagen housing market in 2012, Airbnb, an example of the so-called sharing economies, became an instant success, rapidly increasing both its geographical spread and its magnitude. This has raised a series of questions about its effect on the housing market, two of which will be handled in this thesis. Paper 2 focuses on the effect of Airbnb on residential mobility by asking this research question:

What effect does the presence of Airbnb have on households' residential mobility?

The paper therefore places itself directly on the residential mobility side of the spectrum while only dealing with the housing choice side indirectly. The paper investigates whether households move out as a result of increasing Airbnb activity in their neighbourhood, or whether instead they choose to stay for longer than they otherwise would. Given that Airbnb is one of the technological advances that have brought forward new types of economic activity, it places itself on the more structural side of events, rather than on the individual side. Although it is up to the households themselves whether they participate in the activity, it is not up to them to decide what other households in close proximity do. It therefore still affects them indirectly, even though they might choose not to participate.

Paper 3 takes up the other side of the question regarding the possible effects of Airbnb on Copenhagen's housing market, namely how Airbnb influences housing prices and neighbourhood composition. As Airbnb allows people to optimize their housing consumption better, it is likely to increase the value of residences in areas with a high level of Airbnb activity and to affect those who seek housing there, as some people are more willing to pay a premium for a residence within such an area than in others. This prompts the following research question for Paper 3:

To what extent is the presence of Airbnb increasing residential prices and influencing households' housing choices?

As indicated by the research question itself this paper lean more heavily on the side of housing choice than on residential mobility side of the spectrum as opposite to Paper 2. In a way, Paper 2 and Paper 3 both share the same overall research question but go at it from opposite directions. Therefore, like Paper 2, Paper 3 is situated at the more structurally specific side of events, rather

than individual side when it comes to changes in households' preferences, although households are freer to opt in if they want to do so without necessarily being affected by the choices of others.

Paper 4 takes on a different subject, as it investigates how the dissolution of a family in the form a partner's sudden death can change not only people's residential mobility but also their preferences for future housing. Family dissolution can change households' residential needs, as they no longer consume the same area of residential space as they previously did and are likely to rethink their ranking of housing preferences. This is especially true when family dissolution happens involuntarily and suddenly, as in the case of the death of a cohabiting partner. As national demographic compositions are changing in many countries, given that the share of people above the age of retirement continues to increase, this issue is becoming increasingly pertinent. This has prompted the following research question in Paper 4:

How does the death of a partner change the surviving partner's subsequent residential mobility and housing preferences?

Like Paper 1, the research question raised in Paper 4 addresses both the residential mobility and the housing choice aspects equally. But unlike Paper 1, in which the aspects of residential mobility and housing choice are only handled indirectly, Paper 4 considers the direct impact on both residential mobility and housing choice of the death of a cohabiting partner. Unlike Papers 2 and 3, Paper 4 deals with an event that is entirely internal to the household and that happens on the individual level. It can be argued that demographic change with a population that continues to grow older is itself a structural issue, but even so the event is not something that is structurally determined.

3. Theoretical framework regarding residential mobility and housing choice

Understanding households' residential preferences and what influences their decision on whether to stay or to move is an important factor in predicting the future development of cities and to make sure that the match between people's residential needs and the available housing is met. In the words of Richard Florida, "Place matters" (Florida 2002b, 183): the neighbourhood characteristics that attract some people to move to a neighbourhood can deter others and vice versa. Likewise, affordability may play an important role in people's housing choices and residential mobility (Florida 2012). Another important aspect is that people experience a path dependency to their residence and neighbourhood over time, resulting in them being less likely to move. This happens because people become more and more firmly embedded in their residence, as they acquire knowledge of and become familiar with their home and neighbourhood the longer they stay in the same place (Fischer et al. 2000, 1998; Fischer and Malmberg 2001). This chapter

presents the theoretical frameworks used to understand residential mobility, defined as the frequency with which people change residence, and housing choice, defined as people's observed housing preferences. The first section that goes over the concept of residential mobility, including the evolution of the literature on the subject, and is followed by a section on key aspects of housing choice and residential consumption. However, first the most important aspects covered by the literature on residential mobility and housing choice at the present day will first be outlined.

Historically the events that have been viewed as being the biggest push-factors towards residential mobility and that have attracted the most attention in the literature include being a student, entering the labour market, losing one's job, going on retirement etc. The literature on residential mobility and housing choice in 2020 is heavily focused on, for example, how residential mobility affects neighbourhoods and how it can be an intermediate factor in segregation and neighbourhood deprivation (Schouten 2020; Bernelius and Vilkama 2019; Greenlee 2019; van Gent et al. 2019; Andersson et al. 2020). Also, the match between the likelihood of neighbourhoods and households moving has attracted attention (Büchel et al. 2019; Shuttleworth et al. 2020; Carlson and Gimpel 2019), together with research on how the use of housing vouchers can successfully move poor households to better neighbourhoods (Aliprantis et al. 2020; Ellen 2020). Furthermore, how residential mobility can affect other outcomes has also been investigated, such as student performance (Cordes et al. 2019; Voight et al. 2020; Haugan and Myhr 2019) and transportation choices (Haque et al. 2019; Saghapour and Moridpour 2019; Hu and Wang 2019).

Some of the literature also seeks to move the focus on housing choice away from an emphasis on choice towards aspirations (Preece et al. 2020) and asks how stated and revealed preferences should be combined (Hasanzadeh et al. 2019). Other literature focuses on how housing choices should be explained through either a push-pull framework (Ghazali et al. 2020), risk factors (Sahasranaman et al. 2020) or public housing policies (Dantzler and Rivera 2019; Dong et al. 2020). Furthermore, classical themes such as the role of life events on residential mobility are still relevant in the literature today (Ferrari et al. 2019; Wang et al. 2019). The same can be said of the connection between life cycle changes and residential mobility, both changing from adolescence to young adulthood (Bernard and Vidal 2020; Brazil and Clark 2019; Opit et al. 2020) and later on in life (Jong 2020; Hrast et al. 2019; Tanaś et al. 2019; Andersson et al. 2019).

Other events, such as how childbirth and the death of one's spouse affect residential mobility, have not been as thoroughly investigated, although the link between childbirth and residential preferences is well documented (van Ham 2012; Long 1972; Kooiman 2020; Michielin

and Mulder 2008). Likewise, the question of how contemporary technological innovations that permit more optimal housing use and the emergence of new modes of interaction affect our moving patterns and housing choices within cities has not yet seen much research (Shaheen and Chan 2016; Circella et al. 2017). Mostly since this is still a relatively new phenomenon within the research field, and there is thus no shared consensus as yet regarding to how this is best measured and explored. This thesis will show how the match between household's residential needs and the available housing stock are affected by looking at some of theses' more unexplored factors behind residential mobility and housing choice. The thesis thereby contributes to the migration literature by showing how the demographic changes and new innovations that make it possible to optimize the consumption of housing through flexible short-term subletting is affecting future housing demand and thus the dynamics informing our cities.

3.1. Mechanisms of residential mobility

Residential mobility has a big impact on how neighbourhoods, and in the end cities, develop (Jacobs 1961). One the one hand, a somewhat high overall residential turnover rate can make for a more socioeconomically and demographically mixed and dynamic city, while on the other hand, a low moving rate can lead to more stable areas and be a sign of a good match between the residents and residences. However, this does not necessarily mean that more dynamic neighbourhoods are automatically more socially diverse than static neighbourhoods and are therefore preferable. Many deprived neighbourhoods have a high moving rate, but this does not imply that they are more diverse than other neighbourhoods – perhaps even the contrary, as deprived neighbourhoods often attract people with the same socioeconomic backgrounds (Andersen 2002; Andersson et al. 2007; Bretherton and Pleace 2011).

Residential mobility therefore plays an important role in society. In order to gain a better grasp of the theoretical framework, this section will consider the mechanisms behind residential mobility. It will do this first by untangling the historical literature on the subject, from its beginnings in the 1900s to the present day, followed by a consideration of the dichotomies involving residential mobility, such as external vs. internal events and long- vs. short-distance moves. The section will end by touching on new trends within the field of residential mobility.

3.1.1. The history of literature on residential mobility

Studies of residential mobility can be traced back at least a century, back then being mostly descriptive in nature. These studies reported on moving rates and median numbers of residential moves for selected small groups in the US, such as schoolchildren in Seattle or registered voters in the city of Columbus, Ohio (Caplow 1949; Gaus 1923). Later on studies that also tried to connect residential mobility with social and economic aspects of the household started to emerge

(Albig 1933). Some of these studies reported a positive association between residential mobility and changes in both household income and family structures. In the same period, other studies started to look at the association between neighbourhood attachment and residential mobility as a way to determine the degree of urbanization within the large cities and showed that peripheral areas of cities were growing at a faster rate than inner city areas (Harris 1943). However, this was criticized for making conclusions about decentralization that could not be supported by the available data and could just as likely be part of the natural expansion of the city (Riemer 1948). This led to studies with more rigorous sampling procedures that followed the residential mobility of the same families over a period of time, thus confirming the hypothesis of decentralization (Caplow 1949).

Throughout the 1950s and 1960s, both structural and social determinants of residential mobility began to be documented in the literature. Structural determinants were treated as external factors affecting a group of households, and potentially the whole of society, while the social determinants were taken to be specific changes internal to the household that varied from household to household (Hauser 1959; Potter 1956; Vance 1957). In particular, a study conducted by Rossi in 1955, called 'Why families move', was a turning point in associating residential mobility with changes to the family structure (Lee and Waddell 2010). In his study, Rossi show that households move home as a way to cope with new housing needs after the occurrence of an event causing a change to the family structure (Rossi 1955). In particular, Rossi found housing size and type of tenure to be among the biggest determinants of a household's residential mobility. Whereas scholars such as Rossi, Potter, Hauser, Vance etc. documented some of the determinants of household residential mobility by studying either structural or family changes separately from each other, others such as Sabagh et al. (1969) tried to combine them in order to create general framework for studying residential mobility. In their paper, Sabah et al. showed how different determinants of residential mobility, such as the family life cycle, the residential environment etc., can be analysed in terms of push and pull factors and their interrelation (Sabagh et al. 1969). Likewise, they showed that determinants that are both structural and social in character can have an influence on a household's residential mobility.

These studies led to a new way of thinking about residential mobility in terms of how households adjust their residential consumption in the wake of change to their family structures (Lee and Waddell 2010). One of the first attempts to conceptualize this framework, and has since gained wide support in the residential mobility literature, is a paper by Brown and More from 1970, entitled 'The intra-urban migration process: a perspective' (Brown and Moore 1970). In their paper, Brown and More set up a framework for residential mobility by utilizing household

decision-making. They did this by breaking down the process of a residential move into two steps. In the first step, the household experiences some changes, either structural or individual, that make their current residence inadequate and leaves the household dissatisfied. The second step is for the household to decide whether to move or stay based on the available housing stock that fits its residential needs. By using this conceptual framework together with survey data, Brown and Moore argued that researchers could develop better fitting models of residential mobility within urban areas and improve their evaluations of urban planning (Brown and Moore 1970). By extension, Alden Spear argued that the household's satisfaction with their current residence could acts as an intervening variable in explaining residential mobility (Speare 1974). In his paper, Spear shows that, by using residential satisfaction as a criterion – compiled as an index of various household and housing characteristics, such as age, size, tenure etc., as determinants – most other background variables lose their importance in predicting residential mobility, thus supporting the framework of housing consumption and household adjustment.

As new family forms that deviated from the traditional nuclear family started to become more dominant in the late 1970s, such as single-person households, the framework needed adjustment in order to include these new types of families (Stapleton 1980). In their paper 'Life cycle and housing adjustment as explanations of residential mobility' from 1983, Clark and Onako try to combine the life cycle and housing-adjustment framework by breaking the life cycle framework down into specific changes and stages that can affect residential mobility (Clark and Onaka 1983). More particularly, they split the determinants for residential mobility into adjustment moves and induced moves. Adjustment moves can be thought of as single-factor determinants that directly affect a household's housing satisfaction, such as the need for more residential space, better neighbourhood quality, better access to one's workplace etc. Induced moves, on the other hand, are caused by changes in the household that affect a range of determinants for household housing satisfaction, such as changes in household size and retirement, but can also be caused by residential moves due to household dissolution (Clark and Onaka 1983).

From the 1980s onwards the literature on residential mobility continued to evolve, and the amount of research being conducted saw a significant increase, only to be overtaken in the 1990s by studies of international and transnational migration (Coulter et al. 2016). One reason for this increase in research into residential mobility might be found in better access to longitudinal data, which many studies used as the basis for analysing the links between residential mobility and changes in household life cycles (Davies and Pickles 1985). In the final decade of the twentieth century, the life cycle framework was changed and developed into the life-course

framework due to increasing dissatisfaction with the old framework within the discipline. The life cycle framework was thought to be too deterministic and overall ill-suited to predicting the reality precisely when it came to residential decision-making by households (Dykstra and van Wissen 1999; Elder 1994). This new modified approach also meant that some of the old determinants of residential mobility, such as the age of the head of the household, were now seen as poor proxies for predicting residential moves. Instead the emphasis was laid on 'trigger' events, such as family formatting, childbirth, retirement etc., as determinants of residential mobility, as these mark a change in households' residential needs (Kan 1999; Littlewood and Munro 1997; Mulder and Hooimeijer 1999). Another new notion that gained traction within the literature on residential mobility in the last part of the twentieth century was the concept of cyclical mobility, or moves between multiple residences (McHugh et al. 1995). These types of moves are typically seen among families with complex family structures, such as divorced couples with joint custody of their children, as well as households that have two or more residences and that share their time equally between their residences. Up until that point most research on residential mobility had treated residential moves as an event connected to a single point in time, whereas cyclical moves were thought of as belonging primarily to long-distance migration (Coulter et al. 2016).

The relationship between the life-course framework and the theme of residential mobility saw further development at the beginning of the 21st century. This was partly due to the availability of high-quality data that makes it possible to track households over time and to advances in methods of analysing the data (Aisenbrey and Fasang 2010; Mulder 2007). Access to better longitudinal data also meant that it became possible to turn the relationship between life-course and residential mobility around. Instead of looking at how changes in the life course can affect households' or individuals' residential mobility, as was the case in the traditional literature on residential mobility, research on how residential mobility could affect later life-course events started to emerge (Haynie and South 2005; Jelleyman and Spencer 2008; Malmberg and Andersson 2019; Andersson and Malmberg 2018). The period also saw a greater emphasis on the role of neighbourhoods and neighbourhood attachment on residential mobility. While high levels of local social capital were found to be associated with low residential mobility (Kan 2007; Mulder and Malmberg 2014; Andersen 2011), low residential mobility was also shown to be correlated with neighbourhood gentrification (Freeman 2005).

Some of the focus within the residential mobility literature also went on trying to disentangle the impact of the neighbourhood on residential mobility from the household's life-course. What was shown was that households do not always move in order to adjust their residential consumption in order to fit their housing needs better after a life-course event, but

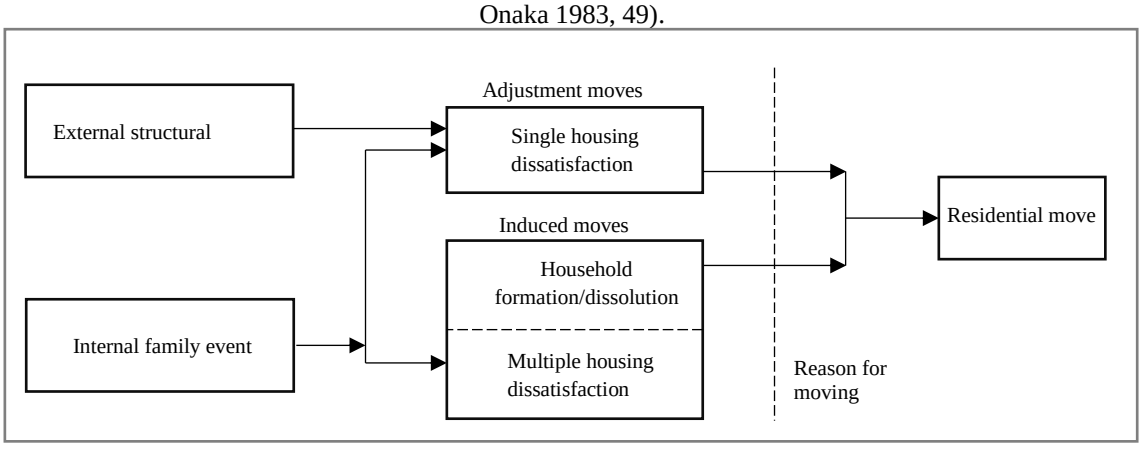
sometimes did so to trade up in neighbourhood quality while maintaining house quality at the same level (Clark et al. 2006; Rabe and Taylor 2010).

During the last ten years, the amount of research into residential mobility has continued to increase, thus proving that, even despite the vast amount of studies already completed, there is still room for further advances in understanding residential mobility (Coulter et al. 2016). In addition, advances in computing power have made it possible to explore increasingly complex questions regarding residential mobility. Likewise, the opportunity to trace residential data far back in time means that it is now possible to compare residential trends stretching over decades, instead of looking at just a couple of snapshots, thus making it possible to investigate the association between residential mobility over whole household life-courses (Coulter and Ham 2013; Shuttleworth and Östh 2017; Kulu et al. 2018; Holm 2017).

3.1.2. External and internal events

As mentioned in the previous section, one typical division within the literature on residential mobility is to distinguish between structural changes that are external to the household and life-course events that constitute internal changes within it. In their 1983 paper, Clark and Onaka describe how both external structural changes and family life-course events can cause residential dissatisfaction with specific aspects of the residence, while only family life-course events can lead to either dissatisfaction with multiple residential aspects or household formation and dissolution (Clark and Onaka 1983). Figurer 2 features a simplified version of Clark and Onaka's diagram of the interrelations between different reasons for moving. The forced moves depicted in the original diagram have been omitted here, as this perspective falls outside the range of this thesis.

Figure 2. Simplification of Clark and Onaka's *"the interrelationship of reasons for moving"* (Clark and Onaka 1983, 49).



The central point in Figure 2 is that external and internal changes can both cause a household to choose to move to a new residence. Where external structural changes mostly cause housing

dissatisfaction with one specific aspect of the residence, internal life-course events can lead to housing dissatisfaction with both single and multiple residential features.

Some of the largest external structural changes underlying a household's residential mobility, as described in both Clark and Onaka's paper and other papers, are related to changes in the housing market, structural changes in the labour market, workplace relocations and changes to the local physical environment (Clark and Onaka 1983). Changes to the housing market can affect a household's residential mobility, as they can make it either easier or more difficult to acquire a new residence. For example, liberalizing mortgage regulations means that it would be cheaper to take on a new mortgage, but that this is also likely to increase residential prices (Hooimeijer and Oskamp 1996; van der Vlist et al. 2002). Likewise, labour market changes can affect a household's residential mobility, as laid-off workers might find it difficult to afford to stay in their current residences while searching for a new job, while increased commuting time due to workplace relocation could mean less time spent with the family in exchange for relative small economic gains (Bloze and Skak 2016; Hansen et al. 2020; Henley 1998; Kan 2002; Scott 2008a; Eliasson et al. 2003). Finally, can changes to the local physical environment, such as pollution, increase household residential mobility, while neighbourhood amenities such as parks and recreational areas can reduce the likelihood that households acquire residential dissatisfaction (Bartik et al. 1992; Clark et al. 2006; Taylor 2014; Niedomysl 2008).

How various life-course events affect household's residential mobility is another theme that has been covered extensively within the literature of residential mobility. Among the most significant life-course events are those related to either household formation or dissolution, that is, when families first form and when they start to break apart again either through their children leaving home, divorce or the death of a family member (Bonnet et al. 2010; Kooiman 2020; Speare and Goldscheider 1987). These types of event affect many different aspects of the household's residential satisfaction, in contrast to external structural changes, which typically only affect single aspects of this. Likewise, other life-course events, such as retirement, may also affect the household's residential mobility through multiple aspects of household residential satisfaction, such as needs regarding the size of the residence and the proximity to neighbourhood amenities (Ball and Nanda 2013; Banks et al. 2012; Niedomysl 2010; Mulder and Malmberg 2014). Other life-course events, however, as mentioned by Clark and Onaka, only affect single aspects of the household's residential satisfaction, such as the need for more space after the birth of a child, although it can also be argued that this affects other aspects regarding residential satisfaction, such as neighbourhood characteristics (Clark and Onaka 1983; Coulter and Scott 2015; Lanzendorf 2010).

3.1.3. Long-term and short-term residential mobility

Besides this framework of adjusted and induced moves, other studies have shown that the motives as to why households move to a new residence are partly correlated with the geographical distance of the residential relocation (Clark and Cosgrove 1991; Niedomysl 2011; Pelikh and Kulu 2018; Thomas et al. 2019). Households that move over longer distances or that cross municipal or regional boundaries are more likely to do so due to proximity to areas of interest to them, such as changes of workplaces or educational institutions. Short-distance moves are more likely to be correlated with changes in the household's residential needs due to changes in its size or in the household's preference for neighbourhood amenities. Some factors, however, like family-related issues, are found to be related to both short- and long-distance moves (Niedomysl 2011).

As in most cases, there will always be outliers that perform differently from the trends outlined here, as these only are general tendencies aimed at describing how the average household can be expected to act. Examples of large households living in very small residences in deprived, unattractive neighbourhoods can be found, as they have no other choice due to low levels of income. Likewise, will it be possible to find cases of very small households composed of only one or two elderly individuals living in abnormally large residences, many times larger than their actually needs, just because they have the means to acquire such a place. These cases, although also interesting, are not representative of the choices for the majority of households and are therefore better studied separately.

3.1.4. New trends in residential mobility research

Although research on residential mobility has been around for more than a century and has drawn increased attention within disciplines like geography, sociology, economics etc., there is still a need for additional research. As shown at the beginning of this chapter, contemporary literature on residential mobility still focuses on life-course events and life cycles as explanations for residential relocation, as well as the connection between residential mobility and neighbourhood development and how residential mobility affects other aspects of people's lives.

Demographic change can lead to life-course events that previously had less of an impact on society now having a more profound effect on neighbourhoods and the housing market. As the quality of health-care services increases, so does the number of people living well beyond the age of retirement. Coupled with the large baby boomer generation and the relatively smaller generations that followed, this has meant that in many countries the average age is rising significantly (Danmarks Statistik 2018; United Nations 2020). This demographic change is also likely to have implications for residential mobility, since older households do not have the same residential mobility and housing needs as younger households (Abramsson and Andersson 2012;

Goldscheider 1966; Morris et al. 2018). These demographic changes can also change residential mobility, as they lead to more cases of family dissolution, as more will experience a partner's death, but so far only a few studies have looked into this association (van Ham 2012).

Likewise, technological advancements and new innovations can also have a profound impact on a household's residential mobility. Some of these technological innovations have made it possible for households to obtain more information about the available housing stock and compare different residences not only on price and size, but also on location, local amenities etc. This knowledge has made it easier than ever for households themselves to trade residences and circumvent the normal ways of buying and selling, which in turn has made the housing market much more competitive (Stamsø 2015; Hendel et al. 2007; Zietz and Sirmans 2011; Levitt et al. 2008). Another way technological advances have changed residential mobility is through what have been labelled 'sharing economies', but are also known as 'platform-' or 'gig' economies, either by making it easier for households to optimize their utilization of their residences, or making the latter more accessible. Most noticeable are sharing economy services that deals with residence sharing like Airbnb, HomeAway etc, as well as transport services like Uber and Lyft, as they can make the area more accessible (Barron et al. 2020; Circella et al. 2017; Flores and Rayle 2017; Garcia-López et al. 2019; Koster et al. 2018a; Shaheen and Chan 2016). Although these new trends, which have emerged within the last ten to twenty years, have brought about demographic changes and technological innovation, there is still a lack of research on how they affect and possibly change the household's residential mobility. This leaves plenty of possibilities open for new research to add to the already comprehensive literature on residential mobility.

3.2. Frameworks for determinants of housing choice

As previously explained, there are strong determinants underlying people's residential mobility and housing choices. Having covered some of the different aspects that go into residential mobility, the next task is to go over the housing choice framework to sketch out some of its main features and determinants.

Throughout people's lives, their needs and preferences regarding which features their residence should provide them with changes in respect of both the types and the size of the preferred features. While some of these features are implicit properties of the residence and thus not something we think consciously about when choosing a new residence, others are more explicit in nature. This includes features such as the physical size of the residence, the number of rooms it has, its bathroom facilities etc. Based on people's preferences for the features they value as most important in a residence and what their possibilities are, people choose the residences that are most in accordance with their own views.

This section will cover two frameworks that can be used to explain the determinants that goes into residential choice and how they change over time. The first is the life-course framework, which builds on the life cycle framework to explain changes in people's housing preferences because of certain events that happen in their lives. The second is a theoretical framework for explaining housing choice through people's housing consumption. These two frameworks for describing housing choice interact well with each other, as the life-course framework is useful in pointing out the life events that impact on behaviour, while the housing consumption framework describes why we change our housing preferences. Finally, the section will go over some of the major determinants for changes in households' housing preferences and relate them to previously covered frameworks.

3.2.1. Life course debate

There are undoubtedly many reasons why people choose to change residence, and almost as many theories trying to explain and predict these underlying reasons. One of the more profound theories argues that a change in residence happens in close correlation with the significant life events that happen during our life course (Painter and Lee 2009). However, preceding the life-course framework was the life cycle framework, one of the leading frameworks when it came to explaining the reasons behind changes in both residential mobility and housing choice before the 1980s (Rossi 1955; Clark and Onaka 1983; Sabagh et al. 1969; Davies and Pickles 1985).

To put it somewhat simply, the life cycle framework breaks a person's life down into various stages, as depicted in Figure 3, each affecting the person's residential mobility and housing choice in different ways. Each stage has its own types of rationale and preferences regarding what we view as important and essential in our existence, and we do our very best to optimize these preferences in according to the dominant rationale we possess at that time (Browning and Crossley 2001). Changes to life cycles thus happen when we move from one stage in life to another, which also includes a change in our preferences and coherent rationales (Clark and Van Lierop 1987).

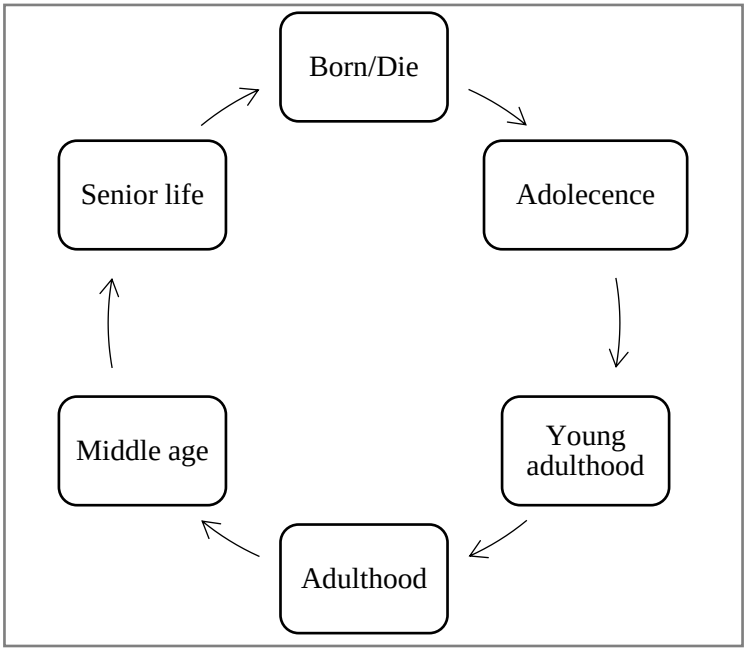
From the time of being born through the adolescent stage, most people have little to no say in their own residential mobility or housing choices. After the adolescent stage, people are on track towards becoming independent young adults, which, within the life cycle framework, is characterized by the first move away from home (Simmons 1968; White 1994). As social contact means a great deal to young adults, even though money is at the same time scarce, adolescents typically choose small residences located in close proximity to areas with high levels of social activity, like cities (Chen and Rosenthal 2008; Haurin et al. 1996; Andersen 2011).

The following stage is characterized by full adulthood, meaning finding one's first real job after graduating and starting to form a family, with all that that entails. In this stage housing choices are therefore in general characterized by acquiring larger residences, partly as a result of having a higher income, and partly due to more spaces being needed as they form their own families (Clark and Onaka 1983; Freedman and Kern 1997; Doling 1976).

The next stage is middle age, which is characterized by both family structures growing stronger and the beginning of family dissolution, as the children grow older and eventually start to move away from home. Additionally, this is also the stage with the highest likelihood of divorce (Kennedy and Ruggles 2014). The housing choices in this stage resolve around acquiring even more space, as capital resources have been accumulated over the years, although in the case of divorce the picture is more one of downsizing, as single-earner households will have less capital funds than dual-earner households, all things being equal (Speare 1970; Speare and Goldscheider 1987).

The final stage within the life cycle framework is the senior life stage, which is characterized by retirement, more family dissolution and ultimately death. Housing choices in this stage of life are predominantly characterized by residential downsizing, as people either move to smaller and more manageable residences, or even retirement homes (Schnure and Venkatesh 2015; Yogo 2016; Ermisch and Jenkins 1999).

Figure 3. Life cycle stages of life based on age**.**



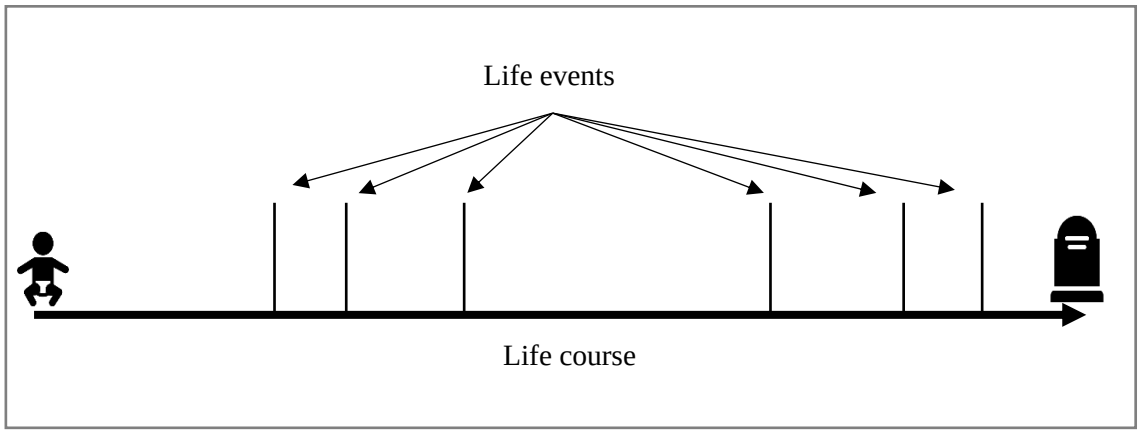
However, this framework have received a fair amount of criticism for being too deterministic when thinking about life and family development and for having limited predictive power when examining residential mobility and housing choice using real data (Speare 1970; Dykstra and van Wissen 1999; Elder 1994). The main problem with the life cycle framework is not so much that it is wrong about the underlying motives behind people's reasons for moving and choosing a residence but that the framework is too rigid and has problems in handling those who do not fit neatly into its various stages.

The life-course framework was therefore developed in its place, which, just as in the life cycle framework, can be used as a framework to explain how people's residential mobility and housing choices change over time (Clark and Dieleman 1996). This is not to say, however, that the life cycle framework has been completely abandoned by academia. Indeed, it still has its uses, but when it comes to research on residential mobility and housing choice, it has to a large extent been overtaken by the life-course framework.

The life-course framework has many resemblances to the life cycle framework when it comes to explaining which aspects of a person's life affect their residential needs and preferences. But instead of letting age determine residential motives and letting the transition from one life stage to another explain changes in housing needs, as with the life cycle framework, the life-course framework focuses on the different events that happen over a person's life-course, as illustrated in Figure 4. According to the life-course framework, these events will influence residential mobility and housing choices in different ways depending on where in the life-course people have reached and what events have preceded them (Kan 1999; Littlewood and Munro 1997; Mulder and Hooimeijer 1999). These events can be, but are not necessarily connected to the person's age, such as completing educational training or going into retirement, which typically happen at the beginning and end of one's adult life respectively, but in practice can happen at any stage of life. Likewise, while a person will probably experience specific events during their life course, such as creating a family, having children, or experiencing the death of a spouse, it is not absolutely certain that these events will happen and therefore that the life-course framework can contain them. These thoughts are not uncommon within the discipline of geography, as researchers such as Torsten Hägerstrand already commented on the importance of both space and time for people's behaviour half a century ago. The argument that Hägerstrand made was that time and space both play important roles in people's daily lives, as well as when they are faced with different events. Therefore, analytical frameworks should aim at mapping human behaviour geographically and also take these two aspects into account, as they are inseparable from human life (Pred 1977; Merriman 2012). In this light it becomes obvious how this this time-geography

fits together with the life-course framework, which also states that life events can have different outcomes on a person's life depending on the time they happen and where in the world that person is at the time. This is especially the case in situations in which events are characterized by people forming groups, such as creating a family, or dissolving them, as in the case of family dissolutions (Pred 1977).

Figure 4. The life-course with different life events happening along the way.



There is a wide range of life events that we encounter from cradle to grave that can have an impact on our future residential mobility and housing choice. They can range from interpersonal events, such as sickness or life-altering accidents that leave us in need of special care and therefore make certain demands regarding the characteristics of our residence (Matznetter and Mundt 2012; LaGrow 1995), to family-specific events, regarding events that contribute to both family formation and family dissolution, such as childbirth, divorce or death, which among other things impacts on how much housing we want to consume (Kulu 2008; Wagner and Mulder 2015; Feijten and Ham 2010). This can also extend to structural events like changes in society, such as being laid off due to a global economic crisis or new technological innovations that make it easier to optimize previous under-used housing consumption through flexible short-term subletting (Mohino and Ureña 2020; Koster et al. 2018b).

Thus, instead of focusing on a person's age and what characterizes his or her specific life-stage when dealing with the causes of residential mobility and housing choice, researchers who adapt to the life course will look at what significant life events people have experienced. The events sketched out above are therefore not intended as a complete list but serve as examples in order to show the wide range of events that can influence people's residential mobility and housing choice.

3.2.2. Housing consumption and utility maximizing

Besides the life-course framework, the other framework that will be used in this thesis is the housing consumption framework. The housing consumption framework is a theoretical framework that explain changes in residential mobility and housing choice in terms of the utility households have in their current residence compared to the potential utility they would enjoy in another residence (Boehm 1981; Boehm and Ihlanfeld 1986; Ritsilä and Ovaskainen 2001). The housing consumption framework supplements the life-course framework, which explains the causes of change in households' housing preferences over time, while the housing consumption framework describes the underlying mechanisms behind the changes.

Within the housing consumption framework, households are always thought of as acting in order to maximize the utility they gain from their residence. Households thus choose to move when the potential utility they gain by moving to a new residence exceeds the utility gained by staying in their current residence. This utility that households obtain from a residence can be thought as consisting of a bundle of housing services offered by their residence, which are consumed by the household. These housing services are the aggregate characteristics that make up the residence and make it comparable with other residences (Muth 1974; Røed Larsen and Sommervoll 2009). This term has been criticized, as it implies that housing services are homogeneous across residences, thus risking overlooking unobserved heterogeneity between various residences (Rouwendal 1998).

However, despite its shortcomings, the term 'housing services' can still be useful, as it can be used to separate and group the residence-related characteristics that are valued by households from other valued characteristics that are detached from the residence. These residentially specific characteristics can be divided into three groups. The first group consists of the structural characteristics associated with the residence, such as bathroom facilities, floor, number of rooms, size of the residence and so on. The second group focuses on proximity to areas or places of interest to the household, such as distance to workplaces, education and care facilities, or distance from other families, etc. Finally, the third group attends to the neighbourhood characteristics where the residence is located, such as amenities like shops, restaurants, cafés, parks etc., as well as negative externalities such as crime and pollution in the neighbourhood.

Over time the household's preferences for the available housing services will change as it experiences new events throughout the life course (Clark and Van Lierop 1987; Browning and Crossley 2001; Painter and Lee 2009). This could be due to an increase in the size of the family, leading to the household needing more space, or the other way around, but it could also be due to a change in the household's financial situation that could cause it to pursue housing services that

were earlier unobtainable for them. Besides the changes in the household's preferences, the housing services offered at the current place of residence will decay over time. This increases the likelihood that the utility gained by staying in the present residence will worsen when compared to the utility the household could gain by moving to another residence that better matches its housing needs.

When the distinction between preferred and actual housing services increases while also taking the cost of moving into consideration, households will start to look for new residences. Thus, according to the housing consumption framework, households will choose to move to a new residence when the possible utility they believe they will gain from residing in another residence, combined with the cost of moving, itself surpasses the utility of their current residence to them.

3.2.3. Factors in housing choice

Having covered the two frameworks that are used to explain how housing preferences change over time and affect residential mobility and housing choice, the following section will describe some of the main determinants that have been found to impact on households' housing choices.

Based on the housing consumption framework, studies of residential mobility and housing choice can be broken down into three groups: residential needs, proximity to places of interest, and neighbourhood amenities. Residential needs deals with everything physically connected to the residence, such as the apartment or house, its size, its cooking and bathing facilities, garden access, floor number and so on. Studies that cover this field have found a strong correlation between events that increase household size, such as childbirths, and an increase in residential size (Clark et al. 1984, 1994; Withers 1998; Feijten and Mulder 2002; Kulu 2008; Wagner and Mulder 2015). Likewise other residential characteristics, such as the number of bathrooms, have been found to be of interest to households (Kain and Quigley 1970; Srour et al. 2002). On the other hand, events that cause household dissolution, such as divorce and children moving out, have been connected with people downsizing to smaller residences, and old age in general has also been connected with downsizing (Tatsiramos 2006; Chiuri and Jappelli 2010; Angelini and Laferrère 2012; Ball and Nanda 2013; Angelini et al. 2014).

Proximity to areas of interest refers to the distance and accessibility to places that households find important from the location of their residence. For instance, the distance to a workplace has been found to have a significant role when it comes to choosing the location of a residence, as a shorter distance also means less commuting time (Rouwendal 2002; Letdin and Shim 2019; Baum-Snow and Hartley 2020). This effect seems to be stronger for more highly skilled workers and those in creative sectors, although only marginally (Hansen and Niedomysl

2009; Niedomysl and Hansen 2010). Dual-earner households may have to find a site that satisfies both parties (Klis and Mulder 2008). The distance to educational institutions has also been found to be significant when choosing a residence for both young adults still in college and for parents of children that are still in elementary school (Vyvere et al. 1998; Frenette 2004; Bayer et al. 2007; Alm and Winters 2009; Pinjari et al. 2009). Furthermore, proximity to relatives and social networks has been found to be important to households (Champion and Fielding 1992; Dykstra et al. 2006; Mulder 2007; Pettersson and Malmberg 2009), as well as distance and access to green recreational areas (Guest 1972; Srour et al. 2002; Pinjari et al. 2009, 2011; Carlino and Saiz 2019).

Finally, neighbourhood amenities dealing with externalities within the local neighbourhood of the residence also play a part in housing choice. While negative externalities can deter households from moving to a neighbourhood, positive externalities can attract households to neighbourhoods. The spreading of crime within a neighbourhood has been found to impact negatively on households' willingness to move to it (Cullen and Levitt 1999; Tita et al. 2006; Ellen and O'Regan 2010; Xie and Mcdowall 2014; Bayer et al. 2016), especially crime targeting people like robberies and assaults (Ihlanfeldt and Mayock 2010). Other negative neighbourhood externalities, such as pollution and traffic in the area, have been found to have a negative impact on how attractive households find it (Harrison Jr. and Rubinfeld 1978; Zheng and Kahn 2008; Bayer et al. 2009). Furthermore, building and population densities have been found to have both negative (Jae Hong Kim et al. 2005; Waddell 2006; Lee et al. 2010) and positive effects on how attractive households perceive an area, with young households especially preferring more populated areas (Bürgle 2006; Zolfaghari et al. 2012). As for positive neighbourhood externalities, open spaces and green areas, as well as views of open water, impact positively on households' willingness to move into such neighbourhoods (Guest 1972; Babawale and Adewunmi 2011; Seiler et al. 2001; Bourassa et al. 2004). Businesses that create the sensation of life in the neighbourhood, such as cafés, restaurants and small shops, are also correlated positively with the perceived attractiveness of the neighbourhood, as have well-maintained buildings (Morandi 2011; Farahani and Beynon 2015; Lansing and Marans 1969).

3.3. Summary of theoretical chapter

This chapter has outlined the theoretical frameworks on residential mobility and housing choice used in this thesis. Both residential mobility and housing choice are important aspects within human and economic geography, as spatial allocations of people have a significant impact on the development and economy of cities and regions. Although residential mobility and housing choice are closely intertwined, it can be beneficial to describe them separately, as the underlying rationales for them both do not always coincide. By outlining the residential mobility and housing

choice frameworks, the chapter has also revealed some of the gaps in the literature. This section will briefly highlight the most important notions from the chapter above.

Residential mobility has been shown to have a crucial role in how both cities and regions develop, from the local development of communities within the neighbourhood and how cities and urban areas develop in terms of increased segregation and the divide between different socioeconomic groups to national developments in which some regions are abandoned by certain demographic groups. By understanding the aspects underlying residential mobility and revealing how likely some aspects are to change residential mobility in the future, community councils, urban developers and policy-makers can be aided in addressing some of the future challenges before they become major issues. The section on residential mobility revealed how the history of its literature has gone from being purely descriptive, with a narrow geographical focus, to create more grand theories of the underlying causes of residential mobility and why it changes over a lifetime. The chapter described how residential mobility can be broken down into adjusted and induced moves. Whereas adjusted moves are caused by either external or internal changes that lead to household dissatisfaction with a single aspect of the residence, induced moves are caused by internal life-course events which either lead to dissatisfaction with several residential aspects or the formation or dissolution of the family altogether. Furthermore, the chapter showed that long- and short-distance moves have different causes. Whereas long-distance moves are mostly motivated by aspects related to proximity to the residence, short-distance moves are mostly related to changes in the households' housing needs. The chapter also uncovered the connection between urbanization and residential mobility. Finally, the chapter pointed to aspects within the residential mobility literature related to changing social trends in demographic composition, as well as new technological innovations that change how people can utilize their residence, which has not yet been fully covered.

Housing choice, like residential mobility, can also have a large impact on how places develop as a mismatch between people's housing needs and the available housing stock and can cause some areas to develop in unintended ways, such as becoming deprived, and in the worst case becoming desolate. The section used the life-course framework in order to identify and explain how people's housing needs change during their lifetimes. The life-course framework builds on the life cycle framework to focus on how different personal or structural events over a person's life-course can change their housing needs. These events are more or less likely to occur depending on where the person is in their life course and are not bound to happen to all people. In addition to the life-course framework, the section on housing choice also described the main points in the housing consumption framework. This framework can be used to uncover the

mechanisms that go into a household's specific housing choices and to determine how dissatisfaction with housing can influence a residential move. The framework works on with the assumption that households are always trying to maximize the utility they gain from housing by matching their actual housing consumption to their housing needs. Primarily, the framework distinguishes three aspects that households can adjust in order to maximize their utility: the structural aspects of the residence, its proximity to areas of interest and the neighbourhood's characteristics. On top of that is also the cost of moving, which together may reveal whether a household will achieve a higher degree of utility by moving to a residence that is better suited to their needs or by staying in their current residence. Finally, the chapter covered how these three aspects can be related to the findings of the literature on housing choice.

The chapter showed that, even though progress is still being made with both the new and old aspects of the literature on residential mobility and housing choice, in 2020 there is still room for additional research. This is especially the case given the significance of demographic changes and new technological innovations on people's residential utilization and the match between people and residences.

4. Philosophy of science and research design

When conducting empirical based research, or any type of research for that matter, there is especially one question that must always be addressed more or less explicitly, which is: *How can I, as a researcher, be certain that what I investigate is an actual representation of reality, and to what degree can it be generalized?* This question touches on two separate issues. The first is what is the nature of the subject out in the real world, and how is it possible to observe and investigate it scientifically in order to obtain knowledge of it? The second issue relates to whether the subject that is being investigated is a unique one-in-a-lifetime event or a common occurrence (Moss 1977). Within the social sciences the answer usually lies somewhere in between, but it is still important to know how applicable the research subject is to the general population. How the above questions are answered partly depends on what branch of philosophy of science the researcher is committed to, as this acts as a guide to the above-mentioned issues (Johnston 1989). This thesis acknowledges the branch of the philosophy of science known as critical rationalism. The aim of this chapter is to make it clear what exactly are the ramifications of this choice for the thesis and its conclusions, as well as how it fits within my ontological and epistemological perspective.

The first section of this chapter describes the ontology of the thesis by presenting the position the thesis adopts to the question of reality. The following section describes how one can derive useful knowledge from this ontology, the epistemology of the thesis, and how through verification and validation this knowledge can be generalized. This is elaborated further in the

following section by outlining the key features within the framework of critical rationalism. Finally, the last section will cover the research design for each of the four papers included in the thesis.

4.1. How reality can be perceived

Although at first glance the question of *what is reality?* might sound redundant to answer or even to think about, as the answer seems quite straightforward, this is nowhere the case (Couper 2015). Any quantum physicist would tell you that reality is made up of particles moving through fields in space, while a philosopher might say that reality is what we perceive and that outside our perception nothing meaningful exists. Such extreme positions on the subject of reality are not being taken up in this thesis, but they do show why it is important to think about the nature of reality, as the answer is not necessarily as straightforward as it is first perceived.

In this thesis, I adhere to an ontological realism in which reality is thought of as being made up of rational agents (i.e. people) who interact which each other and the physical world they are a part of and who act rationally with respect to the information they obtain (Raubal 2001; Jenkins 2010; Kitchin 2006). Rational behaviour in this context does not refer exclusively to decisions to pursue economic profiteering and maximization. Rational behaviour could also be aimed at social, material, cultural or other sorts of goals the agent considers valuable. In this sense rationality becomes something personal that is bound to the specific agent, as each agent follows and act in accordance with their own unique rational. This also entails the impossibility of knowing the exact nature of the type of rational underlying rationale the agents are pursuing, only that when they act, they do so in accordance with their own personal rational beliefs. This means that, whenever an event that intervenes in an agent's life occurs, agents will act freely in accordance with their own rationales on behalf of the information and possibilities available to them (Raubal 2001). These events range in scale from agent-specific events that happen due to actions by the agent themselves to events caused by interactions with other agents and up to structural events on a historical and social level, which happens entirely outside the control of the agents. Examples of agent-specific events are creating a family or starting an education, while examples of structural events are global economic crises or natural catastrophes. Roughly speaking, it can be said that the more structural an event is, the fewer options there are and the less room it leaves in which the agent can act, this, for example, being the case with economic crises or natural catastrophes, while the more agent-specific events leave more options and thus more room for the agent to act. Furthermore, even agent-specific events, such as choosing an education, build on top of previous events outside the agent's control. Thus agents are never truly

free to act, but only within certain predefined space. This means that most often agents will act on events that are both agent-specific and structural in nature.

To a large extent this is also what is assumed in Paper 1 on the demographic change in Copenhagen, where agents are thought of as acting rationally on behalf of both agent-specific and structural events, that is, as a general demand for higher academic qualifications and completion of educational training. However, as the remaining papers in this thesis demonstrate, this is not always the case. Papers 2 and 3 on Airbnb revolve around agents who are facing structural changes caused by technological innovations but leave agents with a high possibility to act rationally based on their beliefs and the information available to them. In Paper 4, on the other hand, we have agents who experience an event as somewhat personal to them, in this case the sudden death of a cohabiting partner, which leaves them with limited room for action, as the event subsequently restricts their ability to choose freely.

4.1.1. How to obtain knowledge of reality

Having presented the position of the thesis regarding the question of the nature of reality, the time has come for the next, and equally important issue of how it is possible to obtain useful knowledge on the basis of this reality (Couper 2015). Just as with the first question, this issue depends on the research field and philosophical belief. Furthermore, the answer regarding ontology also influences the issue of epistemology, as they are closely intertwined (Couper 2015). For example, an ontology regarding where reality is seen as something people construct through their interaction with each other would not work well with an epistemology that says we can acquire knowledge of reality simply by observing it objectively without ever interacting with it. Instead a researcher who adheres to such an ontology must use an epistemology like social constructivism or perhaps even phenomenology, one that can account for the fact that the researcher is not an objective observer but a co-creator of what is being studied (Lock and Strong 2010). Likewise, the epistemological approach must accommodate the view of an ontological realism where reality is believed to consist of rational agents who act more or less freely based on the information available to them. If agents and their actions, made as a result of rational decisions, are what constitute reality, then it must be possible to observe those agents and their actions objectively from afar (Couper 2015; Kitchin 2006). This also means that I will have to utilize different theoretical frameworks that can help explain actions regarding residential decision-making and put them into context. Such frameworks have already been described in the previous chapter, which went over the frameworks of the life course and housing consumption. Even by utilizing these approaches, however, it will not be possible for me to gain knowledge of rational decision made consciously or subconsciously by the agents based on the information available to them, as

that would require a different epistemological approach. What this means is that, even by following this approach, it will not be possible for me to gain knowledge of the agents' motives but only of their actions.

However, regardless of the position taken on epistemology and the scientific research field, all research aims to realize the two concepts of verification and validation (Couper 2015). These two concepts are central to ensuring that the findings and ultimately the conclusions are not something that has been grabbed out of thin air by the researcher but are grounded in a solid and rigorous approach. The goal of scientific verification is to ensure that other researchers are able to reach the same results and conclusions using the same or similar data and approach when reproducing the research subject and question if they should wish to do so. In other words, the way the results and conclusions are produced must ensure that the same results will always be the same every time, thus verifying them (Ormerod and Rosewell 2009). In order to achieve this, different approaches have been developed within the scientific disciplines ensuring that scientific quality is being met and data are being handled correctly, thus validating the work of the researcher.

One branch of the philosophy of science that fits both the ontological and epistemological beliefs outlined in this chapter, as well as having the concepts of verification and validation at the centre of its domain, is critical rationalism (Kitchin 2006; Stockman 2013). Pioneered by Karl Popper in the middle of the twentieth century, critical rationalism's main principles are that research should be conducted through falsification, which leads to the broadest possible theory that can survive rigours testing (Kitchin 2006; Couper 2015). Therefore, this thesis acknowledges to framework of critical rationalism and follow its principles to the best of its abilities. The rest of this chapter will be dedicated to going over critical rationalism, covering its core concepts and showing how its principles are implemented in the different papers.

4.2. Critical rationalism

For a long time, the positivist approach was one of the dominant philosophical methods used to validate empirical research that made use of large quantities of data (Couper 2015; Kitchin 2006). One of the key concepts of logical positivism, as this approach is formally called within the philosophy of science, is the principle of verification (Miller 2006), by means of which the researcher should always aim to form generalized theories supported by empirical evidence (Ormerod and Rosewell 2009). If, for example, one were to examine people's housing careers using the positivist approach, one would first collect and quantify empirical data and from this sample form a general theory about how people change residence during their life course in order to optimize their housing consumption. This approach is also known as inductivism, as it

generates a general theory based on an empirical sample of observations. The approach is not as widespread today as it used to be, but it still has its uses within some fields of research, such as grounded theory. However, when trying to validate causal relationships within either new or already well-established areas of research or when conducting quantitative empirical research, the positivist approach has some flaws that are hard to overlook. Most notably, logical positivism is vulnerable to making theories too broad to stand the test of time, as new empirical observations emerge that debunk them (Andersson 1994; Wettersten 1992; Zecha 1999). For example, newly collected observations about households that do not move to a smaller residence as they grow older and their children leave home, even though the original observation sample supported the theory of optimizing housing consumption. With the criticism from philosophers, among others Karl Popper, in the late 1950s, the dominant position of logical positivism started to decline, and new philosophical approaches to verifying empirical research started to gain ground (Miller 2015; Couper 2015; Wettersten 1992).

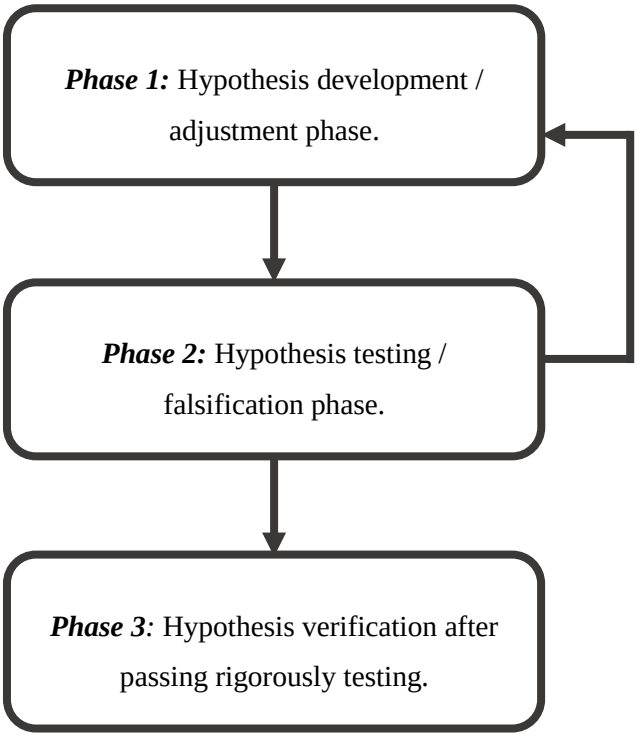
One of these approaches, which has since gained a lot of support, especially in quantitative empirical research, was Karl Popper's empirical falsification or critical rationalism. Unlike logical positivism, critical rationalism relies on falsification as the guiding principle in order to verify empirical research (Zecha 1999; Stockman 2013). Instead of assembling a general theory out of observable data already collected through induction, critical rationalism starts out with a general theory, or hypothesis, about the observable world, and then through deduction tests this hypothesis on observable data. The strategy in Popper's critical rationalism is to start out with a theory or hypothesis about the subject that is as broad and general as possible (Rowbottom 2011; Miller 2015; Couper 2015). For example, people always optimize their housing consumption and thus continuously move to either smaller or larger residences as their residential needs change. This very general hypothesis is then tested against empirically observed data as rigorously as possible with the purpose of trying to reject the hypothesis or at least make it as improbable as possible for the hypothesis not to be accepted. When the hypothesis fails, and it most likely will fail at the beginning, the researcher then modifies the hypothesis or theory, making it a little more specific and less general, and sets out to test it again (Zecha 1999; Rowbottom 2011; Miller 2006). For example, the hypothesis set out above might be modified slightly to state instead that individuals will optimize their housing consumption when they are faced with more permanent changes to their residential needs.

This process of constantly altering theories or hypotheses as they are tested and rejected continues until the researcher is left with a theory or hypothesis that is much more specific than the one they started out with, but which also is not debunked or falsified when it is rigorously

tested. In principle the testing of either theories and hypotheses never stops and can go on forever with additional tests and adjustments. However, since this is not a feasible or realistic way to conduct research, what is done instead is to be transparent in the research design and to present the results of the tests that have failed to falsify the theory or hypothesis for one's peers to judge. This also means that theories and hypotheses are never really completed but instead always evolving even after initial completion. This process of generating hypotheses and subsequently testing them is depicted in Figure 5, which is, of course, a simplification of the actual process of hypothesis development and the falsification process that goes into critical rationalism.

In this thesis Figure 5 is used to test whether the people I observe choose to act or not to act when faced with an event like a family's dissolution or a sudden possibility to optimize its residential consumption. Actions in this case would include whether they choose to move or to stay in their current residence and, if they move, what type of new residence do they choose. In this situation, I therefore do not acquire new knowledge of their motivations, reflections or thoughts in the process that leads up to the action, but only of the action itself. As a result their motives will remain somewhat speculative, as they are only validated through literature written by others.

Figure 5: The different phases in the critical rationalism process of testing and falsifying hypothesis



Consequently, by choosing to utilize the critical rationalism framework, this thesis must aim to be as theory-driven in its approach to its research field and papers as possible. The papers included in this thesis therefore all draw on the life course and housing consumption frameworks when investigating subjects related to the match between people and residences by looking at different aspects regarding residential mobility and housing choice. Furthermore, it falls to each paper to select a research design that complies with the falsification principle of critical rationalism.

4.3. Research design

All four papers in this thesis follow their research questions with the same overall empirical approach by using quantified micro-data on people and their residences. The data are primarily sourced from Statistics Denmark, but at times also comes from other sources or are self-collected through web-scraping techniques. This approach serves several benefits when conducting geographical research, as it can describe population changes within a geographical area, as well as identifying the causal links in relation to the subject being examined (Clarke and Holm 1987). By using the quantitative approach, the papers also stay true to their ontological and epistemological positions, as they observe the actions and residential decisions made by agents. Furthermore, this approach is in harmony with the falsification principle in critical rationalism, as a central part of statistical analysis is to submit hypotheses to intensive testing of their robustness, only accepting them when they cannot be falsified on even the slimmest of grounds (Angrist and Pischke 2008; Gujarati and Porter 2010). Below the research design of each of the four papers will be presented in succession.

Paper 1 examines how the demographic composition of metropolitan Copenhagen has changed over a period of 25 years. The paper focuses on the demographic group of young adults between the age of 20 and 29 due to the fact that, even though Copenhagen has experienced youthification over this 25-year period, this group still represents the same share of the total population in Copenhagen. This means that the paper is not observing a stable group, as the 20- to 29-year-olds of 2017 are not the same group of 20- to 29-year-olds of 1993. Furthermore, this also means that people are not being observed when they are making their choices regarding whether to move to Copenhagen or enrol in an educational programme, but rather sometime after that decision has been made. This, of course, is a consequence of the paper's power of prediction, which is why it delivers a more descriptive picture of the city's development than a causal explanation.

The paper follows people five years after they have completed an upper secondary education and pinpoint the location not only of their place of residence but also of their workplace. The paper utilizes data from Statistics Denmark from 1993 to 2017 that makes it possible to identify and connect the location of the place of residence and the workplace of each individual.

Furthermore, the data make it possible to distinguish between various socioeconomic and demographic characteristics of those within the demographic group. These include an ordinal variable for the highest level of completed education (elementary school, high school, vocational education, college degree, bachelor's degree, master's degree or higher), a nominal variable for people's primary occupation (student, employed, unemployed, retired) and a continuous variable for household income deflated to a 2014 level.

Paper 2 studies how technological innovations that provide an opportunity to better maximize the residential utilization, such as Airbnb, affect people's residential mobility. The hypothesis in this paper is that those who live in underutilized housing in areas with a high potential for short-term lending through services such as Airbnb will be more inclined to stay in their place of residence rather to move to a residence more suited to their needs. In the paper, the same people are followed for up to fifteen years, and the paper thus observes their choices regarding whether to stay or move residence within that period.

The paper estimates the likelihood of people moving given how much Airbnb they are exposed to within their zip code using a duration model including the year and zip code-fixed effects, as well as individual fixed effects. By only sampling those who moved into their residences before 2012, we make sure we avoid any selection due to Airbnb, first was introduced in Denmark in 2012. The paper uses data from three different sources. First it uses micro-data on people and their residential pattern from Statistics Denmark from 2001 to 2016. These data are merged with data from Airbnb aggregated on number of visitors and average nights stayed with Airbnb in Copenhagen from 2012 to 2016 identified by zip code. Finally, data-scraping of an aggregated number of pictures taken within different zip codes and uploaded on the online community and image hosting service Flickr is used as a proxy to control for attractiveness to tourists. We divide the analysis up based on type of tenure (owner-, cooperative, renting), each of which has different rationales for moving or staying due to Airbnb, either economically or otherwise. To go further, within each subsample of a type of tenure, we investigate how the size of the residence in terms of the number of rooms plays a role in people's choices over whether to move or stay when exposed to Airbnb. To support the findings, several robustness tests, including synthetic tests simulating the presence of Airbnb ten years prior to its real appearance, were made.

Paper 3 also investigates people's preferences towards short-term rental services such as Airbnb, but instead of looking at the changes in residential mobility, the paper explores how Airbnb affects the likelihood of people buying and selling residences and the link between Airbnb and residential prices. The hypothesis is fundamentally the same as in Paper 2, namely that some people are willing to pay more for a residence when they can get some of their expenses subsidized through

short-term rentals, thus causing residential prices in the area to go up. In this paper, I observe people's actions when acquiring a residence and the impact it has on the housing market. Whereas Paper 2 looks at the aggregated choices of people moving or staying, Paper 3 looks specifically at the characteristics of those who either buy or sell residences when the use of Airbnb increases.

The affect Airbnb has on the housing market is estimated using a difference in difference model and a hedonic price model, both of which deploy an instrument-variable approach for Airbnb in order to eradicate endogeneity between Airbnb and neighbourhood attractiveness. Data from Statistics Denmark on traded residence in Copenhagen from 2008 to 2016 is used together with micro-data on people selling and buying the said residences and the same data on Airbnb as was deployed in Paper 2. Besides the analysis documenting the affect Airbnb has on residential prices, the paper asks who is more likely to sell and buy a residence in a zip code with a high level of Airbnb. The paper also includes a robustness test in order to strengthen the evidence that Airbnb has an effect on the housing market and neighbourhood composition.

Paper 4 tackles changes to both people's residential mobility and housing choices, as it investigates how a sudden family dissolution following the death of a cohabiting partner affects the surviving partner's subsequent residential choices. Family dissolution is a natural part of the life course for most people, and the hypothesis is that it will leave the surviving spouse with a quantity of housing that exceeds his or her actual housing needs. In this paper, I observe people in a cohabiting situation where at least one partner is between 50 and 90 years of age who are then followed over a 35-year period, which means that both the loss of a partner and the survivor's subsequent residential decisions are observed in the data.

The effect of a partner's death on subsequent residential mobility is estimated through a duration regression model using a natural experiment involving only those whose partners have died suddenly due to a heart attack or a stroke and with no medical history five years prior to this event as an exogenous shock. The data used in the paper come from Statistics Denmark, which include the characteristics of people and their residences between 1981 and 2016, making it possible to observe residential moves and to determine the characteristics of old and new residences. Data from the Statens Serums Institut (SSI), which contains information on people's medical histories and the potential causes of their deaths, covering the period 1994 to 2012, is merged with this dataset. Following the analysis of the effect a partner's death has on the survivor's subsequent residential mobility, the paper goes on to describe how the event also has an impact on subsequent housing choices by utilizing both competing risk and ordinary least square estimates. More specifically, the paper examines how the death of a partner has an impact on the distance from adult children and the size of the new residence when choosing a new

residence. The paper conducts several robustness tests, including using an alternative variable to examine changes to housing choices and a synthetic test of the effect of a partner's death on residential mobility by simulating the partner's death ten years prior to the real event in the sampled population. All robustness tests verify the original findings of the paper. Finally, the paper also sets out to describe the 'real-world' effects of its findings, namely how large a share of people move as a result of a partner's death, how close to adult children they move and how much they really downsize compared to a control group of people with living partners.

4.4. Summary of philosophy of science and research design chapter

This chapter started by setting out the ontological position of this thesis followed by its epistemological position, showing how these fit together with the philosophy of science approach of critical relativism that is used throughout the research design of this thesis.

This thesis adheres to an ontological realism in which rational agents are believed to act freely within the borders of their structural placement, based on the information at their disposal. The framework of critical relativism makes it possible to describe these actions and test hypotheses regarding the rationales that are driving them through the falsification principle. Although starting with a theoretically driven hypothesis, in adhering to the critical relativism framework the researcher must test this hypothesis on the empirical data and make adjustments accordingly. This implies going back and forth between adjusting the hypothesis and testing it empirically in relation to the data until the hypothesis can no longer be falsified. By setting up research designs that test the hypotheses in the thesis rigorously, I have striven to follow the principles of the critical rationalism framework. The chapter ends with a presentation of both the overall and paper-specific research design of Papers 1 to 4.

5. Findings and concluding remarks

This final chapter will provide a summary of each of the four papers included in the thesis and their main findings. As a final remark, the chapter will make an overall conclusion on the thesis, followed by suggesting possible future research based on the papers and the findings of the thesis.

5.1. Summary of papers

Paper 1 describes demographic changes in Copenhagen over a 25-year period and shows how the group of young adults, one of the city's largest demographic groups that from the outside seems stable, changes internally. The first goal was to describe and show how this demographic pattern has changed over the course of 25 years within the city of Copenhagen, including Frederiksberg, as this has led to a change in the types of residence that are in demand. Like many other metropolitan areas, the city has experienced a process of the youthification and

academization of its residents. The analysis showed, however, that the group of 20- to 29-year-olds has remained stable at about 25 per cent of the city's population over the 25-year period, but that during the period there have been significant changes within that group. The results showed that the group has become significantly better educated and that a significantly larger number within it were either enrolled in an upper secondary education program or were an active part of the labour force in 2017 compared to 1993. The second goal was to investigate how the connection between the location of the residence and workplace has changed for the group of young adults between the age of 20- and 29 since completing an upper secondary education. The analysis showed that a significantly larger share of the 20- to 29-year-olds who complete a university education are still living in Copenhagen five years later in 2017 than in 1993. Furthermore, a significantly larger share of this group also worked in Copenhagen in 2017 compared to 1993. When comparing them to the 20- to 29-year-olds who have completed a vocational education, it becomes evident that this driven by the academification of the city. Very little changed in terms of residential and workplace locations five years after completing their education from 1993 to 2017 for the group with a vocational education. Furthermore, the number of 20- to 29-year-olds who have completed a vocational education fell by more than two-thirds in this 25-year period, while the number of 20- to 29-year-olds who have completed a university education almost quadrupled from 1993 to 2017.

These results support the hypothesis that cities have undergone a process of both youthification and academification over the last 25 years, while also having experienced an increase in jobs that require an academic background, thus supporting a trend that we choose to refer to as the workification of the 20- to 29-year-olds. Besides supporting the hypotheses of the youthification and academification of urban areas, the analysis also went deeper and described some of the characteristics of this development, thereby adding important information to the literature aimed at these phenomena.

Paper 2 analysed how the emergence of new technological innovations, and with them new possibilities for optimizing housing consumption, can influence people's residential mobility. From 2012 to 2016, the number of tourists in Copenhagen who used Airbnb for accommodation rose from 13,110 to 388,198 guests. Likewise, residents in Copenhagen quickly adapted to the new technology, what at the beginning was mostly a city-centre phenomenon being found in both the central and peripheral areas of Copenhagen by 2016. By short-term lending through Airbnb, residents have been given an opportunity to rent out part of or their whole residence for short periods of time. This allows them to be able to reside in residences that are larger than their actual housing needs, thus consuming more housing overall. This can result in people choosing to stay

in residences that under other circumstances would no longer be optimal in terms of housing utility. On the other hand, this trend could also make people choose to move, as the increasing number of tourists in their neighbourhood might diminish the value they gain from living in the area. Thus, the paper not only looks at residential moves, but also at the lack of residential moves, which can be very difficult to observe without a delicate research design.

The findings support these hypotheses, as it shows that living in a larger residence with many rooms reduces the likelihood of people moving when the presence of Airbnb tourists increases in one's zip code. Likewise, the findings reveal a difference in how the presence of Airbnb visitors affects the value people get from their housing depending on the type of tenure. People who either own or rent out their residences are in general more likely to move residences when the presence of Airbnb increases in their area, though this is not so much the case for people living in shared residences. This finding finds support in the literature, as Airbnb has been found to increase residential prices and rental prices, meaning that privately owned and rental residences are more likely to be affected by market changes, which is not the case for shared residences (Koster et al. 2018b; Garcia-López et al. 2019; Shabrina et al. 2021).

The paper adds to the literature by documenting empirically how the new sharing economies such as Airbnb influence people's residential mobility and thereby have an effect on how cities develop in the future.

Paper 3 also focuses on the effect the new sharing economies may have on people's housing preferences when choosing to move to a new residence. Instead of looking at the effect of the presence of Airbnb tourists on people's mobility rates, the paper analyses how the possibility of acquiring a residence in an area with a high potential for short-term renting through Airbnb influences who sells and buy residences and affects housing prices. The paper finds that high concentrations of renting through Airbnb within an area have an effect on housing prices in that area, as on average they go up 0.35 per cent for each 1 per cent increase in Airbnb activity. This finding is in agreement with what has been found in Barcelona, New York, Los Angeles and Reykjavik (Koster et al. 2018b; Garcia-López et al. 2019; Elíasson and Ragnarsson 2018; Sheppard and Udell 2016).

In order to take this a step further, the paper then investigates what characterizes those who buy and sell residences in areas with a high concentration of short-term Airbnb lending. The paper finds that Airbnb's increasing presence in a neighbourhood increases the likelihood of residents both buying and selling their residences equally, and especially high educational fulfillment and high income are correlated with selling and especially buying a residence. On the other hand, does the paper find that being a student or unemployed and not having completed a

higher secondary education are connected with being less likely to buy a residence. Furthermore, does the findings show that being single or having more two or more children are associated with a greater likelihood of selling a residence. While people are more likely to sell if living in a small apartment and more likely to buy a large apartment or townhouse. These findings show that, besides increasing residential prices, Airbnb also affects the characteristics of the households that flow in an out of the neighbourhoods in which there is Airbnb activity.

Like Paper 2, Paper 3 adds to the literature on the impact of technological innovations permitting more flexible residential use on housing consumption, partly by providing more evidence that short-term rental platforms such as Airbnb leads to increased residential costs, but also by showing for the first time what characterizes those who choose to opt to support Airbnb.

The context of **Paper 4** is the demographic change that is happening in most developed and many developing countries, where an increasing share of their populations are close to or have passed the age of retirement. In this light, the paper analyses empirically how the sudden dissolution of the family of an elderly couple affects the surviving spouses' subsequent residential mobility due to the death of a cohabitant partner. The paper finds that in the short term the death of a partner leads to an initial increase in the surviving partner's subsequent residential mobility, but only in the first four years. This finding agrees with the results of another study using French survey data on elderly couples (Bonnet et al. 2010) finding that widows adjust their housing consumption after experiencing a family dissolution caused by their partner's death.

Additionally, the paper also investigates two aspects regarding the housing choices of the surviving spouses after their transition into widowhood, namely changes in the distance to adult children and in residential size following a residential relocation. The paper finds that, while there are only small effects on the distance to adult children after the surviving spouse moved residence following their partner's death, they are significantly more likely to downsize their residence. More specifically the paper finds that women in general move closer to their adult children after the loss of a partner, while men move 1.2 kilometres further away. Similarly, the paper finds that women downsize on average by 11.5 square metres when moving after the death of a partner and men by 9 square metres. Thus, the paper supports the claim that residential relocation is at least partially motivated by a change in the widow(er)'s housing use.

The paper contributes to the literature on residential mobility among the increasing group of elderly people by documenting the impact of a partner's sudden death on the survivor's subsequent residential mobility and housing consumption. As the average age keeps rising in many countries, this is an aspect of residential mobility that will become increasingly more relevant to uncover. Furthermore, the paper also contributes by looking at the difference in

residential mobility between men and women who have lost a partner, which has not been done before in the relevant body of literature.

5.2. Concluding remarks and possible future research

This thesis has set out to investigate how the match between people's residential desires and the available housing stock is influenced by demographic changes and new technological innovations that allows for a more flexible housing utilization. This was done by investigating residential mobility and housing choice primarily within the Copenhagen metropolitan area. In order to do so, the thesis consists of four papers that each explore a different aspect of residential mobility and housing choice in relation to demographic change and new types of short-term subletting.

The papers included in the thesis build on the theoretical frameworks of the life course and housing consumption when investigating the changes and underlaying causes in residential mobility and the mechanisms behind housing choice, while the analysis is based on the critical rationalism framework when generating the results. This entails that the hypotheses stemming from the theoretical frameworks and the empirical research design and analyses are posited and tested with the falsification principle in mind. As the four papers investigate the match between people and housing within Denmark, the papers are based on empirical administrative data from Denmark.

The match between people and residences depends on many different factors, including people's specific life courses, whether they have just experienced any significant life-course events, and the current stock and availability of suitable housing. This is observed in changing residential mobility patterns as well as in the characteristics of the housing units people choose to relocate towards. The extent of how well the match between people and residences goes can have a big impact, not only on individual households, but also on the development of cities.

The thesis' motivation in relation to this topic has been to investigate how changing demographic patterns and emerging technological innovations continue to influence the match between people and residences and ultimately have an impact on the development of our cities. First, the results showed how changes in demographic composition also can lead to changes in the socioeconomic structure within cities and that, despite countries in general growing older, cities are becoming younger. One of the factors that has contributed to this development is the increasing demand for educational training, which causes young people to seek locations with a wide supply of educational institution, typically larger cities. Furthermore, larger cities have also experienced great economic expansion in recent decades, resulting in them having better job opportunities compared to smaller cities and towns in rural areas. This, combined with increasing housing prices in the suburbs, have compelled younger people to stay in large cities for longer

even after completing their education, thus driving the youthification of cities. The results also showed that there has been an increase in the socioeconomic divide within the group of young adults living in the city over the past couple of decades. How this increasing inequality is expressed spatially within the city deserves further research. That is, can the increasing gap between the top and bottom of the socioeconomic hierarchy also be found in how young adults are spatially distributed within the cities, potentially leading to increasing economic segregation within cities?

However, the changing demographic process was found to influence not only city development, but also the more general demand for residences. As people grow older, the likelihood that they will experience the death of a cohabiting partner increases, and as an increasing share of the population are reaching the age of retirement, this phenomenon will likely be more common in the future. The results showed that people's housing preferences change towards downsizing to smaller residences located closer to adult children following a family dissolution caused by a cohabiting partner's death. However, more research is needed in order to determine whether the reason that those whose partners have died continue to live in comparatively large residences even after downsizing is due to a lack of available suitable housing or simply preference. Likewise, a deeper understanding of the extent to which the different factors related the transition into widowhood influence subsequent housing preferences would be beneficial in determining what causes some people to move, while others choose to stay following their partner's death.

Finally, did the results show that technological innovations and the new possibilities they enable for better residential utilization, can influence peoples housing preferences and residential mobility, as well as the way cities will evolve in the future if left unregulated. As flexible home-sharing technologies make it easier for people to optimize their housing consumption, they can allow themselves to reside in residences that do not exactly match their housing needs. As a result, the demand for housing in cities is likely to increase, as people are more willing to pay for residences in areas with a good potential for short-term lending, while the supply goes down, as people become less likely to move from a residence that no longer fits their residential needs, thus causing residential prices to rise and cities to become more socioeconomically divided. Seeing that flexible home-sharing technologies are a somewhat new phenomenon, much research into their effects on cities and the match between people and housing is still needed. This includes a deeper analysis of the different housing preferences of those who choose to adopt these new technological innovations and those who do not but who are still affected by them due to their proximity to where they live. Furthermore, would it be beneficial to look further at how changes

in residential prices and those who are willing to pay a premium for access to areas with a high potential for short-term renting are contributing to a new wave of gentrification within cities.

Although the four papers presented in this thesis have different analytical perspectives and focus on residential mobility, housing preferences or something in between, they all share the same goal of investigating new aspects related to how people are matched with housing. The scope of the thesis has not aimed to dissect the underlying mechanisms that inform optimising such matching in order to come up with new recommendations for policy-makers and city planners on how to plan the future development of cities. Instead, the goal has been to show how changing demographic patterns and new technological innovations continue to influence an already well-established field within the literature on residence and migration and how these new trends change both people's residential mobility and their housing preferences. Thus, the overall conclusion of this thesis is that the match between people and residence is not, and most likely never will be, at a stable state, but will always fluctuate between the unique supply of available residences at a specific time and the equally unique demand from an ever-changing group of people and households. This also means that neither demographic change in society or within cities, or new technological innovations like short-term subletting, change the steady state of the match between people and residences, but rather that they work as additions to this already fluctuating relationship. For example, does the youthification and academification process of urban areas influence the demand for residences within cities, as more people choose to stay after completing a university education rather than moving to the suburbs, while family dissolution in old age can contribute to a rising demand for smaller residences as the nation grows older. Likewise, can the emergence of new innovations that allow for a more flexible use of residences through short-term subletting lead to people choosing to live in their residences for longer while also increasing the demand for residences in areas with a potential for short-term subletting, in turn contributing to increased residential prices. One of the implications of these results is that they challenge the way urban development has been thought of up until now. Urban planners will therefore need to take both demographic changes and the potential for short-term subletting into account when planning city development in the future. Likewise, does it also fall on the researchers who study residential behaviour and the match between people and housing to evolve and adapt alongside of these new trends and incorporate them into their field of research. The demographic composition of countries and cities will continue to change, and new innovations that in some way influence the way we can optimize our residential consumption will continue to emerge, thereby continuing to influence the match between people and residences in new ways going forward.

References

Abramsson, Marianne, and Eva K Andersson. 2012: Residential Mobility Patterns of Elderly—Leaving the House for an Apartment Housing Studies 27(5), 582–604.

Aisenbrey, Silke, and Anette E Fasang. 2010: New Life for Old Ideas: The 'Second Wave' of Sequence Analysis Bringing the 'Course' Back Into the Life Course Sociological Methods & Research 38(3), 420–62.

Albig, W. 1933: The Mobility of Urban Population a Study of Four Cities of 30,000 to 40,000 Population Social Forces 11(3), 351–67.

Aliprantis, Dionissi, Hal Martin, and Kristen Tauber. 2020: *What Determines the Success of Housing Mobility Programs?*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Alm, James, and John V Winters. 2009: Distance and intrastate college student migration Economics of Education Review 28(6), 728–38.

Andersen, Hans Skifter. 1998: Gentrification or social renewal? Effects of public supported housing renewal in Denmark Scandinavian Housing and Planning Research 15(3), 111–28.

Andersen, Hans Skifter. 2002: Excluded Places: the Interaction Between Segregation, Urban Decay and Deprived Neighbourhoods Housing, Theory & Society 19(3/4), 153–69.

Andersen, Hans Skifter. 2011: Explaining preferences for home surroundings and locations Urbani izziv 22(1), 100–114.

Andersen, Hans Thor. 2006: Urban Competition and urban crisis: Urban Politics in Denmark Working Paper. RUC: Department of Society and Globalisation 7/06(7).

Andersen, Hans Thor, Lasse Moller-Jensen, and Sten Engelstoft. 2011: The End of Urbanization? Towards a New Urban Concept or Rethinking Urbanization European Planning Studies 19(4), 595–611.

Andersson, Eva K, Marianne Abramsson, and Bo Malmberg. 2019: Patterns of changing residential preferences during late adulthood Ageing & Society 39(8), 1752–81.

Andersson, Eva K, and Bo Malmberg. 2018: Segregation and the effects of adolescent residential context on poverty risks and early income career: A study of the Swedish 1980 cohort Urban Studies 55(2), 365–83.

Andersson, Eva K, Bo Malmberg, and William AV Clark. 2020: Neighbourhood context and young adult mobility : A life course approach Population, Space and Place.

Andersson, Gunnar. 1994: *Criticism and the History of Science: Kuhn's, Lakatos's and Feyerabend's Criticisms of Critical Rationalism*. BRILL.

Andersson, Roger, Sako Musterd, George Galster, and Timo M Kauppinen. 2007: What Mix Matters? Exploring the Relationships between Individuals' Incomes and Different Measures of their Neighbourhood Context. Housing Studies 22(5), 637–60.

Angelini, Viola, Agar Brugiavini, and Guglielmo Weber. 2014: The dynamics of homeownership among the 50+ in Europe Journal of Population Economics 27(3), 797–823.

Angelini, Viola, and Anne Laferrère. 2012: Residential Mobility of the European Elderly CESifo Economic Studies 58(3), 544–69.

Angrist, Joshua D, and Jörn-Steffen Pischke. 2008: *Mostly Harmless Econometrics: An Empiricist's Companion*. 1st ed. Princeton University Press.

Atkinson, Rowland. 2008: Commentary: Gentrification, Segregation and the Vocabulary of Affluent Residential Choice Urban Studies 45(12), 2626–36.

Babawale, Gabriel, and Yewande Adewunmi. 2011: The Impact of Neighbourhood Churches on House Prices Journal of Sustainable Development 4(1), p246.

Ball, Michael, and Anupam Nanda. 2013: Household attributes and the future demand for retirement housing International Journal of Housing Markets and Analysis 6(1), 45–62.

Banks, James, Richard Blundell, Zöe Oldfield, and James P Smith. 2012: Housing Mobility and Downsizing at Older Ages in Britain and the USA Economica 79(313), 1–26.

Barron, Kyle, Edward Kung, and Davide Proserpio. 2020: *The Effect of Home-Sharing on House Prices and Rents: Evidence from Airbnb*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Bartik, Timothy J, JS Butler, and Jin-Tan Liu. 1992: Maximum score estimates of the determinants of residential mobility: Implications for the value of residential attachment and neighborhood amenities Journal of Urban Economics 32(2), 233–56.

Baum-Snow, Nathaniel, and Daniel Hartley. 2020: Accounting for central neighborhood change, 1980–2010 Journal of Urban Economics 117, 103228.

Bayer, Patrick, Fernando Ferreira, and Robert McMillan. 2007: A Unified Framework for Measuring Preferences for Schools and Neighborhoods Journal of Political Economy 115(4), 588–638.

Bayer, Patrick, Nathaniel Keohane, and Christopher Timmins. 2009: Migration and hedonic valuation: The case of air quality Journal of Environmental Economics and Management 58(1), 1–14.

Bayer, Patrick, Robert McMillan, Alvin Murphy, and Christopher Timmins. 2016: A Dynamic Model of Demand for Houses and Neighborhoods Econometrica 84(3), 893–942.

Bernard, Aude, and Sergi Vidal. 2020: Does moving in childhood and adolescence affect residential mobility in adulthood? An analysis of long-term individual residential trajectories in 11 European countries Population, Space and Place 26(1), e2286.

Bernelius, Venla, and Katja Vilkama. 2019: Pupils on the move: School catchment area segregation and residential mobility of urban families: Urban Studies.

Bloze, Gintautas, and Morten Skak. 2016: Housing equity, residential mobility and commuting Journal of Urban Economics 96, 156–65.

Boehm, T. 1981: Tenure choice and expected mobility: A synthesis Journal of Urban Economics 10, 375–89.

Boehm, Thomas P, and Keith R Ihlanfeld. 1986: RESIDENTIAL MOBILITY AND NEIGHBORHOOD QUALITY* Journal of Regional Science 26(2), 411–24.

Bonnet, Carole, Laurent Gobillon, and Anne Laferrère. 2010: The effect of widowhood on housing and location choices Journal of Housing Economics 19(2), 94–108.

Bourassa, Steven C, Martin Hoesli, and Jian Sun. 2004: What's in a View? Environment and Planning A: Economy and Space 36(8), 1427–50.

Brazil, Noli, and William AV Clark. 2019: Residential mobility and neighborhood inequality during the transition to adulthood Urban Geography 40(7), 938–63.

Bretherton, J, and N Pleace. 2011: A Difficult Mix: Issues in Achieving Socioeconomic Diversity in Deprived UK Neighbourhoods Urban Studies 48(16), 3433–47.

Brown, Lawrence A, and Su-Yeul Chung. 2006: Spatial segregation, segregation indices and the geographical perspective Population, Space and Place 12(2), 125–43.

Brown, Lawrence A, and Eric G Moore. 1970: The Intra-Urban Migration Process: A Perspective Geografiska Annaler. Series B, Human Geography 52(1), 1–13.

Browning, Martin, and Thomas F Crossley. 2001: The Life cycle Model of Consumption and Saving Journal of Economic Perspectives 15(3), 3–22.

Büchel, Konstantin, Diego Puga, Elisabet Viladecans-Marsal, and Maximilian von Ehrlich. 2019: *Calling from the Outside: The Role of Networks in Residential Mobility*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Bürgle, Michaela. 2006: Residential location choice model for the Greater Zurich area: conference paper STRC 2006 , Working Paper / IVT. ETH, Eidgenössische Technische Hochschule Zürich, IVT.

Caplow, T. 1949: Incidence and Direction of Residential Mobility in a Minneapolis Sample Social Forces 27(4), 413–17.

Carlino, Gerald A, and Albert Saiz. 2019: Beautiful city: Leisure amenities and urban growth Journal of Regional Science 59(3), 369–408.

Carlson, Caroline, and James G Gimpel. 2019: Political implications of residential mobility and stasis on the partisan balance of locales Political Geography 71, 103–14.

Champion, Tony, and Tony Fielding. 1992: *Migration processes and patterns / Vol. 1, Research progress and prospects.* London: Belhaven Press.

Chen, Yong, and Stuart S Rosenthal. 2008: Local amenities and life cycle migration: Do people move for jobs or fun? Journal of Urban Economics 64(3), 519–37.

Chiuri, Maria Concetta, and Tullio Jappelli. 2010: Do the elderly reduce housing equity? An international comparison Journal of Population Economics 23(2), 643–63.

Christensen, Jan. 2017: *Urbaniseringen i Danmark siden 1926*. KL.

Circella, Giovanni, Farzad Alemi, Kate Tiedeman, Rosaria M Berliner, Yongsung Lee, Lew Fulton, Patricia L Mokhtarian, and Susan Handy. 2017: What Affects Millennials' Mobility? PART II: The Impact of Residential Location, Individual Preferences and Lifestyles on Young Adults' Travel Behavior in California.

Clark, David E, and James C Cosgrove. 1991: Amenities Versus Labor Market Opportunities: Choosing the Optimal Distance to Move* Journal of Regional Science 31(3), 311–28.

Clark, William AV, Marinus Deurloo, and Frans Dieleman. 2006: Residential Mobility and Neighbourhood Outcomes Housing Studies 21(3), 323–42.

Clark, William AV, MC Deurloo, and FM Dieleman. 1984: Housing Consumption and Residential Mobility Annals of the Association of American Geographers 74(1), 29–43.

Clark, William AV, MC Deurloo, and FM Dieleman. 1994: Tenure Changes in the Context of Micro-level Family and Macro-level Economic Shifts Urban Studies 31, 137–54.

Clark, William AV, and Frans M Dieleman. 1996: *Households and Housing: Choice and Outcomes in the Housing Market*. Transaction Publishers.

Clark, William AV, and Jun L Onaka. 1983: Life Cycle and Housing Adjustment as Explanations of Residential Mobility Urban Studies 20(1), 47–57.

Clark, William AV, and WFJ Van Lierop. 1987: Chapter 3 Residential mobility and household location modelling , Handbook of Regional and Urban Economics. Regional Economics. Elsevier, pp. 97–132.

Clarke, Martin, and Einar Holm. 1987: Microsimulation Methods in Spatial Analysis and Planning Geografiska Annaler. Series B, Human Geography 69(2), 145–64.

Cohen, Barney. 2006: Urbanization in developing countries: Current trends, future projections, and key challenges for sustainability Technology in Society 28(1). Sustainable Cities, 63–80.

Copenhagen municipality. 2020: *Status på København 2019*. Economy department, Copenhagen municipality.

Cordes, Sarah A, Amy Ellen Schwartz, and Leanna Stiefel. 2019: The Effect of Residential Mobility on Student Performance: Evidence From New York City American Educational Research Journal 56(4), 1380–1411.

Coulter, Rory, and Maarten van Ham. 2013: Following People Through Time: An Analysis of Individual Residential Mobility Biographies Housing Studies 28(7), 1037–55.

Coulter, Rory, Maarten van Ham, and Allan M Findlay. 2016: Re-thinking residential mobility: Linking lives through time and space Progress in Human Geography 40(3), 352–74.

Coulter, Rory, and Jacqueline Scott. 2015: What Motivates Residential Mobility? Re-examining Self-Reported Reasons for Desiring and Making Residential Moves Population, Space and Place 21(4), 354–71.

Couper, Pauline. 2015: *A Students Introduction to Geographical Thought. Theories, Philosophies, Methodologies*. SAGE Publications Ltd.

Cullen, Julie Berry, and Steven D Levitt. 1999: Crime, Urban Flight, and the Consequences for Cities Review of Economics and Statistics 81, 159–69.

Danmarks Statistik. 2018: Befolkningsfremskrivninger 2018-2060 Nyt Fra Danmarks Statistik(180), 2.

Dantzler, Prentiss A, and Jason D Rivera. 2019: Settling in or moving out? Exploring the effect of mobility intentions on public housing exits Housing Studies 34(4), 715–33.

Davies, RB, and AR Pickles. 1985: Longitudinal versus Cross-Sectional Methods for Behavioural Research: A First-Round Knockout Environment and Planning A: Economy and Space 17(10), 1315–29.

Doling, J. 1976: The Family Life Cycle and Housing Choice Urban Studies 13(1), 55–58.

Dong, Zhaoyingzi, Eddie CM Hui, and Daichun Yi. 2020: Housing market sentiment and homeownership Journal of Housing and the Built Environment.

Dykstra, Pearl A, and Leo JG van Wissen. 1999: Introduction: The Life Course Approach as an Interdisciplinary Framework for Population Studies. In Leo J. G. van Wissen & Pearl A. Dykstra (eds.) , Population Issues: An Interdisciplinary Focus. The Plenum Series on Demographic Methods and Population Analysis. Dordrecht: Springer Netherlands

Dykstra, Pearl, Matthijs Kalmijn, Trudie Knijn, Aafke Komter, Aart Liefbroer, and Clara Mulder. 2006: *Family solidarity in the Netherlands*.

Elder, Glen H. 1994: Time, Human Agency, and Social Change: Perspectives on the Life Course Social Psychology Quarterly 57(1), 4–15.

Eliasson, Kent, Urban Lindgren, and Olle Westerlund. 2003: Geographical Labour Mobility: Migration or Commuting? Regional Studies 37(8), 827–37.

Elíasson, Lúðvík, and Önundur Páll Ragnarsson. 2018: Short-term renting of residential apartments. Effects of Airbnb in the Icelandic housing market IDEAS Working Paper Series from RePEc; St. Louis.

Ellen, Ingrid Gould. 2020: What do we know about housing choice vouchers? Regional Science and Urban Economics 80. Special Issue on Housing Affordability, 103380.

Ellen, Ingrid Gould, and Katherine O'Regan. 2010: Crime and urban flight revisited: The effect of the 1990s drop in crime on cities Journal of Urban Economics 68, 247–59.

Ermisch, John F, and Stephen P Jenkins. 1999: Retirement and housing adjustment in later life: evidence from the British Household Panel Survey Labour Economics 6(2), 311–33.

Escribano, María Jesús Rivera. 2007: Migration to Rural Navarre: Questioning the Experience of Counterurbanisation Tijdschrift voor economische en sociale geografie 98(1), 32–41.

Farahani, L Mahmoudi, and D Beynon. 2015: Pavement cafes as the activity zone in the social life of neighbourhood centres. University of Melbourne, pp. 193–202.

Feijten, Peteke, and Maarten van Ham. 2010: The Impact of Splitting Up and Divorce on Housing Careers in the UK Housing Studies 25(4), 483–507.

Feijten, Peteke, and Clara H Mulder. 2002: The Timing of Household Events and Housing Events in the Netherlands: A Longitudinal Perspective Housing Studies 17(5), 773–92.

Ferrari, Giulia, Carole Bonnet, and Anne Solaz. 2019: 'Will the one who keeps the children keep the house?' Residential mobility after divorce by parenthood status and custody arrangements in France Demographic Research 40, 359–94.

Fielding, AJ. 1982: Counterurbanisation in Western Europe Progress in Planning 17, 1–52.

Fischer, Peter A, Einar Holm, Gunnar Malmberg, and Thomas Straubhaar. 2000: *Why do people stay? Insider advantages and immobility*Unpublished HWWA Discussion Paper. Hamburg Institute of International Economics (HWWA).

Fischer, Peter A, and Gunnar Malmberg. 2001: Settled People Don't Move: On Life Course and (Im-)Mobility in Sweden International Journal of Population Geography 7(5), 357–71.

Fischer, Peter A, Gunnar Malmberg, Einar Holm, and Thomas Straubhaar. 1998: *Why Do People Stay? The Insider Advantages Approach: Empirical Evidence from Swedish Labor Markets*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Flores, Onesimo, and Lisa Rayle. 2017: How cities use regulation for innovation: the case of Uber, Lyft and Sidecar in San Francisco Transportation Research Procedia 25. World Conference on Transport Research - WCTR 2016 Shanghai. 10-15 July 2016, 3756–68.

Florida, R. 2002a: The economic geography of talent Annals of the Association of American Geographers 92(4), 743–55.

Florida, Richard. 2002b: *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life*. Basic Books.

Florida, Richard. 2003: Cities and the Creative Class City & Community 2(1), 3–19.

Florida, Richard. 2017: *The New Urban Crisis: Gentrification, Housing Bubbles, Growing Inequality, and What We Can Do about It*. London, UNITED KINGDOM: Oneworld Publications.

Florida, Richard, and Patrick Adler. 2018: The patchwork metropolis: The morphology of the divided postindustrial city Journal of Urban Affairs 40(5), 609–24.

Florida, Richard L. 2012: *The Rise of the Creative Class: Revisited*. Basic Books.

Freedman, Ora, and Clifford R Kern. 1997: A model of workplace and residence choice in two-worker households Regional Science and Urban Economics 27(3), 241–60.

Freeman, Lance. 2005: Displacement or Succession?: Residential Mobility in Gentrifying Neighborhoods Urban Affairs Review 40(4), 463–91.

Frenette, Marc. 2004: Access to College and University: Does Distance to School Matter? Canadian Public Policy 30(4), 427–43.

Garcia-López, Miquel-Àngel, Jordi Jofre-Monseny, Rodrigo Martínez Mazza, and Mariona Segú. 2019: *Do Short-Term Rental Platforms Affect Housing Markets? Evidence From Airbnb in Barcelona*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Gaus, John M. 1923: Review of The Neighborhood in Nation Building, ; The Neighborhood: A Study of Local Life in the City of Columbus, Ohio The American Political Science Review 17(3), 502–3.

van Gent, Wouter, Marjolijn Das, and Sako Musterd. 2019: Sociocultural, economic and ethnic homogeneity in residential mobility and spatial sorting among couples Environment and Planning A: Economy and Space 51(4), 891–912.

Ghazali, Ezlika M, Elaine Yee-Ling Ngiam, and Dilip S Mutum. 2020: Elucidating the drivers of residential mobility and housing choice behaviour in a suburban township via push–pull–mooring framework Journal of Housing and the Built Environment 35(2), 633–59.

Glaeser, Edward L. 2020: *Urbanization and its Discontents*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Glaeser, Edward l, and Joseph Gyourko. 2005: Urban Decline and Durable Housing Journal of Political Economy 113(2), 345–75.

Glaeser, Edward L, Jed Kolko, and Albert Saiz. 2001: Consumer city Journal of Economic Geography 1(1), 27–50.

Goldscheider, Calvin. 1966: Differential Residential Mobility of the Older Population Journal of Gerontology 21(1), 103–8.

Greenlee, Andrew J. 2019: Assessing the Intersection of Neighborhood Change and Residential Mobility Pathways for the Chicago Metropolitan Area (2006–2015) Housing Policy Debate 29(1), 186–212.

Guest, Avery M. 1972: Patterns of Family Location Demography 9(1), 159–71.

Gujarati, Damodar N, and DC Porter. 2010: *Essentials of Econometrics*.

van Ham, Maarten. 2012: Housing Behaviour , The SAGE Handbook of Housing Studies. London: SAGE Publications Ltd, pp. 47–65.

Hansen, AL, HT Andersen, and E Clark. 2001: Creative Copenhagen: Globalization, urban governance and social change European Planning Studies 9(7), 851–69.

Hansen, Høgni Kalsø, and Louise G Aner. 2017: On the location dynamics of highly educated people migrating to peripheral regions of Denmark Population, Space and Place.

Hansen, Høgni Kalsø, Ditte Håkonsson Lyngemark, and Cecilie Dohlman Weatherall. 2020: Migration and employment after an economic shock: regional characteristics and migration patterns Regional Studies 0(0), 1–14.

Hansen, Høgni Kalsø, and Thomas Niedomysl. 2009: Migration of the creative class: evidence from Sweden Journal of Economic Geography 9(2), 191–206.

Haque, Md Bashirul, Charisma Choudhury, Stephane Hess, and Romain Crastes dit Sourd. 2019: Modelling residential mobility decision and its impact on car ownership and travel mode Travel Behaviour and Society 17, 104–19.

Harris, Chauncy D. 1943: Suburbs American Journal of Sociology 49(1), 1–13.

Harrison Jr., David, and Daniel L Rubinfeld. 1978: Hedonic housing prices and the demand for clean air Journal of Environmental Economics and Management 5(1), 81–102.

Hasanzadeh, Kamyar, Marketta Kyttä, and Greg Brown. 2019: Beyond Housing Preferences: Urban Structure and Actualisation of Residential Area Preferences Urban Science 3(1)

Haugan, Tommy, and Arnhild Myhr. 2019: Residential Mobility, Family Structure, and Completion of Upper Secondary Education – A Registry-Based Cohort Study of the Norwegian Adolescent Population Frontiers in Psychology 10.

Haurin, Donald R, Patric H Hendershott, and Susan M Wachter. 1996: *Borrowing Constraints and the Tenure Choice of Young Households*Unpublished Working Paper. Working Paper Series. National Bureau of Economic Research.

Hauser, Philip M. 1959: *The study of population: An inventory and appraisal /*. (Chicago, Ill.): University of Chicago Press.

Haynie, Dana L, and Scott J South. 2005: Residential Mobility and Adolescent Violence Social Forces 84(1), 361–74.

Hedin, Karin, Eric Clark, Emma Lundholm, and Gunnar Malmberg. 2012: Neoliberalization of Housing in Sweden: Gentrification, Filtering, and Social Polarization Annals of the Association of American Geographers 102(2), 443–63.

Hendel, Igal, Aviv Nevo, and François Ortalo-Magné. 2007: *The Relative Performance of Real Estate Marketing Platforms: MLS versus FSBOMadison.com*. National Bureau of Economic Research.

Henley, Andrew. 1998: Residential Mobility, Housing Equity and the Labour Market The Economic Journal 108(447), 414–27.

Herslund, Lise. 2012: The Rural Creative Class: Counterurbanisation and Entrepreneurship in the Danish Countryside Sociologia Ruralis 52(2), 235–55.

Holm, Einar. 2017: Microsimulation , International Encyclopedia of Geography. American Cancer Society, pp. 1–8.

Hooimeijer, Pieter, and Anton Oskamp. 1996: A simulation model of residential mobility and housing choice Netherlands journal of housing and the built environment 11(3), 313–36.

Hrast, Maša Filipovič, Richard Sendi, Valentina Hlebec, and Boštjan Kerbler. 2019: Moving House and Housing Preferences in Older Age in Slovenia Housing, Theory and Society 36(1), 76–91.

Hu, Lingqian, and Liming Wang. 2019: Housing location choices of the poor: does access to jobs matter? Housing Studies 34(10), 1721–45.

Ihlanfeldt, Keith, and Tom Mayock. 2010: Panel data estimates of the effects of different types of crime on housing prices REGIONAL SCIENCE AND URBAN ECONOMICS 40(2–3), 161–72.

Jacobs, Jane. 1961: *The Death and Life of Great American Cities*. Vintage.

Jae Hong Kim, Francesca Pagliara, and John Preston. 2005: The intention to move and residential location choice behaviour Urban Studies (Routledge) 42(9), 1621–36.

Jelleyman, T, and N Spencer. 2008: Residential mobility in childhood and health outcomes: a systematic review Journal of Epidemiology & Community Health 62(7), 584–92.

Jenkins, CS. 2010: What Is Ontological Realism? Philosophy Compass 5(10), 880–90.

Johnston, RJ. 1989: Philosophy, Ideology and Geography. In Derek Gregory & Rex Walford (eds.) , Horizons in Human Geography. Horizons in Geography. London: Macmillan Education UK, pp. 48–66.

Jong, Petra A de. 2020: Later-Life Migration in The Netherlands: Propensity to Move and Residential Mobility Journal of Aging and Environment 0(0), 1–10.

Kain, John F, and John M Quigley. 1970: Measuring the Value of Housing Quality Journal of the American Statistical Association 65(330), 532–48.

Kan, Kamhon. 1999: Expected and Unexpected Residential Mobility Journal of Urban Economics 45, 72–96.

Kan, Kamhon. 2002: Residential mobility with job location uncertainty Journal of Urban Economics 52, 501–23.

Kan, Kamhon. 2007: Residential mobility and social capital Journal of Urban Economics 61(3), 436–57.

Kennedy, Sheela, and Steven Ruggles. 2014: Breaking Up Is Hard to Count: The Rise of Divorce in the United States, 1980–2010 Demography 51(2), 587–98.

Kitchin, Rob. 2006: Positivistic geography and spatial science , Approaches to Human Geography. London: Sage, pp. 20–29.

Klis, Marjolijn van der, and Clara H Mulder. 2008: Beyond the trailing spouse: the commuter partnership as an alternative to family migration Journal of Housing and the Built Environment 23(1), 1–19.

Københavns Kommune, Plandirektorat. 1992: *From slum clearance to urban renewal in Copenhagen*. Københavns Kommunes Plandirektorat.

Kooiman, Niels. 2020: Residential mobility of couples around family formation in the Netherlands: Stated and revealed preferences Population, Space and Place.

Koster, Hans, Jos van Ommeren, and Nicolas Volkhausen. 2018a: *Short-Term Rentals and the Housing Market: Quasi-Experimental Evidence from Airbnb in Los Angeles*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Koster, Hans RA, Jos van Ommeren, and Nicolas Volkhausen. 2018b: *Short-term rentals and the housing market: Quasi-experimental evidence from Airbnb in Los Angeles*Unpublished CEPR Discussion Paper. C.E.P.R. Discussion Papers.

Kotkin, Joel. 2007: *The City: A Global History*. Random House Publishing Group.

Kulu, Hill. 2008: Fertility and Spatial Mobility in the Life Course: Evidence from Austria Environment and Planning A: Economy and Space 40(3), 632–52.

Kulu, Hill, Emma Lundholm, and Gunnar Malmberg. 2018: Is spatial mobility on the rise or in decline? An order-specific analysis of the migration of young adults in Sweden Population Studies 72(3), 323–37.

LaGrow, Steven J. 1995: Housing, Support and Community: Choices and Strategies for Adults with Disabilities. Julie Ann Racino, Pamela Walker, Susan O'Connor & Steven J. Taylor. Baltimore: Paul H. Brookes Publishing Co., 1993. 393 pp. AUD $64 paper. The Australian Journal of Rehabilitation Counselling 1(2), 142–43.

Lan, Tian, Jens Kandt, and Paul Longley. 2020: Geographic scales of residential segregation in English cities Urban Geography 41(1), 103–23.

Lansing, John B, and Robert W Marans. 1969: Evaluation of Neighborhood Quality Journal of the American Institute of Planners 35(3), 195–99.

Lanzendorf, Martin. 2010: Key Events and Their Effect on Mobility Biographies: The Case of Childbirth International Journal of Sustainable Transportation 4(5), 272–92.

Larsen, Henrik Gutzon, and Anders Lund Hansen. 2008: Gentrification—Gentle or Traumatic? Urban Renewal Policies and Socioeconomic Transformations in Copenhagen Urban Studies 45(12), 2429–48.

Lee, Barrett A, Sean F Reardon, Glenn Firebaugh, Chad R Farrell, Stephen A Matthews, and David O'Sullivan. 2008: Beyond the Census Tract: Patterns and Determinants of Racial Segregation at Multiple Geographic Scales American Sociological Review 73(5), 766–91.

Lee, Brian HY, and Paul Waddell. 2010: Residential mobility and location choice: a nested logit model with sampling of alternatives Transportation 37(4), 587–601.

Lee, Brian HY, Paul Waddell, Liming Wang, and Ram M Pendyala. 2010: Reexamining the Influence of Work and Nonwork Accessibility on Residential Location Choices with a Microanalytic Framework Environment and Planning A: Economy and Space 42(4), 913–30.

Lemberg, Kai. 1979: Urban renewal in Copenhagen Batiment International, Building Research and Practice 7(2), 96–96.

Letdin, Mariya, and Hyoung S Shim. 2019: Location choice, life cycle and amenities Journal of Regional Science 59(3), 567–85.

Levitt, Steven D, Chad Syverson, and Fernando Ferreira. 2008: Antitrust Implications of Outcomes When Home Sellers Use Flat-Fee Real Estate Agents Brookings-Wharton Papers on Urban Affairs, 47–93.

Lindgren, Urban. 2003: Who is the counter-urban mover? Evidence from the Swedish urban system International Journal of Population Geography 9(5), 399–418.

Littlewood, Amanda, and Moira Munro. 1997: Moving and Improving: Strategies for Attaining Housing Equilibrium , Moving and Improving: Strategies for Attaining Housing Equilibrium Urban Studies 34(11)

Lock, Andy, and Tom Strong. 2010: *Social Constructionism: Sources and Stirrings in Theory and Practice*. Cambridge University Press.

Long, Larry H. 1972: The influence of mumber and ages of children on residential mobility Demography 9(3), 371–82.

Malmberg, Bo, and Eva K Andersson. 2019: Adolescent neighbourhood context and transition to parenthood: A longitudinal study Population, Space and Place 25(5), e2228.

Matznetter, Walter, and Alexis Mundt. 2012: Housing and Welfare Regimes. In David F. Clapham, William A. V. Clark, & Kenneth Gibb (eds.) , The SAGE Handbook of Housing Studies. SAGE, pp. 274–94.

McHugh, Kevin E, Timothy D Hogan, and Stephen K Happel. 1995: Multiple Residence and Cyclical Migration: A Life Course Perspective* The Professional Geographer 47(3)

Merriman, Peter. 2012: Human geography without time-space Transactions of the Institute of British Geographers 37(1), 13–27.

Michielin, Francesca, and Clara H Mulder. 2008: Family Events and the Residential Mobility of Couples Environment and Planning A: Economy and Space 40(11), 2770–90.

Miller, David. 2015: *Critical Rationalism: A Restatement and Defence*. Open Court.

Miller, David W. 2006: *Out of Error: Further Essays on Critical Rationalism*. Ashgate Publishing, Ltd.

Mohino, Inmaculada, and José M Ureña. 2020: Mobility, housing and labour markets in times of economic crises Regional Studies 54(4), 443–49.

Morandi, Corinna. 2011: Retail and public policies supporting the attractiveness of Italian town centres: The case of the Milan central districts URBAN DESIGN International 16(3).

Morris, Tim, David Manley, and Clive E Sabel. 2018: Residential mobility: Towards progress in mobility health research Progress in Human Geography 42(1), 112–33.

Moss, RP. 1977: Deductive strategies in geographical generalization Progress in Physical Geography 1(1).

Mulder, Clara H. 2007: The family context and residential choice: A challenge for new research Population, Space and Place 13(4), 265–78.

Mulder, Clara H, and Pieter Hooimeijer. 1999: Residential Relocations in the Life Course. In Leo J. G. van Wissen & Pearl A. Dykstra (eds.) , Population Issues: An Interdisciplinary Focus. The Plenum Series on Demographic Methods and Population Analysis. Dordrecht: Springer Netherlands, pp. 159–86.

Mulder, Clara H, and Gunnar Malmberg. 2014: Local Ties and Family Migration Environment and Planning A: Economy and Space 46(9), 2195–2211.

Musterd, Sako, and Mariïlle De Winter. 1998: Conditions for spatial segregation: some European perspectives International Journal of Urban and Regional Research 22(4), 665–73.

Muth, Richard F. 1974: Moving costs and housing expenditure Journal of Urban Economics 1(1)

Niedomysl, Thomas. 2008: Residential preferences for interregional migration in Sweden: demographic, socioeconomic, and geographical determinants Environment and Planning A 40(5), 1109–31.

Niedomysl, Thomas. 2010: Towards a Conceptual Framework of Place Attractiveness: A Migration Perspective Geografiska Annaler Series B: Human Geography 92(1), 97–109.

Niedomysl, Thomas. 2011: How Migration Motives Change over Migration Distance: Evidence on Variation across Socio-economic and Demographic Groups Regional Studies 45(6), 843–55.

Niedomysl, Thomas, and Høgni Kalsø Hansen. 2010: What matters more for the decision to move: jobs versus amenities Environment and Planning A 42(7), 1636–49.

OECD. 2019: *Regions and Cities at a Glance 2018 – Denmark*. OECD Publishing, Paris.

Opit, Simon, Karen Witten, and Robin Kearns. 2020: Housing pathways, aspirations and preferences of young adults within increasing urban density Housing Studies 35(1), 123–42.

Ormerod, Paul, and Bridget Rosewell. 2009: Validation and Verification of Agent-Based Models in the Social Sciences. In Flaminio Squazzoni (ed.) , Epistemological Aspects of Computer Simulation in the Social Sciences. Lecture Notes in Computer Science. Berlin, Heidelberg: Springer, pp. 130–40.

Östh, John, Ian Shuttleworth, and Thomas Niedomysl. 2018: Spatial and temporal patterns of economic segregation in Sweden's metropolitan areas: A mobility approach Environment and Planning A: Economy and Space 50(4), 809–25.

Painter, Gary, and KwanOk Lee. 2009: Housing tenure transitions of older households: Life cycle, demographic, and familial factors☆ Regional Science and Urban Economics 39, 749–60.

Pelikh, Alina, and Hill Kulu. 2018: Short- and long-distance moves of young adults during the transition to adulthood in Britain Population, Space and Place 24(5), e2125.

Pettersson, Anna, and Gunnar Malmberg. 2009: Adult children and elderly parents as mobility attractions in Sweden Population, Space and Place 15(4), 343–57.

Pinjari, Abdul Rawoof, Chandra R Bhat, and David A Hensher. 2009: Residential self-selection effects in an activity time-use behavior model Transportation Research Part B: Methodological 43(7), 729–48.

Pinjari, Abdul Rawoof, Ram M Pendyala, Chandra R Bhat, and Paul A Waddell. 2011: Modeling the choice continuum: an integrated model of residential location, auto ownership, bicycle ownership, and commute tour mode choice decisions Transportation 38(6), 933.

Potter, Robert G. 1956: Review of Why Families Move The Milbank Memorial Fund Quarterly 34(2), 216–19.

Pred, Allan. 1977: The Choreography of Existence: Comments on Hägerstrand's Time-Geography and Its Usefulness Economic Geography 53(2), 207–21.

Preece, Jenny, Joe Crawford, Kim McKee, John Flint, and David Robinson. 2020: Understanding changing housing aspirations: a review of the evidence Housing Studies 35(1), 87–106.

Rabe, Birgitta, and Mark Taylor. 2010: Residential mobility, quality of neighbourhood and life course events Journal of the Royal Statistical Society: Series A (Statistics in Society) 173(3), 531–55.

Rasmussens, Steen Eiler. 1994: *København: et bysamfunds særpræg og udvikling gennem tiderne*. 2nd ed. G.E.C GADs Forlag.

Raubal, Martin. 2001: Ontology and epistemology for agent-based wayfinding simulation International Journal of Geographical Information Science 15(7), 653–65.

Reardon, Sean F, Stephen A Matthews, David O'Sullivan, Barrett A Lee, Glenn Firebaugh, Chad R Farrell, and Kendra Bischoff. 2008: The geographic scale of Metropolitan racial segregation Demography 45(3), 489–514.

Riemer, Svend. 1948: Escape into Decentralization? Land Economics 24(1), 40–48.

Ritsilä, Jari, and Marko Ovaskainen. 2001: Migration and regional centralization of human capital Applied Economics 33(3), 317–25.

Rodríguez-Pose, Andrés, and Michael Storper. 2019: *Housing, urban growth and inequalities: the limits to deregulation and upzoning in reducing economic and spatial inequality*. LSE Research Online Documents on Economics. London School of Economics and Political Science, LSE Library.

Røed Larsen, Erling, and Dag Einar Sommervoll. 2009: The impact on rent from tenant and landlord characteristics and interaction Regional Science and Urban Economics 39, 316–22.

Rossi, Peter H. 1955: *Why Families Move: A Study in the Social Psychology of Urban Residential Mobility*. Beverly Hills, Calif: Free Press.

Rouwendal, Jan. 1998: On Housing Services Journal of Housing Economics 7(3), 218–42.

Rouwendal, Jan. 2002: *A Dynamic Model of Commutes*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Rowbottom, Darrell. 2011: *Popper's Critical Rationalism: A Philosophical Investigation*. Routledge.

Sabagh, Georges, Maurice D Van Arsdol, Jr., and Edgar W Butler. 1969: Some Determinants of Intrametropolitan Residential Mobility: Conceptual Considerations Social Forces 48(1), 88–98.

Saghapour, Tayebeh, and Sara Moridpour. 2019: The role of neighbourhoods accessibility in residential mobility Cities 87, 1–9.

Sahasranaman, Anand, Vishnu Prasad, and Aditi Balachander. 2020: Housing Choice as a Function of Risks Confronting Low-income Households Journal of Emerging Market Finance 19(1), 100–118.

Schnure, Calvin, and Shruthi Venkatesh. 2015: *Demographic and Financial Determinants of Housing Choice in Retirement and the Rise of Senior Living*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Schouten, Andrew. 2020: Residential mobility and the geography of low-income households Urban Studies, 0042098020922127.

Scott, Allen J. 2008a: *Social Economy of the Metropolis: Cognitive-Cultural Capitalism and the Global Resurgence of Cities*. Oxford ; New York: Oxford University Press.

Scott, Allen J. 2008b: Resurgent Metropolis: Economy, Society and Urbanization in an Interconnected World International Journal of Urban and Regional Research 32(3), 548–64.

Scott, Allen J. 2014: Beyond the Creative City: Cognitive–Cultural Capitalism and the New Urbanism Regional Studies 48(4), 565–78.

Scott, Allen J. 2019: City-regions reconsidered Environment and Planning A: Economy and Space 51(3), 554–80.

Seiler, Michael J, Michael T Bond, and Vicky L Seiler. 2001: The Impact of World Class Great Lakes Water Views On Residential Property Values Appraisal Journal 69(3), 287.

Shabrina, Zahratu, Elsa Arcaute, and Michael Batty. 2021: Airbnb and its potential impact on the London housing market Urban Studies, 0042098020970865.

Shaheen, Susan, and Nelson Chan. 2016: Mobility and the Sharing Economy: Potential to Facilitate the First- and Last-Mile Public Transit Connections Built Environment 42(4), 573–88.

Sheppard, Stephen, and Andrew Udell. 2016: *Do Airbnb Properties Affect House Prices?*Unpublished Department of Economics Working Paper. Department of Economics, Williams College.

Shuttleworth, Ian, Brian Foley, Myles Gould, and Tony Champion. 2020: Residential mobility in divided societies: How individual religion and geographical context influenced housing moves in Northern Ireland 2001–2011 Population, Space and Place, e2387.

Shuttleworth, Ian, and John Östh. 2017: Internal migration in a high-migration Nordic country , Internal Migration in the Developed World: Are we becoming less mobile? Routledge.

Simmons, James W. 1968: Changing Residence in the City: A Review of Intraurban Mobility Geographical Review 58(4), 622–51.

Speare, Alden. 1970: Home Ownership, Life Cycle Stage, and Residential Mobility Demography 7(4), 449–58.

Speare, Alden. 1974: Residential satisfaction as an intervening variable in residential mobility Demography 11(2), 173–88.

Speare, Alden, and Frances Kobrin Goldscheider. 1987: Effects of Marital Status Change on Residential Mobility Journal of Marriage and Family 49(2), 455–64.

Srour, Issam M, Kara M Kockelman, and Travis P Dunn. 2002: Accessibility Indices: Connection to Residential Land Prices and Location Choices Transportation Research Record 1805(1), 25–34.

Stamsø, Mary Ann. 2015: Selling a house and the decision to use a real estate broker in Norway Property Management 33(2), 173–86.

Stapleton, Clare M. 1980: Reformulation of the Family Life cycle Concept: Implications for Residential Mobility Environment and Planning A 12(10), 1103–18.

Stockman, N. 2013: *Antipositivist Theories of the Sciences: Critical Rationalism, Critical Theory and Scientific Realism*. Springer Science & Business Media.

Storper, Michael, Thomas Kemeny, Taner Osman, and Institutional Research Information Service Makarem Naji. 2015: *The Rise and Fall of Urban Economies*. Post-Print. HAL.

Storper, Michael, and Allen J Scott. 2009: Rethinking human capital, creativity and urban growth Journal of Economic Geography 9(2), 147–67.

Tanaś, Justyna, Maria Trojanek, and Radosław Trojanek. 2019: Seniors' Revealed Preferences in the Housing Market in Poznań Economics & Sociology 12(1), 353-365,369.

Tatsiramos, Konstantinos. 2006: *Residential Mobility and Housing Adjustment of Older Households in Europe*Unpublished IZA Discussion Paper. Institute for the Study of Labor (IZA).

Taylor, Dorceta. 2014: *Toxic Communities: Environmental Racism, Industrial Pollution, and Residential Mobility*. NYU Press.

Thomas, Michael, Brian Gillespie, and Nik Lomax. 2019: Variations in migration motives over distance Demographic Research 40, 1097–1110.

Tita, George E, Tricia L Petras, and Robert T Greenbaum. 2006: Crime and Residential Choice: A Neighborhood Level Analysis of the Impact of Crime on Housing Prices Journal of Quantitative Criminology 22, 299–317.

United Nations, Department of Economic and Social Affairs, Population Division. 2019: *World Urbanization Prospects - Population Division - United Nations: The 2018 Revision*. United Nations, New York.

United Nations, Department of Economic and Social Affairs, Population Division. 2020: *World Population Ageing 2019*. (ST/ESA/SER.A/444).

Vance, Rupert B. 1957: Community Life and Social Policy: Selected Papers. By Louis Wirth Social Forces 36(2), 173–74.

van der Vlist, Arno J, Cees Gorter, Peter Nijkamp, and Piet Rietveld. 2002: Residential Mobility and Local Housing-Market Differences Environment and Planning A: Economy and Space 34(7), 1147–64.

Voight, Adam, Regina Giraldo-García, and Marybeth Shinn. 2020: The Effects of Residential Mobility on the Education Outcomes of Urban Middle School Students and the Moderating Potential of Civic Engagement Urban Education 55(4), 570–91.

Vyvere, Yves van de, Harmen Oppewal, and Harry Timmermans. 1998: The Validity of Hierarchical Information Integration Choice Experiments to Model Residential Preference and Choice Geographical Analysis 30(3), 254–72.

Waddell, Paul. 2006: Reconciling household residential location choices and neighborhood dynamics Working paper.

Wagner, Michael, and Clara H Mulder. 2015: Spatial Mobility, Family Dynamics, and Housing Transitions KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie 67(1).

Wang, Ruoniu, Rebecca Walter, Abdulnaser Arafat, and Jie Song. 2019: Understanding the role of life events on residential mobility for low-income, subsidised households Urban Studies 56(8), 1628–46.

Weeks, John R. 2010: Defining Urban Areas. In Tarek Rashed & Carsten Jürgens (eds.) , Remote Sensing of Urban and Suburban Areas. Remote Sensing and Digital Image Processing. Dordrecht: Springer Netherlands, pp. 33–45.

Wettersten, John. 1992: *The Roots of Critical Rationalism*. Rodopi.

White, L. 1994: Coresidence and Leaving Home - Young-Adults and Their Parents Annual Review of Sociology 20, 81–102.

Withers, S Davies. 1998: Linking household transitions and housing transitions: a longitudinal analysis of renters Environment and Planning A 30, 615–30.

Xie, Min, and David Mcdowall. 2014: Impact of Victimization on Residential Mobility: Explaining Racial and Ethnic Patterns Using the National Crime Victimization Survey Criminology 52(4), 553–87.

Yogo, Motohiro. 2016: Portfolio choice in retirement: Health risk and the demand for annuities, housing, and risky assets Journal of Monetary Economics 80, 17–34.

Zecha, Gerhard. 1999: *Critical Rationalism and Educational Discourse*. Rodopi.

Zheng, Siqi, and Matthew E Kahn. 2008: Land and residential property markets in a booming economy: New evidence from Beijing Journal of Urban Economics 63(2), 743–57.

Zietz, Emily, and G Sirmans. 2011: Real estate brokerage research in the new millennium Journal of Real Estate Literature 19, 3–40.

Zolfaghari, Alireza, Aruna Sivakumar, and John W Polak. 2012: Choice set pruning in residential location choice modelling: a comparison of sampling and choice set generation approaches in greater London Transportation Planning and Technology 35(1), 87–106.

Paper 1

Resurgent Cities and the Socioeconomic Divide: The Young, Educated and Affluent City of Copenhagen

Aske Egsgaard,[†] Høgni Kalsø Hansen[‡] and Lars Winther[§]

Abstract

The resurgence of cities has led to increased wealth but have also amplified the socioeconomic divide and polarisation within the city. Recently, interest has been renewed in the socioeconomic consequences of the city's growth, with an emphasis on residential differences in terms of affluence, academic qualifications and the 'youthification' process. In this paper, we examine how the resurgence of cities has influenced the internal divide in socioeconomic structures in form of demography, education and employment. Utilizing Danish register data for all residents in Copenhagen over a 25-year period from 1992 to 2017, we describe the development of the city in relation to three the phenomena of youthification, academification and workification. We show that Copenhagen, like other major European and American cities, has seen a decrease in the mean age of its residents and an increase in young adults who have completed an academic education and found employment in the city. Moreover, we find that the relationship between residence and workplace location has become more divided based on educational background, further emphasizing the socioeconomic inequalities within the city.

[†] Department of Geosciences and Natural Resource Management University of Copenhagen & Department of the Build Environment Aalborg University
[‡] Department of Geosciences and Natural Resource Management University of Copenhagen
[§] Department of Geosciences and Natural Resource Management University of Copenhagen

Introduction

The resurgence of cities based upon the new knowledge economy has led to larger, younger populations, higher average incomes, increased levels of human capital and higher employment rates in city centres (Moos et al. 2019; Turok and Mykhnenko 2008; Andersen and Winther 2010; Cheshire 2006; Costa and Kahn 2000). However, at the same time it has increased socioeconomic inequalities both within and between cities because of, for instance, increased employment polarization in the local labour market (Florida 2017; Høst and Winther 2019) as a result of the well-reported transformation from the Fordist mode of accumulation to today's post-Fordist knowledge economy (Scott 2008b; Glaeser and Gottlieb 2006; Storper et al. 2015). Formerly large cities were seen as the sufferers of the crisis of Fordism, with its industrial restructuring, including the severe deindustrialization, suburbanization of services and job losses of the 1970s and 1980s, especially the restructuring of city centres (Storper and Manville 2006). Later, in the mid-1990s and onwards, large cities were seen as the frontrunners in the emerging knowledge economy and the main drivers of contemporary economic development (Scott 2008b; Glaeser 2012; Scott and Storper 2015; Storper and Scott 2016). Although several cities remain stagnant, many larger European cities have experienced a resurgence and witnessed marked growth rates since the 1990s in population, employment and labour-force qualifications (Gordon 2004; Andersen and Winther 2010; Dustmann et al. 2014). Thus, the average resurgent city has become more affluent, but also more divided (Turok and Mykhnenko 2008; Engelstoft, Hansen, et al. 2006; Musterd 2006; Harsman 2006). This has sparked renewed academic interest in the socioeconomic consequences of the resurgent city (Glaeser 2020; Musterd et al. 2017; Song 2003; Goix 2005; Rodríguez-Pose and Storper 2019).

This paper examines the spatial dimension and socioeconomic divide with regard to three key aspects of the resurgent city: demography, education and employment. The distinctions that have increased or arisen are analysed using quantitative data on Copenhagen for the period 1992 to 2017. The paper investigates to what extent present-day Copenhagen differs from the city it was two and a half decades ago covering the whole period of resurgence. We do this by examining changes in the city's demography (youthification), the qualifications of the labour force (academification) and employment (workification). In the case of the latter two aspects, the focus is primarily on the subgroup of young adults aged 20-29, given previous arguments in the literature on youthification that young people play a fundamental role in the transformation of knowledge cities (Moos 2016; Moos et al. 2019; Revington 2015; Bereitschaft 2020). A second focus is to analyse whether young adults have become more socioeconomically divided in this 25-year period. We also add income into the analysis. Thirdly, we examine whether differences

in formal qualifications led this population group to become increasingly spatially separated during this period.

To answer these questions, we use register-based microdata to analyse the trend towards youthification and academification in Copenhagen. We also show how the changing relationship between residential and workplace locations is linked to this development by investigating the share of young adults who were still living and working in the city five years after obtaining a vocational or long-cycle academic qualification.

The structure of the paper is as follows. First, the theoretical key concepts of youthification, academification and workification are introduced and discussed in the theoretical context of resurgent cities. Secondly, our methods are outlined by describing the microdata employed in this study and introducing Copenhagen as an area for a case-study. Next follows an analysis of a) the extent of youthification, academification and workification in Copenhagen from 1992 to 2017, focusing especially on young adults, and b) socio-economic diversity within the group of young adults, including patterns of places of residence and places of work. The study ends with a discussion and conclusion on how the present findings can help us to theorize contemporary urban development better, with a particular focus on the growing tendency for urban areas to become more divided.

The transformation of cities' socioeconomic structures

The last two and a half decades have witnessed a strong trend towards urbanization and the resurgence of the larger cities and their centres in the wake of the urban decline of the 1970s and 1980s (Scott 2008b; Glaeser and Gottlieb 2006; Storper and Manville 2006). According to the literature, resurgent cities are often characterized by a successful rise in the knowledge economy associated with agglomeration economies, significant growths in population and employment, and increased concentrations of people with high levels of human capital (Glaeser et al. 1992; Hansen and Winther 2015; Storper and Scott 2009; Scott and Storper 2015; Florida 2017). Moreover, dramatic changes in industrial structures have also brought about demographic changes, thus altering the social composition of many resurgent cities (Turok and Mykhnenko 2008; Hansen and Winther 2015; Andersen and Winther 2010; Haase et al. 2010; Rérat 2012, 2019). To study in detail how the form this demographic transformation has taken in socioeconomic terms, this section defines and discusses three key concepts: youthification, academification and workification, in order to build an analytical framework for analysing and qualifying changes to resurgent cities.

As a theoretical concept, youthification was introduced by Moos et al. (2015) to denote the increasing concentration of young adults in certain neighbourhoods of cities dominated by the knowledge economy. Youthification has been identified as a common process in US and Canadian cities (Bereitschaft 2020; Moos et al. 2019; Revington 2015, 2018). Moos (2016) finds clusters of young adults in the downtowns of 56 out of 57 US metropolitan regions. According to Moos (2016), youthification is driven by a combination of an increasing variety of urban amenities, which matches the young adult lifestyle, along with macro-economic affluence and the housing market. Moos et al. (2019) further link the youthification process to an increasing focus on and development of educational institutions in urban areas. Moreover, Bereitschaft (2020) demonstrates that youthification, population growth and traditional forms of gentrification often occur simultaneously, although youthification does not always result in a growing population or gentrification.

A growing political focus worldwide on upskilling and building a highly qualified labour force has introduced a process of academification to resurgent cities as well (Abel and Deitz 2012; Berck et al. 2016; Cuaresma et al. 2018; Ahlin et al. 2018). Current debates on resurgent cities stress the strong link between increasing human capital and economic growth (Black and Henderson 1999; Drucker and Goldstein 2007; Florida 2002a; Glaeser 2012). Florida (2002b) points to the strong link between economic growth and attracting and retaining a creative and to a large extent well-educated workforce in American cities. Florida's work has been widely criticized for making a straightforward link between economic growth and providing the amenities that will propel the creative and educated to move to certain places. Although the means and the policies behind this development are widely debated, the link between a high stock of human capital and economic growth has been identified in many resurgent cities across the world (Wojan et al. 2007; Clifton 2008; Hansen and Winther 2010, 2015; Andersen et al. 2010; Clifton et al. 2013) that are striving to attract and retain high numbers of highly educated individuals. However, such policies come with a downside, namely that those who are more highly educated earn higher salaries: according to Rauch (1993), "Cities with higher average levels of human capital should therefore have higher wages and higher land rents" (p. 380). Thus, resurgent cities with growing stocks of human capital can also expect housing prices to increase, leading to the potential exclusion of those with less education from the urban housing market.

Closely related to the academification of resurgent cities, workification has followed. Workification refers to the higher employment rates in resurgent cities compared to former decades. This process leads to two trends. First, people do not leave the city immediately after finishing their education. Rather, they stay to enjoy urban amenities while entering the job market

(Lorenzen and Andersen 2009; Mellander and Florida 2014). Resurgent cities offer a diverse and thick labour market for people with an academic degree (Musterd 2006; Cheshire 2006; Buch et al. 2014), who are therefore more inclined to stay in an urban area, as this gives them greater access to job opportunities. The second and related trend is that, due to these socio-economic changes, cities in the Global North have been gentrified, taking away space for affordable housing from the poor and socially challenged (Florida 2017; Glaeser 2020; Walks and Maaranen 2008; Larsen and Hansen 2008).

Thus, following the methodological section the analysis will focus on how youthification and academification have led to the workification of residents in the resurgent city of Copenhagen and examine to what extent this has led to socioeconomic changes in the city.

Methodology: data and sampling strategy

For this research, we use administrative micro-data on individuals and their residential locations from Statistics Denmark to analyse the demographic changes in which we are interested. The data allow us to identify all individuals who were living in the Greater Copenhagen area in the period 1992-2017 and to add each individual's socioeconomic characteristics, such as age, sex, education, income and labour market attachment. Moreover, the data permit us not only to determine who was living in or outside the Copenhagen area in that period, but also to link them to specific workplaces and their locations. This makes it possible to draw a clear distinction between the geographical area of Copenhagen and the surrounding municipalities and to detect changes in the demography of the city of Copenhagen itself during this period.

As already noted, the concept of youthification is associated with certain age groups moving into urban areas. Thus, *age* become a central variable to include in the analysis, which is measured continuously over the period. To distinguish different age groups, we group individuals into seven categories based on age: 0-9, 10-19, 20-29, 30-39, 40-49, 50-64 and over 65 years of age.

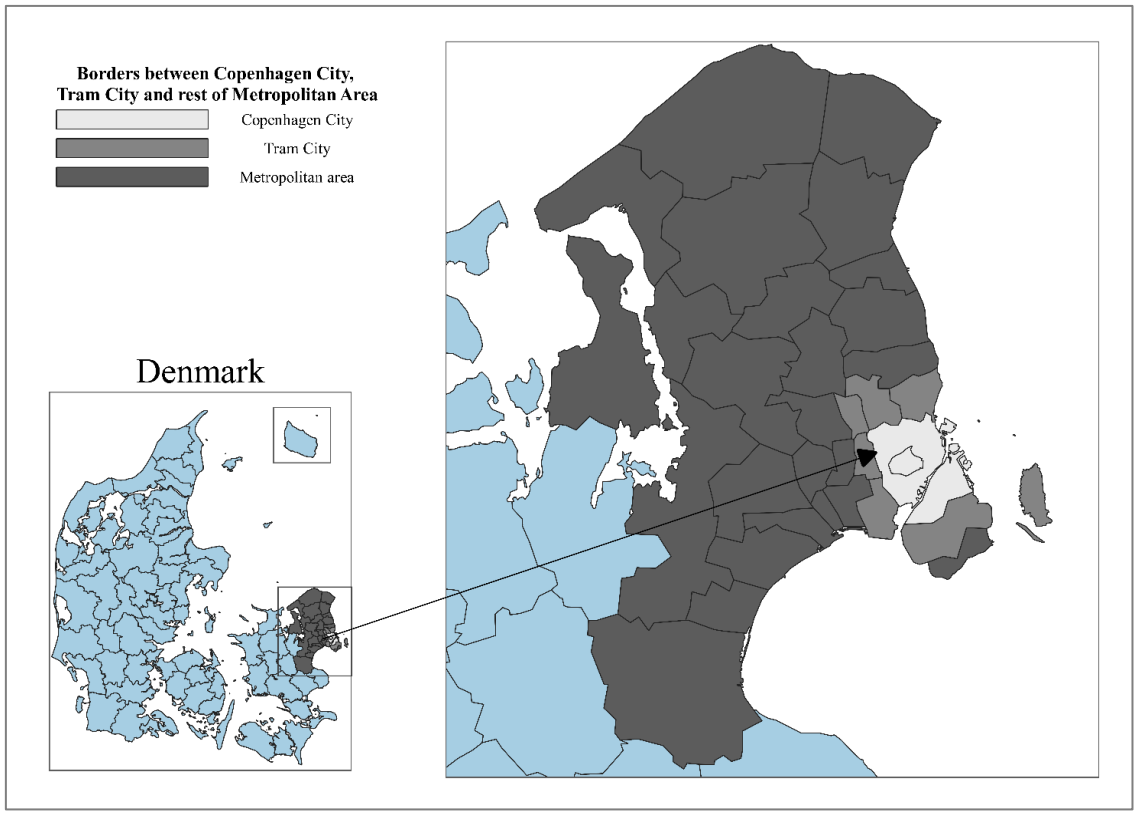
As academification is strongly associated with the educational level of an area's population, *education* is defined as the highest level of education that an individual has completed. Based on the ISCED nomenclature, we divide education into six categories: primary school, high school, vocational education (practical), and short-, medium- and long-cycle education (more theoretically based). Moreover, to control for noteworthy changes in gender structure, *gender* is also included in the analysis as a binary variable. Recent years have witnessed an increase in women entering educational systems, a trend therefore related to the extent to which academification is taking place.

The workification of resurgent cities is connected with attachment to the population's labour market, occupation therefore being defined as a person's main occupation at the time. *Occupation* is categorized into four groups: employed, unemployed, student or retired.

Lastly, to measure economic inequality and determine how this has developed, the analysis takes into account both the *gross income* and the *disposable income* of all individuals in a given year. Gross income is the person's total income, while disposal income is the amount left over after taxes, interest payments and other charges. Both gross and disposal income is deflated to the 2014 level as a base line to allow for comparison across the period. Individuals with no or negative gross or disposable incomes are excluded from the sample.

Initially in the analysis, we sample all individuals who were living in the Greater Copenhagen area annually throughout the whole period. We are primarily interested in the central part of the city and distinguish between the central municipalities, Copenhagen and Frederiksberg, and the suburban municipalities surrounding the city centre, the Tram city municipalities (see Figure 1). The last part of the analysis follows people across time by tracking those living in Copenhagen who complete an education at time t_1 and see the location of their residence and workplace in time t_{1+5}. In this way, the location histories of individuals living in Copenhagen and the Tram city municipalities are followed in the five years subsequent to the completion of their education to see whether people stay longer in the city at the end of the period in question compared to early in the period.

Figure 1. Map of Copenhagen city plus Frederiksberg, Tram city municipalities and the rest of the Metropolitan area



Transformation of Copenhagen

This section describes how the city of Copenhagen has developed in respect of youthification, academification and workification by focusing on the changes to these aspects from 1992 to 2017 and by comparing this development to that of the Tram city municipalities. While youthification covers all the city's residents, academification and workification will primarily focus solely on young adults, as previously noted. First, however, we will briefly describe the resurgence of the Copenhagen city region.

With the rise of a service and knowledge economy, the Copenhagen city region has witnessed the emergence of new competitive industries and new job opportunities since the 1990s. This included strong growth in the number of highly skilled jobs mainly occupied by people with a university degree (Hansen and Winther 2014, 2015), meaning that Copenhagen's recovery resembles instances of urban resurgence observed elsewhere (Storper and Manville 2006; Scott 2008a). Copenhagen's growth coincided with discussions of how urban amenities may become a foundation for planning future economic development (Hansen and Winther 2010). However, as Scott (2008b) has pointed out, there is still a strong distinction between the new economy, with its amenities, and the social deprivation that is being produced concurrently and that manifests

itself in the underlying patterns of segregation and spatial polarization rooted in the urban crisis of the 1970s and 1980s (Andersen and Winther 2010). These patterns were strengthened in recent decades in respect of income, education and occupation (Andersen 2005; Engelstoft, Jensen-Butler, et al. 2006; Hansen and Winther 2010). This development is contrasted with contemporary urban renewal, regeneration and gentrification processes (Larsen and Hansen 2008), which have been launched to encourage families and middle- and high-income groups to remain in the city.

The city has become younger

The population of the City of Copenhagen became younger on average between 1992 and 2017, as shown in Table 1. The average age of residents of the City of Copenhagen fell by nearly five years, from 40.3 years in 1992 to 35.9 years in 2017, while the average age of residents of the surrounding municipalities remained the same at 40.2 years. It is primarily the share of children and young people under twenty years of age that has increased, while the share of young adults between the ages of 20 and 29 remained constant within the period. However, the absolute number of young adults has increased, as the total number of residents in the city grew by over 150,000 in this period. Thus, young adults are still the largest age group in Copenhagen, accounting for nearly one in four of those residing in the city.

Table 1. Changes in gender and age between 1992 and 2017.

	Copenhagen + Tram city		**Copenhagen City**		**Tram City**	
	1992	*2017*	*1992*	*2017*	*1992*	*2017*
Women	0.527	0.512***	0.530	0.511***	0.521	0.513***
	(0.499)	(0.500)	(0.499)	(0.500)	(0.500)	(0.500)
Age	40.545	37.2***	40.748	35.9***	40.140	40.3
	(22.900)	(21.8)	(23.055)	(20.8)	(22.582)	(23.7)
Age 0-9	0.090	0.118***	0.082	0.115***	0.106	0.124***
	(0.286)	(0.322)	(0.275)	(0.319)	(0.307)	(0.330)
Age 10-19	0.087	0.093***	0.074	0.080***	0.112	0.124***
	(0.281)	(0.291)	(0.261)	(0.272)	(0.316)	(0.330)
Age 20-29	0.201	0.203	0.235	0.240	0.132	0.117***
	(0.400)	(0.402)	(0.424)	(0.427)	(0.338)	(0.321)
Age 30-39	0.149	0.165***	0.151	0.185***	0.146	0.121***
	(0.356)	(0.372)	(0.358)	(0.388)	(0.353)	(0.326)
Age 40-49	0.134	0.135	0.124	0.131***	0.154	0.144***
	(0.341)	(0.342)	(0.330)	(0.338)	(0.361)	(0.351)
Age 50-64	0.143	0.159***	0.128	0.142***	0.174	0.198***
	(0.350)	(0.366)	(0.334)	(0.349)	(0.379)	(0.398)
Age 65+	0.196	0.127***	0.206	0.107***	0.176	0.173***
	(0.397)	(0.333)	(0.404)	(0.309)	(0.381)	(0.378)
Observations	816,222	1,004,089	542,755	699,268	273,467	304,821

Notes: standard errors are in parentheses; ****, ***, **, * indicate that estimates are significantly different from zero at the 0.1%, 1%, 5% and 10% levels respectively.

Two other interesting aspects can be discerned from Table 1. First, the share of residents aged 65 and above nearly halved from 1992 to 2017. This is noteworthy given that the average age in Denmark increased significantly during the 25-year period (Statistics Denmark 2018). Second, the ratio between men and women stayed close to constant, although the proportion of women fell by a small but significant margin.

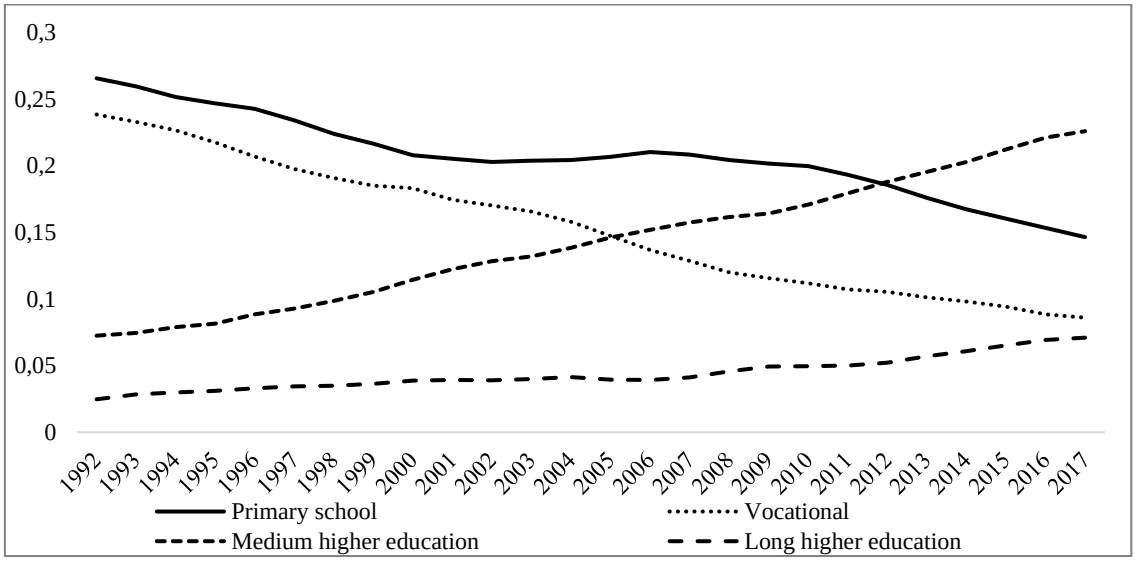
The knowledgeable and educated city

This brings us to the academification and workification of the city of Copenhagen, in which we will mainly focus on the group of young adults between 20 and 29 years of age.

Along with the growing focus on the connection between the high stock of human capital and the increasing competitiveness of urban areas, the labour market has also been transformed in the direction of a demand for more documentation of labour-force qualifications. The more theoretical types of education in particular, such as medium and long-cycle education, have witnessed a significant increase in the number of students in many northern European countries

(Boschma and Fritsch 2009). This is also the case for young adults in Copenhagen (see Figure 1). Figure 1 shows how the share of young adults with either primary school or vocational education fell steadily over the 25-year period, while conversely the trend towards longer-cycle education increased throughout the period (see Appendix 1 for a table showing the respective shares in 1992 and 2017). The share of people living in Copenhagen with only primary school as their highest achieved education nearly halved and the share of those with a vocational education fell by almost two-thirds, while the share of people with medium or long-cycle education tripled. This shows that the City of Copenhagen has experienced the same academification of younger residents as seen in other metropolitan areas in Europe and the U.S. (Glaeser and Saiz 2004; Bacolod et al. 2009; Brinkman 2015). The same trend towards academification is also seen in the Tram city municipalities surrounding Copenhagen, though not to as great an extent as within the city of Copenhagen. The same trend is found when we look instead at all adults above twenty years of age living in either Copenhagen or the Tram city municipalities (see Appendix 2). This indicates the existence of an academification process in Copenhagen, both in general among all adults and among young adults as a separate group.

Figure 1. Trends in completed education for 20-29 year olds in the Copenhagen and Frederiksberg municipality.



The affluent city

Turning our attention now to labour-market attachment and income levels among young adults, we find that the share of young adults whose primary occupational status is either employee or student increased significantly between 1992 and 2017 as shown in table 2. During the period, the share of young adults enrolled in educational institutions nearly doubled to 18.8%, while the share of young adults working in a full-time job increased by almost 6% to account for nearly

three-quarters of all young adults living in Copenhagen in 2017. Correspondingly, the share of young adults who are neither employed nor actively enrolled in an educational institution fell by two thirds in the same period, going from one in five being unemployed in 1992 to one in sixteen in 2017 or from 20.5% to 6.2% in employment.

This transformation towards a larger attachment to the labour market on the part of young adults in Copenhagen is more pronounced than in the surrounding municipalities. This developmental emphasis shows that a workification process was also going on within the City of Copenhagen in particular. Thus, close to 94% of all young adults living in the city were either working actively in their main occupation or enrolled in an educational programme in 2017 compared to 79% in 1992.

Table 2. Changes in employment and income between 1992 and 2017 for 20 to 29 year olds.

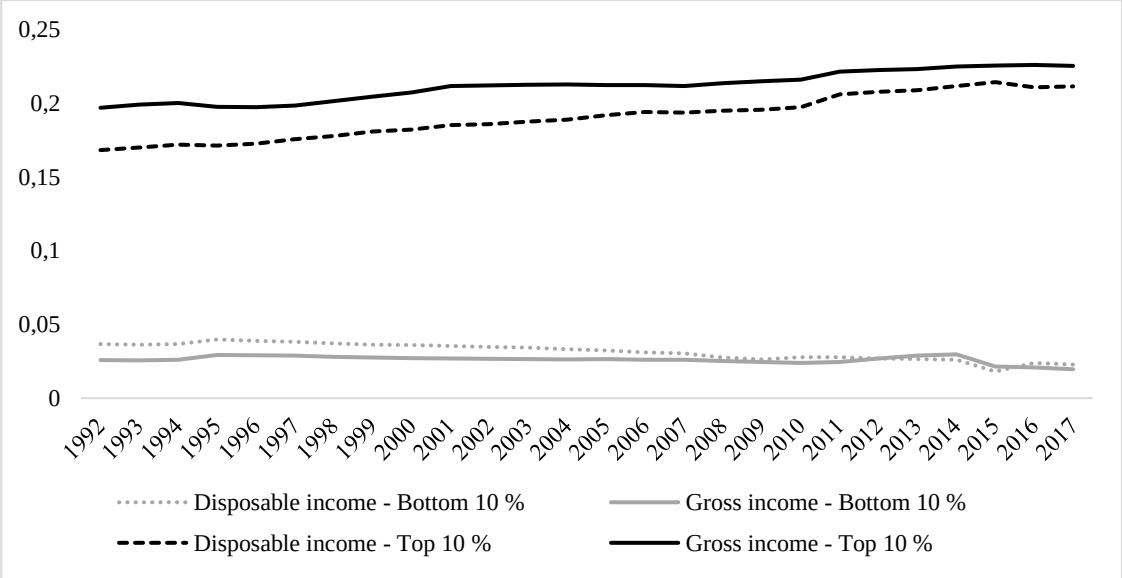
	Copenhagen + Tram city		**Copenhagen City**		**Tram City**	
	1992	*2017*	*1992*	*2017*	*1992*	*2017*
Employed	0.701	0.745***	0.689	0.748***	0.742	0.731
	(0.458)	(0.436)	(0.463)	(0.434)	(0.438)	(0.443)
Student	0.094	0.185***	0.101	0.188***	0.071	0.169***
	(0.292)	(0.388)	(0.302)	(0.391)	(0.256)	(0.375)
Retired	0.005	0.003***	0.004	0.003***	0.006	0.007
	(0.068)	(0.057)	(0.065)	(0.050)	(0.077)	(0.082)
Unemployed	0.200	0.067***	0.205	0.062***	0.182	0.093***
	(0.400)	(0.250)	(0.404)	(0.241)	(0.386)	(0.290)
Disposable income	122,444	135,212***	120,374	135,928***	129,760	131,853
	(48,394)	(74,337)	(48,052)	(73,890)	(48,885)	(76,311)
Gross income	206,092	190,817***	201,890	192,005***	220,942	185,238***
	(106,620)	(116,401)	(105,873)	(116,071)	(107,918)	(117,779)
Observations	163,676	201,760	127,580	166,597	36,096	35,163

Notes: Both disposable and gross incomes have been deflated to a 2014 income level in order to provide a better comparison. Standard errors are in parentheses; ****, ***, **, * indicate that estimates are significantly different from zero at the 0.1%, 1%, 5% and 10% levels respectively.

Another indication of the existence of a workification process is that disposable income went up for young adults living in Copenhagen during the period, and in 2017 being higher than the surrounding Tram city municipalities, whereas this was not the case in 1992. This also applies to gross income, although the average gross income for young adults fell during the period. Declining gross income is also seen for young adults living in the surrounding Tram city municipalities and for young adults nationally (see Appendix 3).

However, we also see the first signs of a greater socioeconomic divide within the group of young adults living in the city of Copenhagen. In Figure 2, for the 20 to 29 year olds in the top 90%, the gross income margin increased from 20% of the total share of gross income in 1992 to 22.5% in 2017. For the 20 to 29 year olds in the bottom 10%, the gross income margin in the same period decreased from 2.5% of the total gross income in 1992 to just under 2% in 2017, equivalent to a 20% decrease. Similarly, when looking at disposable income, the group with the top 90-% gross income margin went from having 17% of disposable income in 1992 to 21% in 2017, while the group with the bottom 10% gross income margin went from having 3.5% of the total share of disposable income to just about 2% in the same period.

Figure 2. Trends in the proportion of total income in the top and bottom 10 % for the 20 to 29-year-olds.



Resurgent contrasts of young adults

To dig further into the socioeconomic divide among young adults living in Copenhagen, this section explores the relationship between place of residence and workplace and shows how it has changed from 1992 to 2017. First, however, we consider another resurgent contrast within the group of young adults by reproducing Table 2 divided by highest completed education.

When we divide the population along educational lines, as is shown in Table 3, all groups, the only exception being those with a medium-cycle education, saw a rise in the share in employment from 1992 to 2017. Furthermore, Table 3 shows that across all education groups the share of young adults who are neither working nor enrolled in an educational institution as their primary activity decreased significantly from 1992 to 2017. However, while the share of unemployed for most groups fell to under 10%, the group with only a primary school education still had 18% unemployed in 2017, while those closest to this group are those with medium-cycle

and vocational education at 8% and 7.5% respectively. This indicates that, although better compared to 1992, young adults without further education beyond primary school were still among the most vulnerable on the labour market in 2017.

The same trend is seen when we look at disposable income, as the group with only a primary school education is the only one to have seen a decline in average disposable incomes between 1992 and 2017. Looking instead at gross incomes, this picture does become less clear, as half of all educational groups saw a decline in their average gross incomes, while the other half saw either an increase or no significant increase between 1992 and 2017. This can mainly be explained by the fact that those groups that saw a decline in their gross incomes are also those with the highest share of young adults enrolled in an educational institution. Those who have seen a significant or insignificant increase in their average gross incomes are also those with the highest share of young adults who were working as their primary activity.

Table 3. Changes in employment and income between 1992 and 2017 for the 20 to 29-year-olds divided educational background

	Primary school		**High School**		**Vocational education**		**Short-cycle higher education**		**Medium-cycle higher education**		**Long-cycle higher education**	
	1992	*2017*	*1992*	*2017*	*1992*	*2017*	*1992*	*2017*	*1992*	*2017*	*1992*	*2017*
Employed	0.588	0.622***	0.683	0.750***	0.820	0.848**	0.773	0.837***	0.859	0.784***	0.892	0.945***
	(0.492)	(0.485)	(0.465)	(0.433)	(0.384)	(0.359)	(0.419)	(0.369)	(0.348)	(0.412)	(0.310)	(0.229)
Student	0.047	0.178**	0.204	0.229***	0.024	0.077**	0.073	0.103**	0.050	0.136**	0.006	0.008
	(0.211)	(0.382)	(0.403)	(0.420)	(0.153)	(0.266)	(0.260)	(0.304)	(0.217)	(0.343)	(0.078)	(0.087)
Retired	0.013	0.020***	0.001	0.000***	0.001	0.000***	0.001	0.000***	0.000	0.000	0.000	0.000
	(0.112)	(0.142)	(0.027)	(0.013)	(0.036)	(0.013)	(0.028)	(0.015)	(0.011)	(0.000)	(0.018)	(0.000)
Unemployed	0.353	0.180**	0.112	0.021***	0.155	0.075**	0.153	0.060**	0.092	0.080***	0.101	0.048***
	(0.478)	(0.384)	(0.316)	(0.144)	(0.362)	(0.264)	(0.360)	(0.237)	(0.289)	(0.271)	(0.302)	(0.214)
Disposable income	117,952	107,641***	100,242	113,087***	148,709	181,110**	138,453	168,548***	152,906	160,424**	178,437	245,139**
	(42,877)	(61,741)	(42,474)	(48,695)	(39,837)	(67,937)	(49,541)	(73,544)	(48,686)	(71,367)	(44,379)	(70,516)
Gross income	185,974	146,457***	159,203	153,670***	266,426	265,713	241,772	243,904***	281,460	228,690***	347,351	368,821**
	(91,017)	(95,099)	(91,406)	(76,732)	(90,469)	(110,322)	(109,110)	(116,794)	(111,820)	(114,332)	(104,965)	(105,255)
Observations	31,866	20,330	45,235	60,897	28,606	11,934	2,572	4,441	8,693	31,370	2,967	9,854

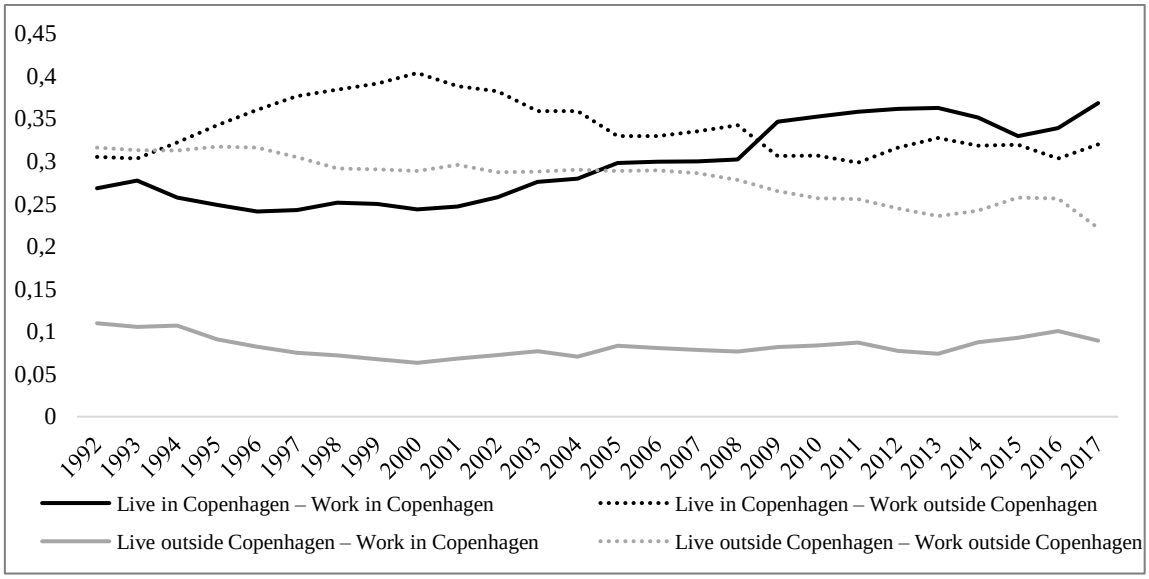
Notes: Both disposable and gross income have been deflated to a 2014 income level in order to provide a better comparison. Standard errors are in parentheses; ****, ***, **, * indicate that estimates are significantly different from zero at the 0.1%, 1%, 5% and 10% levels respectively.

Residence and workplace location five years after completed education

The general trend in Figure 1 shows that the level of education of young adults living in Copenhagen increased during the period. The question thus becomes whether young adults remain in the city after completing their education. This section explores this question by analysing the location of the residences and workplaces of young adults five years after completing their education.

Figure 3 displays the overall relationship between living and working in and outside Copenhagen five years after graduation for all young adults. Three main trends can be seen. First, there is an increasing share of people both living and working in Copenhagen five years after completing their education This trend has been clear since 2001 and distinct since the financial crisis of 2008. This indicates that newly educated people today stay in the city for longer periods of time compared to earlier. Second, the period witnessed a decline in people living and working outside Copenhagen after graduation, a trend that became particularly apparent after the financial crisis of 2008. Third, the share of people living in Copenhagen and working outside the city fell at the beginning of the millennium before stabilizing after the financial crisis of 2008, indicating that there is now a better match between living in and working in Copenhagen. These trends show that young adults are on average staying longer in the city after completing their education and are also more likely to be employed in Copenhagen. Even when dividing up the area outside Copenhagen between the Tram city municipalities and the other municipalities, the picture remains the same, with only a small rise in the proportion living in Copenhagen and working in the Tram city municipalities, though they still constitute a very small share of the whole group, (see Appendix 4).

Figure 3. Trends in residential and workplace location five years after completing education for the 20 to 29-year-olds.



In the final part of this analysis, we will focus on these trends for two educational groups, young adults who have completed a vocational training programme, and those who have acquired a long-cycle academic qualification. The aim of this exercise is to improve understanding of the development patterns within different educational groups.

First, we look at those young adults who completed a vocational training programme five years prior to 1992 and 2017. This is shown in Table 4 which, although suggesting the same trends as Figure 3, also reveals other important aspects that need to be highlighted. First, even though the group who live and work in Copenhagen saw a small but significant increase, it was still significantly below the general trend shown in Figure 3. Second, the same applies to those living and working outside the city, as, although this group saw a decrease in its size, it was still well above the average share for the total of young adults in 2017. Finally, the results show that the proportion living in Copenhagen but working outside of the city witnessed a small increase.

Comparing the incomes for young adults with a vocational education from 1992 to 2017, it is apparent that both the gross and disposal incomes increased during this period. Furthermore, the average age of the group increased by approximately one year, though the proportion of females in the category fell more for those living within Copenhagen compared to those living outside it. We also investigated whether these results would change if we divided up the area outside Copenhagen between the Tram city municipalities and the other municipalities outside the city. The results, presented in Appendix 5, show that this division does not alter the overall picture presented in Table 4.

Table 4. Residential and workplace location five years after graduation in 1992 and 2017 for vocational education

	Live in Copenhagen – Work in Copenhagen		**Live in Copenhagen – Work outside Copenhagen**		**Live outside Copenhagen – Work in Copenhagen**		**Live outside Copenhagen – Work outside Copenhagen**	
	1992	2017	1992	2017	1992	2017	1992	2017
Gender (Female)	0.538	0.519	0.399	0.360	0.588	0.539	0.450	0.437
	(0.499)	(0.500)	(0.490)	(0.480)	(0.493)	(0.499)	(0.498)	(0.496)
Age	25.295	26.128***	25.199	26.05***	25.324	26.15***	25.127	26.128***
	(1.485)	(1.598)	(1.502)	(1.608)	(1.559)	(1.751)	(1.503)	(1.670)
Gross income	285,735	278,698	288,508	294,304	293,977	300,012	289,279	306,421***
	(69,457)	(96,765)	(81,171)	(109,264)	(64,541)	(95,818)	(77,586)	(102,787)
Disposable income	155,400	188,718***	158,518	198,729***	163,277	205,262***	160,834	210,974***
	(31,100)	(60,377)	(36,339)	(67,428)	(29,028)	(60,950)	(35,321)	(65,738)
Group share	0.256	0.284**	0.292	0.314*	0.130	0.103***	0.322	0.299*
	(0.436)	(0.451)	(0.455)	(0.464)	(0.336)	(0.305)	(0.467)	(0.458)
Observations	1,637	732	1,867	812	830	267	2,061	771

Note: Disposable and gross income have been deflated to a 2014 income level. Standard errors in parentheses.

To put this development into context, in Table 5 we focus instead on young adults who have graduated with a long-cycle academic degree. As in Table 4 the focus is on the relationship between place of residence and workplace location for young adults five years after obtaining their degree.

The first thing to note is that the group of young adults who have completed a long-cycle academic education quadrupled from 1992 and 2017, underlining the very prominent academification that took place in this group. Secondly, the share of those who were both living and working in Copenhagen five years after completing a long-cycle education increased by 18 percentage points or almost 60% between 1992 and 2017. In 2017, this group constituted nearly half of all young adults who had completed a long-cycle academic education five years earlier. Thirdly, while the share of young adults with a long-cycle academic education who live outside Copenhagen but work inside the city nearly halved, the largest decrease was found in the group who were both living and working outside Copenhagen five years after completing their academic education. The share of young adults with a long-cycle academic education who constitute this group decreased by about two-thirds between 1992 and 2017.

Another interesting result from Table 5 is that the gross incomes of young adults who completed a long-cycle academic education fell, while disposal incomes increased within the period.

As for those with a vocational education, for those with a long-cycle academic education we divide up the area outside Copenhagen between the Tram city municipalities and the other municipalities outside Copenhagen, as presented in Appendix 6. Although we found nearly the same results as in Table 5 it provided a degree of elaboration of some of the results. Most noteworthy is the fact that the explanation for the slight but not significant increase in the share of 20 to 29 year olds who, five years after completing a long-cycle academic education, were still living in Copenhagen but working outside the city is to be found in the share of young adults who were working in the Tram city municipalities in that period.

Table 5. Residential and workplace location 5 year after graduation in 1992 & 2017 for academic education

	Live in Copenhagen – Work in Copenhagen		**Live in Copenhagen – Work outside Copenhagen**		**Live outside Copenhagen – Work in Copenhagen**		**Live outside Copenhagen – Work outside Copenhagen**	
	1992	2017	1992	2017	1992	2017	1992	2017
Gender (Female)	0.314	0.556***	0.309	0.552***	0.361	0.617***	0.341	0.545***
	(0.466)	(0.497)	(0.463)	(0.498)	(0.484)	(0.488)	(0.475)	(0.499)
Age	27.863	28.07*	27.943	28.100	28.264	28.162	28.012	28.272**
	(1.146)	(0.915)	(1.034)	(0.905)	(0.919)	(0.978)	(1.023)	(0.889)
Gross income	345,433	317,527	357,814	326,475**	388,766	348,204**	380,628	358,130
	(117,813)	(121,288)	(129,599)	(129,212)	(84,458)	(117,793)	(114,560)	(122,382)
Disposable income	178,554	215,473***	180,344	224,75***	195,660	240,039***	195,976	248,825***
	(52,842)	(76,602)	(51.305)	(81.879)	(36.232)	(77.474)	(48.705)	(75.759)
Group share	0.285	0.485***	0.316	0.344	0.117	0.066***	0.282	0.105***
	(0.452)	(0.500)	(0.465)	(0.475)	(0.322)	(0.248)	(0.450)	(0.307)
Observations	175	1,233	194	873	72	167	173	268

Note: Disposable and gross income have been deflated to a 2014 income level. Standard errors in parentheses.

To sum up this section, we can identify a higher share of young adults staying in the city five years after completing an education, no matter whether that education was vocational or academic. However, the increase in young adults with a long-cycle academic education who were both living and working in Copenhagen greatly outweighed the increase in young adults with a vocational education who were doing so. Likewise, the share of those with an academic education increased dramatically, testifying to the fact that the city became both more educated and more employed between 1992 and 2017.

Discussion and conclusion

This study has examined how the resurgence of cities has influenced distinctions internal to the socioeconomic structures by investigating changing developments in the three aspects of demography, education and employment over two and a half decades in Copenhagen.

Literature on the resurgence of cities has uncovered a process of youthification in which young adults especially concentrate in urban areas (Moos 2016; Revington 2015, 2018; Moos et al. 2019; Bereitschaft 2020). The same pattern is found in Copenhagen, where the average age of residents fell from 1992 to 2017, though this was not the case in the Tram city municipalities surrounding the city. The analysis shows that the group of young adults between 20 and 29 years of age living in the city increased in absolute terms between 1992 and 2017, while the total share of the group remained the same. The constant share of young adults is surprising given that the number of people attending higher education increased. The explanation for the youthification of the city is to be found instead in the increase of the number of children together with the decrease in senior within the city. This is likely to be the result of more families choosing to stay in the city even after having children, as opposed to earlier periods, when they would be more likely to move to the Tram city municipalities. Another possible explanation is the decline in the size of the large baby-boomer generation.

Alongside the process of youthification, an academification of both the workforce and workplaces within the city also took place (Florida 2002b; Wojan et al. 2007; Andersen et al. 2010; Clifton 2008; Hansen and Winther 2010, 2015). This inevitably led to a larger share of young adults with an academic education residing in the city, as they were in the midst of their formal education or training when this process first took off. The relevant literature stresses that the process of academification tends to be followed by increasing residential prices and living costs in the city (Storper and Scott 2009; Rauch 1993; Glaeser 2020; Florida 2017; Bereitschaft 2020; Moos et al. 2019), this also being the case in this study. Between 1992 and 2017, the academification of young adults living in Copenhagen increased. The share of residents between the ages of 20 and 29 with a medium- or long-cycle education tripled within the same period, while the share with a vocational education fell by two-thirds. The same trend was found for all residents above the age of twenty, as almost one in four residents have a long cycle academic education in 2017, while in 1992 that was only about one in ten, while half of all the residents have either a university or college education in 2017.

Together with the youthification and academification, a process of workification has also been identified in the relevant literature, as young people with high levels of human capital choose to stay in the city and enjoy the urban amenities while entering the job market, as the resurgent

cities offer diverse and thick labour markets (Lorenzen and Andersen 2009; Mellander and Florida 2014; Musterd 2006; Cheshire 2006; Buch et al. 2014). We showed that there was a significant drop in young adults outside the labour market from 1992 to 2017: whereas about one in five did not have a job, nor were engaged in an educational program in 1992, that number had dropped to one in sixteen by 2017. This development was especially evident for young adults with a long-cycle academic education and less so for those not having completed any form of higher education.

In order to explore further how the city has been transformed in light of the processes of academification and workification, we investigated some of the contrasts found within the group of young adults. By dividing up the group who have completed their education, our results showed that those with little or no tertiary educational training especially did not experience the same income benefits as the remaining groups. Finally, we showed that an increasing share of young adults lived and worked in Copenhagen five years after completing their education in 2017 compared to 1992. Furthermore, the analysis showed that this was especially the case for the group of young adults with a university degree, close to half of whom were both living and working in Copenhagen five years after completing their education compared to only a quarter of those with a vocational education. In addition, over 80% of young adults with a university degree were still living in Copenhagen five years after completing their education, while only 60% of young adults with a vocational education were doing so. The paper thus provides evidence for the youthification and academification of Copenhagen and reveals some socioeconomic distinctions even within the group of young adults.

As the relevant literature also indicates, one reason for this development is the increasing academification and professionalization of many occupations (Bereitschaft 2020; Crankshaw and Borel-Saladin 2014; Ginzberg 1979; Atkinson 2000; Hamnett 1994). The increasing demand for workers' qualifications, even at entry-level positions, has meant that more people are seeking higher education in order to gain an advantage on the labour market. This is of course especially true for young people with little or no work experience. Furthermore, several highly skilled jobs have emerged in or relocated to Copenhagen, partly due to certain policies introduced in the 1990s and 2000s, and partly in order to benefit from the derived effects from knowledge spillover due to the increasing agglomerations of high-skill firms in the city (Majoor 2008; Hansen and Winther 2014, 2015; Bothe et al. 2018; Kristensen 2001; Hansen et al. 2001).

The implications of these processes, most notably academification, are, among others, increasing housing costs, as the more economically resourceful become attracted to the city. This leads to an increase in the demand for accommodation within the city, the supply of available

residences remaining stable, which in turn causes housing costs to increase. However, this also means that those without the economic resources to buy a place of residence are finding it increasingly difficult to access affordable accommodation in the city. This can potentially increase the degree of social segregation in the city, where those without the necessary economic resources are left with still fewer places where they can afford to live. This in its turn may create what Florida and Adler (2018) have called 'the patchwork metropolis' made up of small enclaves of affordable neighbourhoods surrounded by gentrified areas like a patchwork rug. The youthification of Copenhagen has further enhanced this process, as newly educated young adults start at the bottom of the wage ladder, especially if they have a level of education that does not provide them with above-average pay. The relevant questions are therefore whether the youthification of the city will also lead to the development of a patchwork city caused by segregation of the population by age, and whether better educated young adults will take up the space previously occupied by those with less human and economic capital, thus leaving even fewer areas for the latter group to live in.

References

Abel, Jaison R, and Richard Deitz. 2012: Do colleges and universities increase their region's human capital? Journal of Economic Geography 12(3), 667–91.

Ahlin, Lina, Martin Andersson, and Per Thulin. 2018: Human capital sorting: The "when" and "who" of the sorting of educated workers to urban regions Journal of Regional Science 58(3), 581–610.

Andersen, Hans Skifter. 2005: *Den sociale og etniske udvikling i almene boligafdelinger*. SBI-rapport 2005:10. Hørsholm: SBI.

Andersen, Hans Thor, and Lars Winther. 2010: Crisis in the Resurgent City? The Rise of Copenhagen International Journal of Urban and Regional Research 34(3), 693–700.

Andersen, Kristina Vaarst, Markus M Bugge, Høgni Kalsø Hansen, Arne Isaksen, and Mika Raunio. 2010: One Size Fits All? Applying the Creative Class Thesis onto a Nordic Context European Planning Studies 18(10), 1591–1609.

Atkinson, Rowland. 2000: Professionalization and displacement in Greater London Area 32(3), 287–95.

Bacolod, Marigee, Bernardo S Blum, and William C Strange. 2009: Skills in the city Journal of Urban Economics 65(2), 136–53.

Berck, Peter, Sofia Tano, and Olle Westerlund. 2016: Regional Sorting of Human Capital: The Choice of Location among Young Adults in Sweden Regional Studies 50(5), 757–70.

Bereitschaft, Bradley. 2020: Gentrification central: A change-based typology of the American urban core, 2000–2015 Applied Geography 118, 102206.

Black, Duncan, and Vernon Henderson. 1999: A Theory of Urban Growth Journal of Political Economy 107(2), 252–84.

Boschma, Ron A, and Michael Fritsch. 2009: Creative Class and Regional Growth: Empirical Evidence from Seven European Countries Economic Geography 85(4), 391–423.

Bothe, Kristian, Høgni Kalsø Hansen, and Lars Winther. 2018: Spatial restructuring and uneven intra-urban employment growth in metro- and non-metro-served areas in Copenhagen Journal of Transport Geography 70(C), 21–30.

Brinkman, Jeffrey. 2015: Big cities and the highly educated: what's the connection Business Review(Q3), 10–15.

Buch, Tanja, Silke Hamann, Annekatrin Niebuhr, and Anja Rossen. 2014: What Makes Cities Attractive? The Determinants of Urban Labour Migration in Germany Urban Studies 51(9), 1960–78.

Cheshire, Paul C. 2006: Resurgent Cities, Urban Myths and Policy Hubris: What We Need to Know Urban Studies 43(8), 1231–46.

Clifton, Nick. 2008: The "creative class" in the uk: an initial analysis Geografiska Annaler: Series B, Human Geography 90(1), 63–82.

Clifton, Nick, Phil Cooke, and Høgni Kalsø Hansen. 2013: Towards a Reconciliation of the 'Context-less' with the 'Space-less'? The Creative Class across Varieties of Capitalism: New Evidence from Sweden and the UK Regional Studies 47(2), 201–15.

Costa, Dora L, and Matthew E Kahn. 2000: Power Couples: Changes in the Locational Choice of the College Educated, 1940-1990 The Quarterly Journal of Economics 115(4), 1287–1315.

Crankshaw, Owen, and Jacqueline Borel-Saladin. 2014: Does deindustrialisation cause social polarisation in global cities? Environment and Planning A 46(8), 1852–72.

Cuaresma, Jesús Crespo, Gernot Doppelhofer, Florian Huber, and Philipp Piribauer. 2018: Human capital accumulation and long-term income growth projections for European regions Journal of Regional Science 58(1), 81–99.

Drucker, Joshua, and Harvey Goldstein. 2007: Assessing the Regional Economic Development Impacts of Universities: A Review of Current Approaches International Regional Science Review 30(1), 20–46.

Dustmann, Christian, Bernd Fitzenberger, Uta Schönberg, and Alexandra Spitz-Oener. 2014: From Sick Man of Europe to Economic Superstar: Germany's Resurgent Economy Journal of Economic Perspectives 28(1), 167–88.

Engelstoft, Sten, Høgni Kalsø Hansen, and Lars Winther. 2006: Den porøse storby: sammenhænge i bylandskabet . Juni, 6.

Engelstoft, Sten, Chris Jensen-Butler, Ian Smith, and Lars Winther. 2006: Industrial clusters in Denmark: Theory and empirical evidence Papers in Regional Science 85(1), 73–97.

Florida, R. 2002a: The economic geography of talent Annals of the Association of American Geographers 92(4), 743–55.

Florida, Richard. 2002b: *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life*. Basic Books.

Florida, Richard. 2017: *The New Urban Crisis: Gentrification, Housing Bubbles, Growing Inequality, and What We Can Do about It*. London, UNITED KINGDOM: Oneworld Publications.

Florida, Richard, and Patrick Adler. 2018: The patchwork metropolis: The morphology of the divided postindustrial city Journal of Urban Affairs 40(5), 609–24.

Ginzberg, Eli. 1979: The Professionalization of the U.S. Labor Force Scientific American 240(3), 48–53.

Glaeser, Edward L. 2012: The challenge of urban policy Journal of Policy Analysis and Management 31(1), 111–22.

Florida, Richard. 2020: *Urbanization and its Discontents*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Glaeser, Edward L, and Joshua D Gottlieb. 2006: Urban Resurgence and the Consumer City Urban Studies 43(8), 1275–99.

Glaeser, Edward L, Hedi D Kallal, José A Scheinkman, and Andrei Shleifer. 1992: Growth in Cities Journal of Political Economy 100(6), 1126–52.

Glaeser, Edward L, and Albert Saiz. 2004: The Rise of the Skilled City Brookings-Wharton Papers on Urban Affairs 2004, 47–105.

Goix, Renaud Le. 2005: Gated Communities: Sprawl and Social Segregation in Southern California Housing Studies 20(2), 323–43.

Gordon, Ian. 2004: The resurgent city: what, where, how and for whom? Planning Theory & Practice 5(3), 371–79.

Haase, Annegret, Sigrun Kabisch, Annett Steinführer, Stefan Bouzarovski, Ray Hall, and Philip Ogden. 2010: Emergent spaces of reurbanisation: exploring the demographic dimension of inner-city residential change in a European setting Population, Space and Place 16(5), 443–63.

Hamnett, Chris. 1994: Socio-Economic Change in London: Professionalization not Polarization Built Environment (1978-) 20(3), 192–203.

Hansen, AL, HT Andersen, and E Clark. 2001: Creative Copenhagen: Globalization, urban governance and social change European Planning Studies 9(7), 851–69.

Hansen, Høgni Kalsø, and Lars Winther. 2010: The Spatial Division of Talent in the City: Location Dynamics of Business Services in Copenhagen Tijdschrift voor Economische en Sociale Geografie 101(1), 55–72.

Hansen, Høgni Kalsø, and Lars Winther. 2014: Regional development and the impact of the public sector in Denmark: employment growth and human capital Geografisk Tidsskrift-Danish Journal of Geography 114(2), 156–68.

Hansen, Høgni Kalsø, and Lars Winther. 2015: Employment growth, human capital and educational levels: uneven urban and regional development in Denmark 2002–2012 Geografisk Tidsskrift-Danish Journal of Geography 0(0), 1–14.

Harsman, Bjorn. 2006: Ethnic Diversity and Spatial Segregation in the Stockholm Region Urban Studies 43(8), 1341–64.

Høst, Anders Kamp, and Lars Winther. 2019: Job polarization in the new economy in Danish cities: location, size, and the role of the public sector European Planning Studies 27(9), 1661–86.

Kristensen, Hans. 2001: Urban policies and programmes against social exclusion and fragmentation: Danish experiences , Governing European Cities: Social Fragmentation, Social Exclusion and Urban. Aldershot: Ashgate.

Larsen, Henrik Gutzon, and Anders Lund Hansen. 2008: Gentrification—Gentle or Traumatic? Urban Renewal Policies and Socioeconomic Transformations in Copenhagen Urban Studies 45(12), 2429–48.

Lorenzen, Mark, and Kristina Vaarst Andersen. 2009: Centrality and Creativity: Does Richard Florida's Creative Class Offer New Insights into Urban Hierarchy? Economic Geography 85(4), 363–90.

Majoor, Stan. 2008: Progressive Planning Ideals in a Neo-liberal Context, the Case of Ørestad Copenhagen International Planning Studies 13(2), 101–17.

Mellander, Charlotta, and Richard Florida. 2014: The Rise of Skills: Human Capital, the Creative Class, and Regional Development. In Manfred M. Fischer & Peter Nijkamp (eds.) , Handbook of Regional Science. Berlin, Heidelberg: Springer Berlin Heidelberg, pp. 317–29.

Moos, Markus. 2016: From gentrification to youthification? The increasing importance of young age in delineating high-density living Urban Studies 53(14), 2903–20.

Moos, Markus, Nick Revington, Tristan Wilkin, and Jean Andrey. 2019: The knowledge economy city: Gentrification, studentification and youthification, and their connections to universities Urban Studies 56(6), 1075–92.

Moos, Markus, Robert Walter-Joseph, Mark Williamson, Tristan Wilkin, Wendy Chen, and Dave Stockmal. 2015: Youthification: The new kid on the block Working Paper Series 015-01. University of Waterloo: School of Planning.

Musterd, Sako. 2006: Segregation, Urban Space and the Resurgent City Urban Studies 43(8), 1325–40.

Musterd, Sako, Szymon Marcińczak, Maarten van Ham, and Tiit Tammaru. 2017: Socioeconomic segregation in European capital cities. Increasing separation between poor and rich Urban Geography 38(7), 1062–83.

Rauch, James E. 1993: Productivity Gains from Geographic Concentration of Human Capital: Evidence from the Cities Journal of Urban Economics 34(3), 380–400.

Rérat, Patrick. 2012: The New Demographic Growth of Cities: The Case of Reurbanisation in Switzerland Urban Studies 49(5), 1107–25.

Rérat, Patrick. 2019: The return of cities: the trajectory of Swiss cities from demographic loss to reurbanization European Planning Studies 27(2), 355–76.

Revington, Nick. 2015: North American cities aren't just gentrifying, they're youthifying as well.Unpublished Website USApp - American Politics and Policy Blog.

Revington, Nick. 2018: Pathways and Processes: Reviewing the Role of Young Adults in Urban Structure Professional Geographer 70(1), 1–10.

Rodríguez-Pose, Andrés, and Michael Storper. 2019: *Housing, urban growth and inequalities: the limits to deregulation and upzoning in reducing economic and spatial inequality*. LSE Research Online Documents on Economics. London School of Economics and Political Science, LSE Library.

Scott, Allen J. 2008a: *Social Economy of the Metropolis: Cognitive-Cultural Capitalism and the Global Resurgence of Cities*. Oxford ; New York: Oxford University Press.

Scott, Allen J. 2008b: Resurgent Metropolis: Economy, Society and Urbanization in an Interconnected World International Journal of Urban and Regional Research 32(3), 548–64.

Scott, Allen J, and Michael Storper. 2015: The Nature of Cities: The Scope and Limits of Urban Theory International Journal of Urban and Regional Research 39(1), 1–15.

Song, Y. 2003: New urbanism and housing values: a disaggregate assessment Journal of Urban Economics 54, 218–38.

Statistics Denmark. 2018: *Befolkningens udvikling efter område, bevægelsesart og tid. [The population's development for area, type of movement and time]*. StatBank Denmark. Statistics Denmark.

Storper, Michael, Thomas Kemeny, Taner Osman, and Institutional Research Information Service Makarem Naji. 2015: *The Rise and Fall of Urban Economies*. Post-Print. HAL.

Storper, Michael, and Michael Manville. 2006: Behaviour, Preferences and Cities: Urban Theory and Urban Resurgence Urban Studies 43(8), 1247–74.

Storper, Michael, and Allen J Scott. 2009: Rethinking human capital, creativity and urban growth Journal of Economic Geography 9(2), 147–67.

Storper, Michael, and Allen J Scott. 2016: Current debates in urban theory: A critical assessment Urban Studies 53(6), 1114–36.

Turok, Ivan, and Vlad Mykhnenko. 2008: Resurgent European cities? Urban Research & Practice 1(1), 54–77.

Walks, R, and Richard Maaranen. 2008: Gentrification, Social Mix, and Social Polarization: Testing the Linkages in Large Canadian Cities Urban Geography 29(4), 293–326.

Wojan, Timothy R, Dayton M Lambert, and David A McGranahan. 2007: Emoting with their feet: Bohemian attraction to creative milieu† Journal of Economic Geography 7(6), 711–36.

Appendices

Appendix 1. Changes in highest completed education for young adults between 1992 and 2017.

	Copenhagen + Tram city		**Copenhagen City**		**Tram City**	
	1992	*2017*	*1992*	*2017*	*1992*	*2017*
Primary school	0.276	0.175***	0.266	0.146***	0.314	0.311
	(0.447)	(0.380)	(0.442)	(0.354)	(0.464)	(0.463)
High school	0.352	0.424***	0.377	0.439***	0.266	0.356***
	(0.478)	(0.494)	(0.485)	(0.496)	(0.442)	(0.479)
Vocational	0.257	0.100***	0.239	0.086**	0.319	0.168***
	(0.437)	(0.30)	(0.426)	(0.280)	(0.466)	(0.374)
Short-cycle higher education	0.021	0.031***	0.021	0.032***	0.021	0.029***
	(0.145)	(0.175)	(0.145)	(0.176)	(0.143)	(0.168)
Medium-cycle higher education	0.070	0.204***	0.072	0.226***	0.060	0.101***
	(0.255)	(0.403)	(0.259)	(0.418)	(0.238)	(0.301)
Long-cycle higher education	0.024	0.065***	0.025	0.071***	0.020	0.035***
	(0.152)	(0.246)	(0.155)	(0.257)	(0.139)	(0.184)
Observations	163,676	201,760	127,580	166,597	36,096	35,163

Notes: Standard errors are in parentheses; ****, ***, **, * indicate that estimates are significantly different from zero at the 0.1%, 1%, 5% and 10% levels, respectively.

Appendix 2. Changes in education for all residents above the age of 20 between 1992 and 2017.

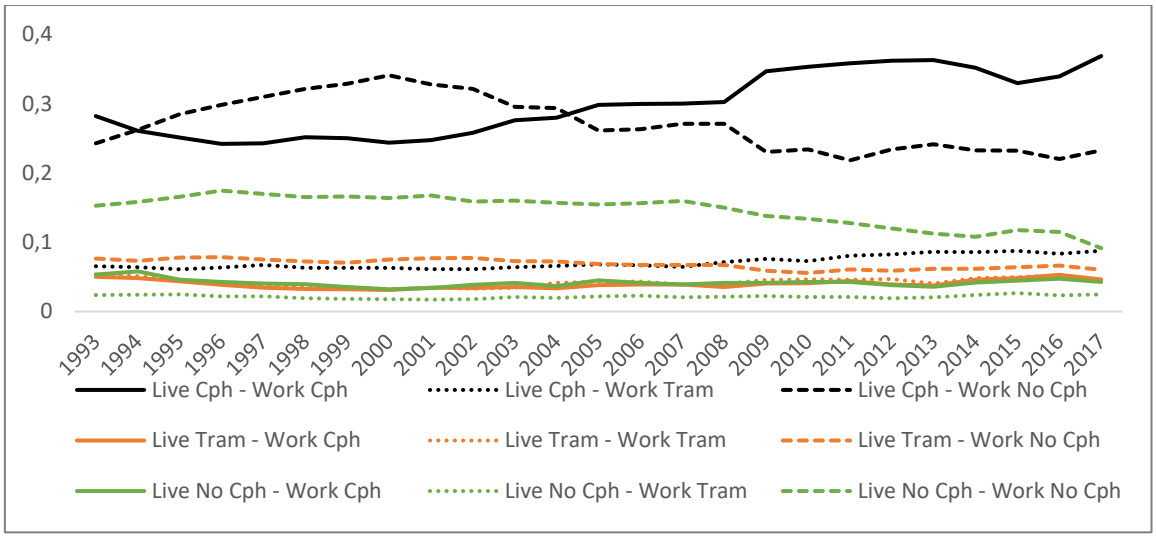
	Copenhagen + Tram city		**Copenhagen City**		**Tram City**	
	1992	*2017*	*1992*	*2017*	*1992*	*2017*
Primary school	0.377	0.172***	0.377	0.160***	0.375	0.199***
	(0.485)	(0.377)	(0.485)	(0.366)	(0.484)	(0.399)
High school	0.132	0.097***	0.160	0.110***	0.078	0.070***
	(0.339)	(0.296)	(0.367)	(0.312)	(0.267)	(0.255)
Vocational	0.299	0.256***	0.272	0.215***	0.350	0.346***
	(0.458)	(0.436)	(0.445)	(0.411)	(0.477)	(0.476)
Short-cycle higher education	0.024	0.045***	0.024	0.044***	0.026	0.048***
	(0.155)	(0.208)	(0.152)	(0.205)	(0.160)	(0.215)
Medium-cycle higher education	0.109	0.229***	0.108	0.249***	0.112	0.184***
	(0.312)	(0.420)	(0.310)	(0.432)	(0.315)	(0.387)
Long-cycle higher education	0.059	0.201***	0.059	0.222***	0.060	0.153***
	(0.236)	(0.401)	(0.235)	(0.416)	(0.237)	(0.360)
Observations	816,222	1,004,089	542,755	699,268	273,467	304,821

Notes: Standard errors are in parentheses; ****, ***, **, * indicate that estimates are significantly different from zero at the 0.1%, 1%, 5% and 10% levels, respectively.

Appendix 3. Disposable and gross incomes for all 20 to 29 year olds in Denmark between 1992 and 2017

	1992	*2017*
Country disposable income	136,617	151,440
Country gross income	136,617	213,816
Observations	797,362	765,439

Appendix 4. Trends in residential and workplace locations five years after completing education among 20 to 29 year olds, showing differences between Tram city municipalities and other areas outside Copenhagen.



Appendix 5. Residential and workplace locations five years after graduation in 1992 and 2017 for vocational education, showing differences between Tram city municipalities and other areas outside Copenhagen

	Gender (Female)		**Age**		**Gross income**		**Disposable income**		**Group share**	
	1992	2017	1992	2017	1992	2017	1992	2017	1992	2017
Cph - Cph	0.533	0.519	25.38	26.13	286,402	278,698	158,140	188,718	0.274	0.284
	(0.499)	(0.500)	(1.52)	(1.60)	(68,910)	(96,765)	(29,282)	(60,377)		
Cph - Tram	0.462	0.389	25.21	26.16	304,889	298,947	164,521	203,510	0.068	0.084
	(0.499)	(0.489)	(1.44)	(1.54)	(71,555)	(103,711)	(31,162)	(65,420)		
Cph - Other	0.400	0.349	25.22	26.01	279,928	292,634	157,064	196,968	0.214	0.231
	(0.490)	(0.477)	(1.47)	(1.63)	(81,226)	(111,231)	(37,697)	(68,122)		
Tram - Cph	0.575	0.500	25.38	26.19	291,797	306,306	163,905	207,599	0.06	0.057
	(0.495)	(0.502)	(1.58)	(1.73)	(56,726)	(93,201)	(26,796)	(60,229)		
Tram - Tram	0.444	0.460	25.14	25.86	295,529	307,269	162,985	208,302	0.056	0.077
	(0.498)	(0.500)	(1.46)	(1.62)	(67,613)	(98,497)	(28,642)	(60,881)		
Tram - Other	0.407	0.340	25.28	26.02	292,196	302,897	161,617	209,780	0.085	0.099
	(0.492)	(0.475)	(1.50)	(1.68)	(81,001)	(109,202)	(35,420)	(71,048)		
Other- Cph	0.559	0.587	25.34	26.11	297,285	292,469	167,877	202,438	0.067	0.047
	(0.497)	(0.494)	(1.45)	(1.78)	(67,648)	(98,723)	(31,515)	(61,944)		
Other - Tram	0.450	0.438	25.23	26.38	299,754	339,698	167,026	232,569	0.026	0.031
	(0.499)	(0.499)	(1.31)	(1.55)	(77,207)	(100,912)	(35,449)	(63,509)		
Other - Other	0.437	0.523	25.22	26.39	284,566	298,423	161,936	207,353	0.149	0.091
	(0.496)	(0.501)	(1.47)	(1.71)	(79,074)	(98,185)	(36,202)	(63,402)		
Observations	5,894	2,582	5,894	2,582	5,894	2,582	5,894	2,582	5,894	2,582

Note: Disposable and gross income have been deflated to a 2014 income level. Standard errors in parentheses.

Appendix 6. Residential and workplace locations five year after graduation in 1992 and 2017 for academic education, showing differences between Tram city municipalities and other areas outside Copenhagen

	Gender (Female)		**Age**		**Gross income**		**Disposable income**		**Group share**	
	1992	2017	1992	2017	1992	2017	1992	2017	1992	2017
Cph – Cph	0.425	0.556	28.13	28.070	369,164	317,527	183,785	215,473	0.308	0.485
	(0.496)	(0.497)	(1.09)	(0.92)	(113,136)	(121,288)	(51,713)	(76,602)		
Cph - Tram	0.314	0.572	28.14	28.14	362,315	357,294	192,664	244,560	0.052	0.096
	(0.471)	(0.496)	(0.88)	(0.92)	(117,238)	(128,115)	(49,425)	(81,740)		
Cph - Other	0.277	0.544	28.06	28.08	354,444	315,240	182,992	217,296	0.280	0.248
	(0.449)	(0.498)	(1.10)	(0.90)	(127,072)	(127,881)	54,349	(80,750)		
Tram - Cph	0.324	0.633	28.27	28.10	398,556	350,376	202,717	241,819	0.051	0.031
	(0.475)	(0.485)	(0.83)	(1.05)	(85,427)	(112,193)	48,511	(74,561)		
Tram - Tram	0.222	0.375	28.22	28.25	456,376	404,088	210,740	276,565	0.013	0.009
	(0.441)	(0.495)	(0.97)	(0.99)	(115,284)	(78,294)	(64,664)	(47,053)		
Tram - Other	0.216	0.547	28.37	28.31	416,472	352,651	212,603	242,369	0.076	0.025
	(0.415)	(0.502)	(0.87)	(0.87)	(109,673)	(138,333)	(45,581)	(84,102)		
Other - Cph	0.356	0.602	28.04	28.22	417,108	346,247	212,797	238,414	0.067	0.035
	(0.484)	(0.492)	(1.00)	(0.92)	(82,709)	(123,286)	(37,460)	(80,474)		
Other - Tram	0.444	0.517	28.33	28.21	425,500	387,733	193,438	262,917	0.013	0.011
	(0.527)	(0.509)	(0.71)	(0.73)	(59,076)	(113,995)	(72,125)	(63,300)		
Other - Other	0.383	0.576	28.26	28.27	390,120	348,513	198,424	245,001	0.140	0.059
	(0.489)	(0.496)	(0.89)	(0.92)	(107,341)	(120,674)	(41,328)	(76,978)		
Observations	672	2,541	672	2,541	672	2,541	672	2541	672	2,541

Note: Disposable and gross income have been deflated to a 2014 income level. Standard errors in parentheses.

Paper 2

Airbnb and residential mobility in Copenhagen, 2008-2016: The impact of home ownership and size of residence

Aske Egsgaard[*], Robert Andersen[†] Lars Pico Geerdsen[‡] and Anders Holm[§]

19 February 2021

Abstract

Using data from Airbnb, Statistics Denmark, and social media data scraped from the internet, we explore the relationship between Airbnb rentals and residential mobility in Copenhagen between 2008 and 2016. Duration models specifying fixed effects for neighbourhood and time demonstrate that Airbnb's presence has triggered fundamental change in mobility patterns. Households in small privately-owned homes have become increasingly more likely to move; this at least partly reflects increasing real estate prices and tourism associated with Airbnb's presence. However, households that own larger homes, and those living in cooperative or rental housing, have been largely unaffected by Airbnb rentals.

[*]Department of Geosciences and Natural Resource Management University of Copenhagen & Department of the Build Environment Aalborg University

[†] Ivey Business School Western University

[‡] Department of the Build Environment Aalborg University

[§] Department of Sociology Western University

Introduction

Founded in 2008, Airbnb became a highly successful international business by 2010. The world's largest short-term accommodation service, it now has a presence in more than 100,000 cities around the world (Airbnb Newsroom 2020). It first entered Copenhagen in 2012 and has grown tremendously since then. Knowledge about how Airbnb's dominance has affected the economy is limited. While there is clear evidence that it has affected the hotel industry (Zervas et al. 2017; Farronato and Fradkin 2018) and housing costs (Barron et al. 2018; Sheppard and Udell 2016; Elíasson and Ragnarsson 2018; Koster et al. 2018; Garcia-López et al. 2020), we have only a tangential understanding of Airbnb's impact on residential mobility (Frenken and Schor 2017).

We contribute to this topic by assessing the housing market in Copenhagen, Denmark from 2008-2016. We seek to answer three general questions. First, does the opportunity that Airbnb presents to supplement household incomes encourage households to remain in their neighbourhood? Alternatively, are households more likely to change residence if Airbnb has a strong presence in their neighbourhood? Finally, do ownership type and residential size interact with Airbnb presence to influence residential mobility?

Copenhagen's status as a major tourist destination, its unique housing market (Andersen et al. 2000; Andersen 2007; Bruun 2011), and its relatively *laissez faire* policy on room rentals (Reuters 2018; Rasmussen 2019) make it ideal for the study of the impact of Airbnb on residential mobility. We also analyse a unique dataset that combines administrative data from Airbnb, Incorporated with Statistics Denmark administrative data on both households and neighbourhood s in the Copenhagen metropolitan area (CMA) and social media data scraped from the internet.

We shall demonstrate there has been fundamental change in residential mobility patterns since Airbnb first took hold in 2012. Owners of smaller homes, who are less likely to live in their 'forever' home and have less opportunity to rent, have become increasingly more likely to move out of their neighbourhood as Airbnb rentals have increased. This effect partly reflects an increase in tourism and housing prices associated with Airbnb (Barron et al. 2018; Sheppard and Udell 2016; Elíasson and Ragnarsson 2018; Koster et al. 2018), which increases the incentive for households that own their homes to sell and move. On the other hand, those who own larger homes—i.e., those with many rooms—have greater opportunity to rent through Airbnb, and concomitantly have become less likely to move as Airbnb has taken hold. Finally, we find that Airbnb has had very little impact on the residential mobility of households that live in cooperative housing or rental units.

How might Airbnb affect residential mobility?

Academics, urban planners and policy makers alike debate the economic and social impact of the sharing economy (Schor 2016; Frenken 2017; Frenken and Schor 2017). Given its rapid growth and increasing prominence, it has consequences for both the labour market (Katz and Krueger 2019) and society more generally (Fraiberger and Sundararajan 2017). In particular, Airbnb's market dominance begs the question of its impact on neighbourhood s. Little is known about whether Airbnb's growth has encouraged households to stay in their neighbourhood, or whether it has incentivized them to leave. Some related evidence provides guidance, however.

Growing evidence suggests that Airbnb has affected both the short-term and long-term housing markets. For example, long-term residential rental vacancy rates tend to be lower as Airbnb rentals increase (Gurran and Phibbs 2017). There is also evidence that rental prices increase as the ratio of long-term rentals to short-term rentals decreases (Yrigoy 2018; Barron et al. 2018; Garcia-López et al. 2020). Other research indicates that an increase in Airbnb is also associated with a rise in residential real estate prices (Barron et al. 2018; Sheppard and Udell 2016; Elíasson and Ragnarsson 2018; Koster et al. 2018a; Garcia-López et al. 2020). It is possible, then, that some homeowners sell their homes to take advantage of an increase in its value after Airbnb takes hold.

Housing prices is not the only factor that could influence the decision to move. Other potential consequences of Airbnb, such as an increase in tourism, may also play a role. Gant (2015) indicates that an increase in tourism reduces the availability of suitable residences for ordinary tenants, which in effect pushes people out of the neighbourhood . Other research suggests that an tourism can also change the neighbourhood composition (Kesar et al. 2015; Wachsmuth and Weisler 2018), which may in turn, encourage people to leave.

Competing evidence suggests a negative relationship between Airbnb presence and residential mobility. There is a broad consensus that people choose to relocate when the costs of their current residence exceed its benefits (Filippas and Horton 2017; Boehm and Ihlanfeld 1986; Ritsilä and Ovaskainen 2001). The ability to rent one's home, which is greatly facilitated by the presence of Airbnb, could compensate for an increase in housing costs (Quattrone et al. 2016). In other words, rental income could allow some households to remain in a neighbourhood that they might otherwise have been unable to afford.

The insights above imply substantial heterogeneity in how Airbnb might affect who moves from the neighbourhood and who stays. Of particular importance are the type of ownership and size of housing unit (Rossi 1980; Woo and Morrow-Jones 2011; van der Vlist et al. 2002).

Like most modern cities, the Copenhagen housing market has three main types of housing units: Privately owned, cooperative housing, and rental units (both privately-owned and public housing). The Danish situation is somewhat less straightforward than some, however.

Privately owned units include both houses and apartments that can be purchased with the help of a mortgage. Capital gains or losses from the sale of a home are not taxed or tax deductible in Denmark (DLA Piper Realworld 2020; The Danish Tax Agency 2020). Moreover, property taxes in Copenhagen are relatively high compared to other prominent tourist cities in Europe. They start at one percent for homes accessed at less than three million Danish kroner (about $400,000 US) but jump to three percent for any exceeding amount (Deloitte 2020; Angloinfo 2018). By comparison, property tax is about 0.3 percent in Paris, less than 0.2 percent in Amsterdam, 0.35 percent in Munich, and less than 0.7 percent in Oslo (Paris Property Group 2017; City of Amsterdam 2020; Obst 2020; Teleport 2017). Airbnb rental could help homeowners offset high property taxes and other expenses, increasing the feasibility of staying in their current home.

Cooperative housing is characterized by limited ownership: households own their unit and have part ownership of the building block or estate that also contains other units. Under the auspice of the cooperative association, unit owners have mutual financial responsibility for the entire building (Sørvoll and Bengtsson 2020; Housing People 2020). The purchasing cost of cooperative housing tends to be less than for private ownership, though it includes a monthly maintenance fee determined by the cooperative association. The cooperative association also makes decisions on the selling price of individual units, under some general restrictions, and rules for subletting (Sørvoll and Bengtsson 2020). Often subletting is not allowed, and even when allowed, it is usually subject to stringent rules that may make it unfeasible for many owners. In short, the lower financial risk associated with joint ownership is balanced by far less freedom with respect to the sale price or sub-rental of the unit. It seems likely, then, that Airbnb has less impact on residential mobility for households living in cooperative homes relative to those living in standard privately-owned properties.

There are two main types of rental housing in Copenhagen: privately-rented units and subsidized public housing. Privately-rented units are often subject to legal restrictions, including rent control, which greatly diminishes the incentive to move (Diamond et al. 2019). There is no legal restriction preventing the subletting of privately-rented units, however. The possibility of supplementing income through Airbnb rentals may further decrease the probability of moving. On the other hand, subletting is not allowed for subsidized public housing (Rasmussen 2019; KAB 2019). All else being equal, the opportunity to rent through Airbnb could incentivize

households in public housing to move to privately-rented units. There are important countervailing constraints, however. Households living in public housing often receive additional means-tested housing benefits that are discontinued if the household moves to privately-owned accommodations (Alves 2017; Skifter-Andersen 2014). Any extra income that Airbnb would provide is unlikely to totally offset the increase in the cost of living associated with paying market price for housing and the loss other housing subsidies. It thus seems highly unlikely that Airbnb has a substantial impact on the residential mobility of those in rental units.

In summary, there is good reason to believe that the impact of Airbnb on household residential mobility will differ by type of ownership and the size of home. Airbnb is likely to have greater impact on households that own have private homes. Those living in cooperative housing and rental units have fewer opportunities to benefit financially from renting out through Airbnb. Those living in rental units also cannot capitalize on an increase in real estate prices. For homeowners, however, the impact of Airbnb is likely to differ by housing unit size.

In terms of short-term rentals, demand is greatest for large units (Guttentag et al. 2018; Dogru et al. 2020), meaning that large homeowners have more opportunity to profit through Airbnb rental. Households that own larger homes are also more likely to be see their residence as a "forever" homes, and thus be deterred by the costs of moving (Clark et al. 1984b; Jae Hong Kim et al. 2005; Woo and Morrow-Jones 2011). On the other hand, households that own small homes have fewer opportunities to rent them, and thus may see the other consequences of Airbnb, such as greater tourism, as reason to leave (Gurran and Phibbs 2017; Nieuwland and Melik 2020). This is compounded by the fact that it is common for households to purchase smaller units as "starter" homes when entering the market and then upgrade to a larger home after accumulating equity (Borgersen and Sommervoll 2012; Oseland and Raw 1991). By increasing the value of the home, a growing presence of Airbnb could hasten this process

A theoretical model

Residential mobility can be seen as a response to a disequilibrium where a change in housing consumption (e.g., moving) exceeds the costs of relocation (Ritsilä and Ovaskainen 2001, Boehm and Ihlanfeld 1986). Housing unit size, ownership type, and external factors, such as community amenities, also play a role in the decision to relocate. We argue that Airbnb heavily moderates the impact of these factors.

Following Boehm & Ihlanfeld (1986), a household's utility (U) in its residence can be expressed as:

$$U = U(H_l, X) \quad (1)$$

where X represents non-housing consumption, including saving, and H_l represents the housing services supplied at location l that can be consumed by the household. This bundle of housing services can be written as:

$$H_l = H(S_l, N_l) \quad (2)$$

where S_l is the structural characteristics at location *l*, such as the type of housing (e.g., whether it is privately owned, cooperative or rental) and size of the residence (e.g., number of rooms), and N_l represents independent neighbourhood characteristics (e.g., local amenities, proximity to areas of interests like work and school, crime and safety). Over time, the household's preferences for housing services may change (H_p) or the quality of services offered by their current residence (H_l) at location l may diminish, decreasing the utility of the residence. Since the residence no longer optimally maximizes utility, the household seeks other options. Assuming no other factors, a household seeks to change residence when $H_p \neq H_l$. Incorporating moving costs, the probability that a household chooses to move is:

$$P(M) = f(|H_p - H_l|, Z) \quad (3)$$

where $H_d - H_l$ represents the discrepancy between the household's preferred bundle of housing services and the actual services offered by their current residence, and Z is a vector of the costs associated with moving residence (time to search for a new residence, economic costs related to the move itself, *etc*).

The possibility of rental income through Airbnb will have no impact on the decision to move if the household's demand for housing consumption exceeds what their current residence offers, $H_p > H_l$. There is no underutilization, and thus no possibility to increase utility by renting out rooms. Homes that are underutilized, however, allow for unused rooms to be rented out for small periods of time, thus helping the household reduce friction and increase economic utility (Sheppard and Udell 2016; Barron et al. 2018). Airbnb's presence could thus reduce the probability of moving if the household's demand for housing consumption is less than their current residence provides, $H_p < H_l$. This is incorporated into equation (2) as:

$$H_l = H(S_l, N_l, A_l) \quad (4)$$

where A_l represents the potential for the household to rent out using Airbnb in location l. Incorporating equation (4) into equation (3), indicates that renting through Airbnb could increase the tipping-point where the household's utility becomes greater by staying in the current residence

than by moving. This happens when subletting is viable, such as when there are few restrictions preventing it and when the home has a surplus of rooms to sublet. This is more likely for privately-owned units than it is for cooperative and rental units; it is also more likely for larger homes than for smaller homes.

Our theoretical model suggests that the impact of Airbnb on the decision to stay or leave is influenced by the utility the household can gain from renting through Airbnb. Particularly important are the type of housing ownership and the size of the home. We test three hypotheses based on this model. The first hypothesis tests the overall impact of Airbnb:

> *Hypothesis 1*: The overall impact of Airbnb depends on ownership type. On average, the opportunity to profit from an increase in the value of real estate, and a desire to avoid the "negative" effects of increased tourism, encourages homeowners to sell and move as Airbnb becomes more prevalent in their neighbourhood. On the other hand, households living in cooperative or rental housing have little opportunity to gain from Airbnb's presence—they cannot sell their homes and the opportunities to rent are hampered by regulations—and thus Airbnb has little impact on residential mobility.

We also test two hypotheses that consider the moderating role of residential size:

> *Hypotheses 2*: The opportunity for homeowners to capitalize on increasing housing prices has its strongest effect on those living in small homes. As the size of home increases, the possibility of subletting increases, and the thus impact of Airbnb's presence diminishes accordingly.

> *Hypotheses 3*: Presence of Airbnb in the neighbourhood is unrelated to residential mobility for households with large homes, regardless of ownership type. Two main mechanisms could be at play. First, those in large homes, especially homeowners, are more likely to profit financially from capitalizing on underutilized capacity in their homes and renting rooms through Airbnb. Second, large homes are more likely to be "forever" homes, where the large size of the home increases both the likelihood that utility is maximized and the costs of moving.

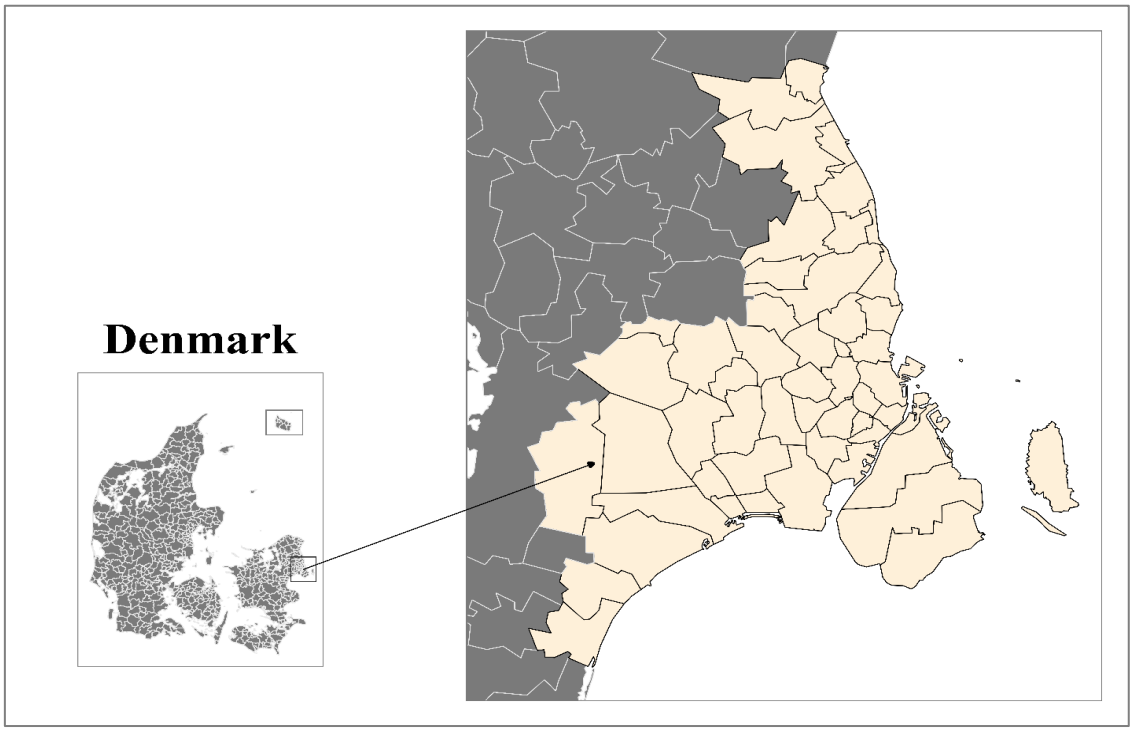
We now turn to a discussion of the data and methods used to test these hypotheses.

Data

We utilize three types of data. First, individual, household and neighbourhood -level data on all residences in the Copenhagen Metropolitan Area (CMA) from 2008 to 2016 were obtained from Statistics Denmark. Although Airbnb did not arrive in Copenhagen until 2012, we use data as far back as 2008 to account for trends before its arrival. Second, we obtained administrative data directly from Airbnb, Incorporated on all Airbnb rentals in the CMA between 2012 until 2016. Third, we also use data on Flickr images scraped from the internet. The three datasets were combined and aggregated to the neighbourhood level using zip codes.

We can identify both the zip codes in which individuals reside, and how these zip codes are spatially organized in relation to each other. The zip codes vary widely in size, both geographically and in terms of population. In terms of area, the smallest zip code includes only a single street and the largest contains a whole city district. The layout of the zip codes and their varying geographical size is illustrated in Figure 1. Especially in the older parts of Copenhagen the zip codes are very small both geographically and residential size wise. We thus clustered some of the smaller zip codes that are situated in close approximation to each other. The resulting number of neighbourhoods in our data is 49; the number of residents within them varies from 600 to 87,000 residents.

Figure 1: Neighbourhood zip codes in the greater Copenhagen metropolitan area (CMA). CMA zip codes identified by light fill.



Individual, Household and Neighbourhood -level Administrative Data

The Statistics Denmark administrative data contain demographic (e.g., gender, education, employment status, marital status and number of children) and socioeconomic information (income) on the entire population of the CMA. Household data include information on the year they moved into the residence, the type of residence (privately-owned, cooperative unit or rental unit), the number of rooms and the year of construction. We include data on all adults—i.e., people over 18 years of age—living in the greater Copenhagen metropolitan area at some point between 2008 and 2012.[1] Each resident is followed until 2016 or until they move.

Our analytical sample includes 5,171,851 observations distributed across 1,236,141 unique individuals. On average, this amounts to 895,532 individuals and 630,129 unique annual households per year, where a household is defined as one or two adults together with or without children. Given that one residential unit can consist of several households (e.g., young singles living together as roommates in the same residence or two or more couples living together in a collaboration or collective), the number of physical dwellings is smaller than the number of households. We have information on 570,488 residences, of which 28 percent are privately owned, 32 percent are cooperative residences, and 40 percent are rental units.

Residential move: Our dependent variable is defined as a change in residential address for *all* members of the household from one year to another. In other words, if only one person in a household of five people changed address, it is not counted as a move. Only if all five people changed address, is it counted as a move. Residential move enters the statistical models as a binary variable (coded 1 for move, 0 otherwise).

Ownership type: Type of ownership is measured using a three-category variable: private ownership, cooperative ownership and rental units. We separate these three groups for most of our analyses.

Housing unit size: Housing unit size is another important predictor. Airbnb rentals are usually listed by the number of rooms, rather than area size, so we use number of rooms as our measure of housing unit size. Given that there are very few homes in the CMA with more than 5 rooms, we cap this variable at 5 (i.e., all homes with more than 5 rooms were coded as 5).

Residential duration: The duration a household remained in a residence is measured in years. Only when all members of a household move, does the residential duration end. In other

[1] Excluded from the sample are people over the age of 18 still living at home with their parents or in some form of public institution where they are thus legally disempowered.

words, if at least one person remains in the household, the duration of residence for the household continues. For cases where one person moved to a new address, this is treated as a new independent household, with its duration starting from the year the move took place. In such cases, the duration of residence for those remaining in the household continues.

Household income: We control for household income measured in 1,000s Danish Kroner (DKK). Household income may positively affect the desire and opportunity to adjust the size of the household dwelling and hence affect the propensity to move. This is an important control because renting through Airbnb provides a source of income, and it is thus correlated with the level of Airbnb in the zip code.

Table 1 presents descriptive statistics for households based on the Statistics Denmark data. Demographic make-up differs dramatically by ownership type. Those living in privately owned homes tend to be older and more likely to be married and have children. They also have significantly higher incomes. Most important for our purposes, privately-owned residences are much large on average and households tend to stay in them longer.

Table 1: Descriptive statistics (means and proportions) for household units, Statistics Denmark data, 2008 and 2016

	Private ownership		**Cooperative ownership**		**Rented units**	
	2008	2016	2008	2016	2008	2016
Age	51.4	51.5	43.3	43.2	48.7	46.8
	(0.027)	(0.025)	(0.034)	(0.031)	(0.034)	(0.032)
Women	0.508	0.505	0.520	0.524	0.544	0.539
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Single	0.119	0.187	0.513	0.463	0.492	0.493
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Children	0.467	0.404	0.199	0.211	0.300	0.266
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Education[a]						
Low education	0.626	0.555	0.702	0.611	0.854	0.799
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Medium education	0.208	0.221	0.184	0.225	0.104	0.137
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
University degree	0.166	0.224	0.115	0.164	0.042	0.064
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Houshold income[b]	311.4	366.5	182.3	206.9	174.7	186.4
	(1.22)	(2.31)	(0.70)	(0.36)	(0.19)	(0.41)
Duration in residence (years)	15.5	14.1	8.2	8.0	10.5	9.0
	(0.026)	(0.021)	(0.021)	(0.018)	(0.024)	(0.020)
Residence size (m^2)	134.6	123.4	81.0	81.4	81.3	79.9
	(0.073)	(0.067)	(0.066)	(0.062)	(0.050)	(0.046)
Nnumber of rooms	4.7	4.4	2.9	3.0	3.1	3.0
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Number of households	284,594	404,096	278,650	323,905	279,130	343,219

Note: standard errors in parentheses.
[a]Low education includes secondary school, vocational education and less; medium education is higher education less than a degree.
[b]Household income is measured in 1,000s Danish Kroner (DKK), and standardized to 2014 prices to simplify comparison.

We also derive two neighbourhood measures from the Statistics Canada data:

Public housing: We control for the percentage of housing units that is public housing in the neighbourhood. This measure varies by both neighbourhood and year. The prevalence of public housing may contribute negatively, through externalities, to the consumption value of living in a specific zip-code. It may also be negatively correlated with the amount of Airbnb because most public housing does not allow subletting.

Housing costs: We assess the impact of the average yearly square meter price of all privately-owned housing units sold during the year in each zip code.

Airbnb Data

This is the first study to employ Airbnb data at the neighbourhood level. The data contain information on the annual number of guests using Airbnb, the average number of nights each guest stayed and the average price per night for every neighbourhood in the CMA from 2012—when it first arrived in Copenhagen—until 2016. We merge these data with the Statistics Canada administrative data for all 49 neighbourhoods (zip codes) we explore.

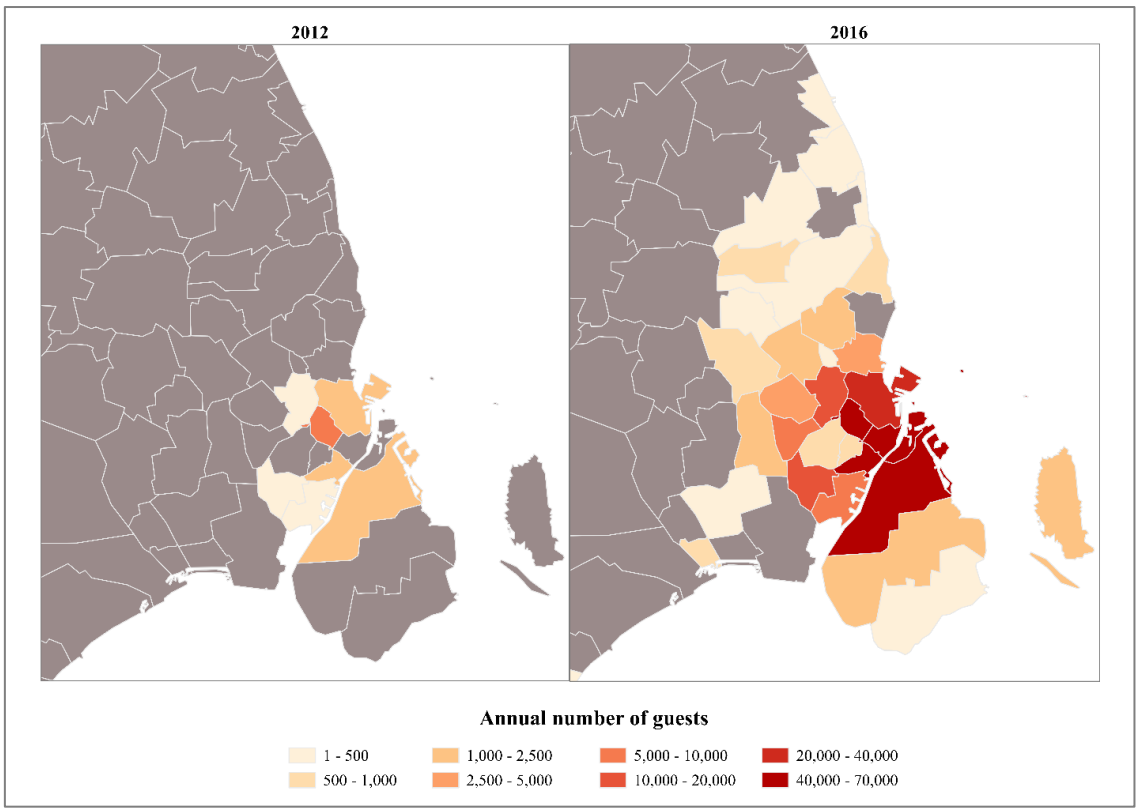
Airbnb intensity is tapped by a weighted measure of the total number of nights spent in Airbnb accommodation. Accommodations are measured for each zip code in every year under study. The measure takes into account: a) the physical size of the neighbourhood, b) the likelihood that nearby neighbourhood s are more influential than those further away, and c) that Airbnb's influence is more likely determined by proximity than artificial administrative borders. The variable, $W\ Airbnb$, is thus calculated as follows:

$$WAirbnb_z = \sum_{z\prime} \frac{Airbnb_{z\prime}}{Area\ size_{z\prime}}\ e^{-\delta\ d_{z\ z\prime}}$$

where the summation runs across all zip codes z', $\frac{Airbnb_{z\prime}}{Area\ size_{z\prime}}$ is the total number of nights tourists spent in Airbnb accommodation in zip code *z*, and d denotes distance measured in meters between zip code *z* and *z'*. Increasing the value of δ results in a smaller weight for the impact of Airbnb; this occurs as zip codes get further away from the focal neighbourhood. We set δ to 0.001, which results in a balanced weight where the weight of Airbnb stays is halved for zip codes 700 metres away. As an example, nights spent in Airbnb accommodation 'around the corner' or 'in the same building' receive a weight of 1, while a night spent in Airbnb accommodation five kilometres receives a weight of 0.007.

Figure 2 displays the density of Airbnb rentals in the CMA in 2012 and 2016. The figure demonstrates the rapid expansion of Airbnb. In 2012, the number of guests in virtually all zip codes could be counted in the hundreds; by 2016, in many zip codes, especially in the centre of Copenhagen, it was in the tens of thousands. The Airbnb also spread dramatically, especially to the northern suburbs of greater Copenhagen. Still, it is important to note that there has been great variation in the use of Airbnb, both within and between zip codes.

Figure 2: Number of guests using Airbnb in each zip code of the Copenhagen metropolitan area

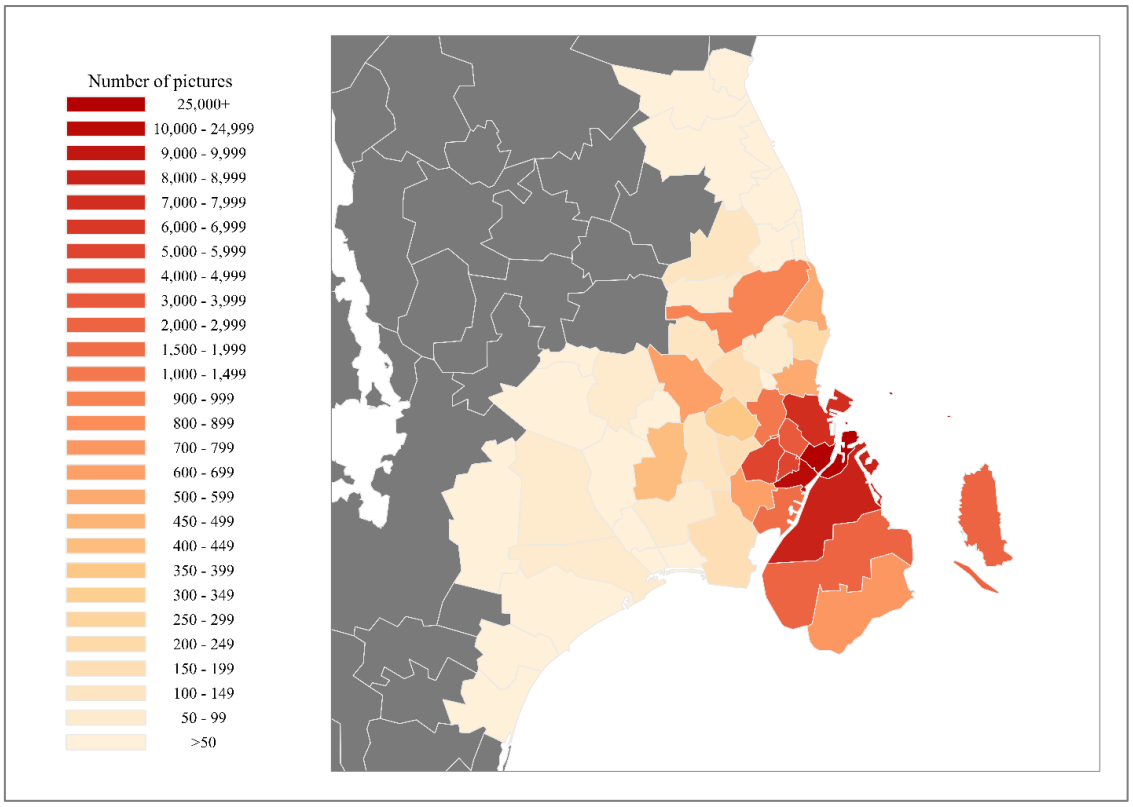


Source: based on data from Airbnb Denmark.

Flickr Images

As a proxy for tourist popularity or neighbourhood attractiveness, we use the number of photographs posted on the online platform Flickr. Flickr allows users to share photographs, connecting them with different 'tags' representing locations or events. These photos also contain meta-information on the time and geolocation, making it possible to identify when and where each picture was taken. We developed a web-crawler to scrape all pictures with the tag 'Copenhagen' taken between 2008 and 2016. The main benefit of using Flickr over other platforms (such as Instagram) is that it has not been widely used by Danes, meaning that pictures with the tag 'Copenhagen' most likely represent posts by tourists rather than locals. Using GIS, we then aggregate the number of pictures taken annually within each zip code in Copenhagen and combine these data with the data from Airbnb and Statistics Denmark. Figure 3 illustrates how pictures posted on Flickr distributes across the zip codes in Copenhagen during the entire 2008-2016 period. The figure demonstrates significant variation in the number of postings across neighbourhood s, with the largest density of photos being in the central areas of Copenhagen where most of the tourism takes place.

Figure 3: Distribution of Flickr pictures in each zip code of the Copenhagen metropolitan area, 2008-2016. Estimates based on web scrape of Flickr posts.



Source: based on data scraped from Flickr.

Methods

Out main analyses rely on three sets of fixed-effects linear probability models—one set for each type of housing ownership—to assess the period by period exit rate from dwellings, and the impact that Airbnb played in that process. The binary dependent variable, *y*, measures whether the *i*th household, in zip code *j*, in spell *s*, at duration *t*, and year *a* moves from its unit:

$$y_{ijsta} = \mu_t + \theta' AW_{jsta} + \beta' X_{ijsta} + \lambda_j + \nu_a + \tau_{ja} + u_i + e_{ijsta} \quad (5)$$

where μ_t represents the effect of residential duration of time $t = 0,1,2, \ldots$. Our focal explanatory variable, AW is the weighted exposure to Airbnb (measured in 10,000s of Airbnb nights spent in the zip code *j*) in a particular year, which varies over duration, *t*, and spell, *s*. The parameter of most interest, θ, demonstrates the direct effect of Airbnb exposure (weighted, and measured in 10,000 annual nights per square kilometre) on the likelihood of moving residence. X_{ijst} is the vector of household residential and neighbourhood variables at duration *t* in spell *s*, β is the corresponding vector of regression coefficients, λ is the zip code fixed effects, ν is the year fixed effects capturing the effect of mobility in the initial year of the duration, τ represents the

interaction between year and zip code, and u_i represents the individual household fixed effects and *e* is an idiosyncratic error term [2].

To assess heterogeneity across the size of housing unit we also fitted models that include terms to tap the interaction between number of rooms in the unit and Airbnb:

$$\delta_{\#rooms} AW_{ijsta} \cdot \#rooms_{ijsta}$$

where $\#rooms_{ijsta}$is the number of rooms in the *i*th household unit. It is possible that unobserved characteristics (especially across zip codes) could change during the sampling period, creating spurious duration dependence, which in turn would bias the estimates of the effect of Airbnb on residential mobility. For example, differences in mobility across zip codes could reflect different levels of gentrification, resulting in some neighbourhood s becoming more popular than others. To mitigate this problem, we specify the fixed effects for zip code and a linear trend for time to interact. We also fitted models that included a nonparametric coding of time (i.e., it enters the model as a set of dummy regressors). Although identification of these models is more fragile than for the linear time trend models, they yielded similar results. We thus focus on the more efficient linear time trend models in the results section (see Table A1 for estimates from the non-parametric models).

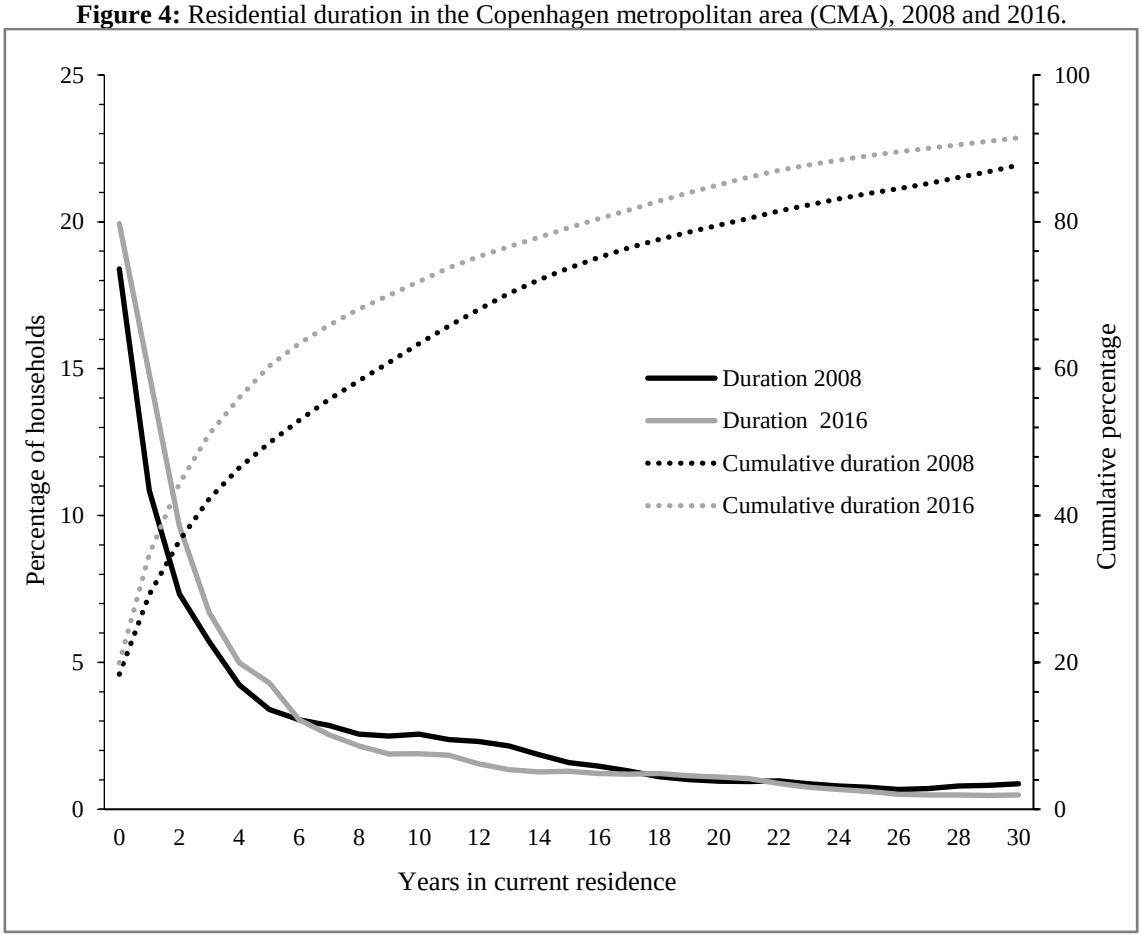
For our main analyses, we fitted separate models to three subsets of the data: a) privately owned residences, b) cooperative residences, and c) rental residences. All these models explore the effect of Airbnb on residential mobility controlling for various covariates, the array of fixed effects, and a parametric trend for time. Model 1 includes all predictors except those associated with tourism (as measured by Flickr posts) and housing costs; it also does not include any interaction terms. Model 2 builds on this model by specifying the interaction between Airbnb and number of rooms in the residence. Model 3 adds the tourism and housing cost variables. Model 4 adds the three two-way interactions between number of rooms and the tourism and housing cost variables. Finally, in an attempt to gain further purchase on causation, Model 5 is a placebo regression that has the identical structure to Model 3 except that it replaces the Airbnb intensity variable with its value measured six years previously.

[2] Identification of the effect of Airbnb (*AW*) is achieved through the assumption that Airbnb exposure variable is independent of the idiosyncratic error term. This assumption is plausible because the arrival of Airbnb was unexpected by most households residing in the CMA, meaning there is unlikely to be any selection into or out of the CMA due to Airbnb. Still, to control for household fixed effects (subscript *i* in (5)), we sample households with multiple spells of residence in the CMA (i.e., those that moved out of their residence but stayed in the CMA).

Results

Figure 4 displays the distribution for duration of residence in current home (measured in years) for all households in the CMA in 2008 and 2016. The two solid lines, which correspond to the left *y*-axis, display the proportion of households at each number of years in residence. The difference between the lines at low durations, where the line representing 2016 is higher, indicates a decrease in residential mobility. That is, households tended to remain in the homes longer in 2016 than they did in 2008. The two dotted lines demonstrate the cumulative percentage of residence duration. The difference between these lines leads to the same conclusion. For example, in 2008 about 50 percent of households lived in their home for six years or less; by 2016 more than 60 percent had done the same. In short, the annual residential turnover rate declined significantly over the eight-year period we investigate. We now turn to our main analyses to determine the extent to which Airbnb may have contributed to this change.

Figure 4: Residential duration in the Copenhagen metropolitan area (CMA), 2008 and 2016.



Source: calculation based on data from Statistics Denmark.

Table 2 displays the AIC and BIC values for the various models discussed above. The differences in the AIC and BIC values between Models 1 and 2 indicates that, for all three ownership types, there is a significant improvement in fit when the interaction between Airbnb and number of rooms is included. Including the Flickr and housing price variables, and their interaction with number rooms, further improves the fit. While we will briefly explore the Airbnb effect in Model 1 to gain an understanding of Airbnb's overall impact for each ownership type, our focus will be largely on Models 3 and 4 because they provide both the best fit to the data, and the most appropriate tests for our hypotheses.

Table 2: AIC and BIC for models predicting residential mobility in Copenhagen neighbourhoods, 2008-2106. Model 1 values are used as the baseline; values for Models 2-4 are differences relative to Model 1.

		Private ownership			**Cooperative ownership**			**Rental units**		
Model	**Terms in model**	BIC	AIC	lnL	BIC	AIC	lnL	BIC	AIC	lnL
1	Parametric time trend	1,591,691	1,594,015	-797,188	592,938	590,621	-295,129	167,305	165,019	-82,329
2	Parametric time trend, Airbnb x rooms	-385	-436	212	-90	-141	74	-129	-193	101
3	Parametric time trend, Airbnb x rooms, Flickr & housing prices	-513	-590	300	-953	-1030	521	-950	-1026	519
4	Parametric time trend, Airbnb x rooms, Flickr & housing prices, Airbnb x Flickr, Airbnb x housing prices	-735	-915	471	-954	-1133	581	-1086	-1263	646

Source: calculation based on data from Statistics Denmark.

The results from Model 1 are shown in Table 3. The coefficients strongly suggest that Airbnb has had a significant overall effect on residential mobility for all three ownership types, albeit the direction of the relationship differs. For private ownership, the overall effect of Airbnb is positive—i.e., the greater the number of Airbnb rentals in the neighbourhood, the more likely it is that the households move out. On the other hand, the effect is negative for cooperative and rental housing. In general, then, Airbnb's presence appears to have increased mobility for households in privately-owned homes but decreased it for others. As we shall see momentarily, however, there are also significant differences related to the size of the housing unit.

Table 3: Estimates of the effect of Airbnb from Model 1, by housing type. The model includes all main effects except for Flickr and housing prices. Aside for the interaction between zip code and year, no other interactions are specified.

	Private ownership	**Cooperative ownership**	**Rental units**
Airbnb exposure (10K)	0.0062****	-0.0042****	-0.0051****
	(0.0007)	(0.0003)	(0.0004)
Control variables	X	X	X
Year trend	X	X	X
FE Duration	X	X	X
FE Zipcode	X	X	X
FE Zipcode * Year	X	X	X
Observations	2,781,341	2,680,445	2,428,767
R^2	0.047	0.058	0.056

Note: standard errors are in parentheses.
****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

We expect the effects of Airbnb to vary by the size of housing unit. Bigger units present greater opportunity to sublet via Airbnb, which should result in lower probability of moving. The results in Table 4 are consistent with this conjecture. Model 3 allows Airbnb intensity to interact with number of rooms in their effects on mobility. While the model also controls for intensity of tourism (measured by number of Flickr postings) and the cost of housing (measured by price of private units per squared-meter) in the zip code, it does not allow these variables to interact with housing size. According to this model, the impact of Airbnb does, in fact, vary by the number of rooms in the home. Airbnb's impact declines with the number of rooms for all ownership types but especially for privately-owned homes. We will return to a detail discussion of these effects after exploring the results from Model 4.

Table 4: Estimates demonstrating for the interaction between Airbnb and residential size (number of rooms), Flickr posts, and unit size (number of rooms), by housing type

	Private ownership		**Cooperative ownership**		**Rental units**	
	Model 3	Model 4	Model 3	Model 4	Model 3	Model 4
Airbnb exposure (10K)	0.0134****	0.0033	0.0083****	0.0097****	0.0134****	0.0151****
	(0.0025)	(0.0032)	(0.0014)	(0.0014)	(0.0016)	(0.0016)
2 rooms * Airbnb (10K)	0.0020	0.0045	-0.0109****	-0.0126****	-0.0134****	-0.0156****
	(0.0026)	(0.0033)	(0.0014)	(0.0015)	(0.0017)	(0.0017)
3 rooms * Airbnb (10K)	-0.0029	0.0055*	-0.0110****	-0.0129****	-0.0166****	-0.0182****
	(0.0026)	(0.0033)	(0.0014)	(0.0015)	(0.0017)	(0.0017)
4 rooms * Airbnb (10K)	-0.0081***	0.0017	-0.0118****	-0.0129****	-0.0151****	-0.0163****
	(0.0026)	(0.0033)	(0.0014)	(0.0015)	(0.0017)	(0.0018)
5+ rooms * Airbnb (10K)	-0.0173****	-0.0059*	-0.0140****	-0.0136****	-0.0040*	-0.0072***
	(0.0025)	(0.0032)	(0.0015)	(0.0016)	(0.0023)	(0.0023)
Number of Flickr pictures (1K)	-0.0077****	-0.0211**	0.0062****	0.0058***	0.0036****	-0.0127****
	(0.0009)	(0.0100)	(0.0005)	(0.0019)	(0.0007)	(0.0026)
Square meter prices	-0.0029****	0.0294****	-0.0058****	-0.0109****	-0.0073****	-0.0161****
	(0.0003)	(0.0087)	(0.0003)	(0.0012)	(0.0004)	(0.0015)
2 rooms * Flickr (1K)		0.0200*		0.0017		0.0117****
		(0.0107)		(0.0021)		(0.0029)
3 rooms * Flickr (1K)		0.0105		-0.0014		0.0165****
		(0.0103)		(0.0021)		(0.0028)
4 rooms * Flickr (1K)		0.0150		0.0012		0.0253****
		(0.0102)		(0.0022)		(0.0031)
5+ rooms * Flickr (1K)		0.0146		-0.0010		0.0258****
		(0.0102)		(0.0024)		(0.0035)
2 rooms * Square meter prices		-0.0095		0.0063****		0.0103****
		(0.0090)		(0.0013)		(0.0015)
3 rooms * Square meter prices		-0.0296****		0.0064****		0.0086****
		(0.0088)		(0.0013)		(0.0016)

Table 4 - continued

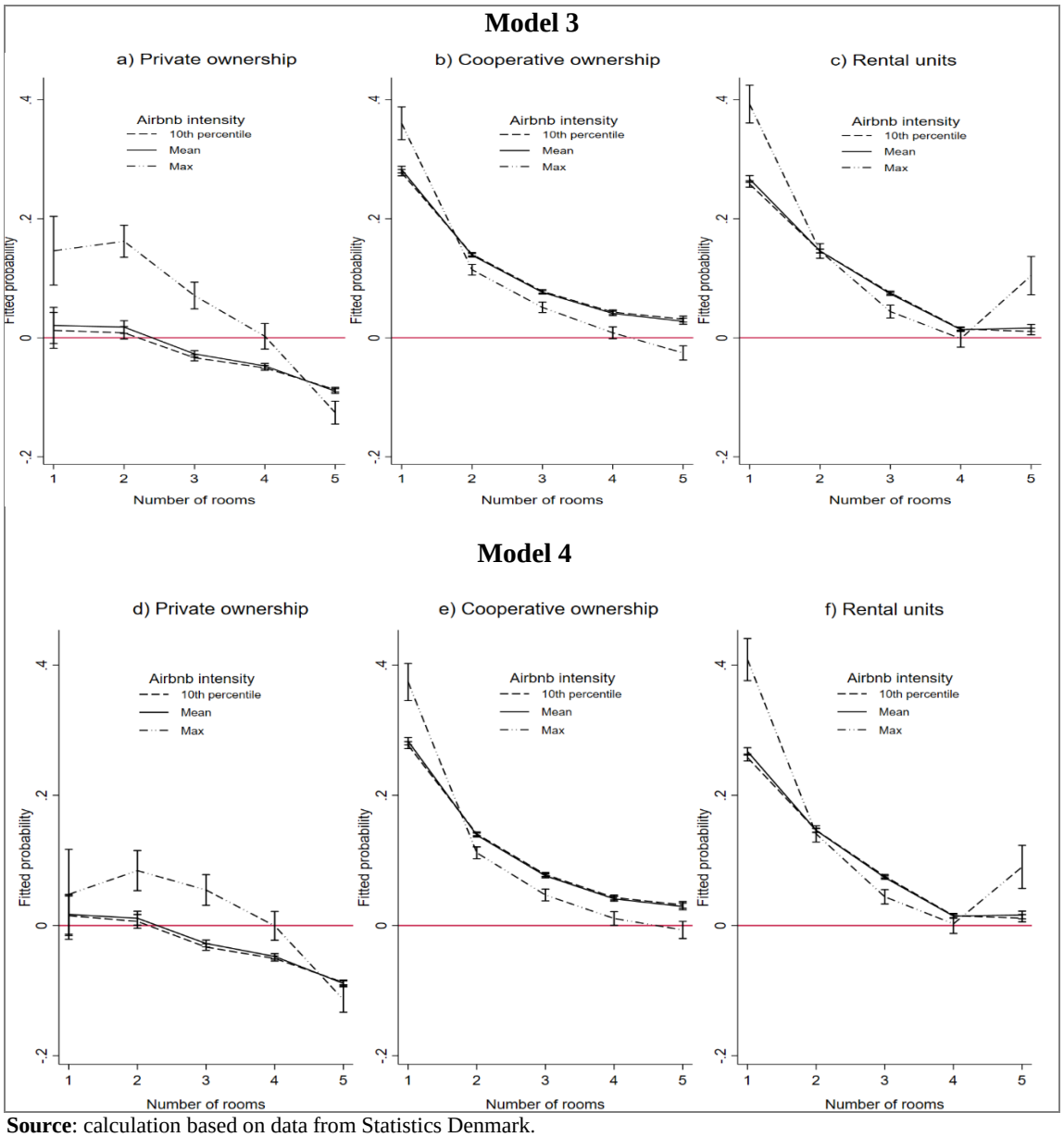
	Private ownership		Cooperative ownership		Rental units	
	Model 3	Model 4	Model 3	Model 3	Model 4	Model 3
4 rooms * Square meter prices		-0.0317****		0.0041***		0.0078****
		(0.0087)		(0.0014)		(0.0016)
5+ rooms * Square meter prices		-0.0345****		-0.0014		0.0135****
		(0.0087)		(0.0016)		(0.0020)
Control variables	X	X	X	X	X	X
Year trend	X	X	X	X	X	X
FE Duration	X	X	X	X	X	X
FE Zipcode	X	X	X	X	X	X
FE Zipcode * Year trend	X	X	X	X	X	X
Observations	2,781,341	2,781,341	2,680,445	2,680,445	2,990,701	2,990,701
R^2	0.047	0.047	0.058	0.058	0.057	0.057

Note: standard errors are in parentheses.
****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

Model 4 adds terms for the interactions between the number of rooms and the tourism and housing costs variables, allowing us to assess the extent to which these measures moderate the Airbnb and number of rooms interaction effect. While the general pattern of the Airbnb and unit size interaction persists for cooperative housing and rental units, it drastically changes for privately-owned housing. For private ownership, almost much of the Airbnb effect is absorbed by the tourism and housing prices variables. Model 4 makes it clear, then, that factors associated with the of Airbnb presence—i.e., tourism and housing process—play a moderating role. Consistent with our theory, it appears that increased tourism and the potential to profit from the sale of their houses strongly influence small homeowners. Households living in large homes are largely unaffected by these contextual factors, however.

The nuances of these effects are difficult to comprehend from the coefficients alone. We thus turn to Figure 5, which displays the fitted probability of moving out of the neighbourhood Models 3 and 4. These probabilities were calculated at the minimum, the tenth percentile, and the maximum values of Airbnb intensity through the range of the housing size variable (i.e., number of rooms). All other variables in the model are held at their means. The figure also includes 95 percent confidence intervals for the estimates.

Figure 5: Effect of Airbnb on residential mobility by ownership type and residential unit size. Fitted probabilities derived from Model 3 (first row) and Model 4 (second row). All controls are set to their means. Vertical bars represent 95 percent confidence intervals.



Source: calculation based on data from Statistics Denmark.

Figure 4 highlights several noteworthy findings. First, all three types of ownership are similar in that residential mobility declines as housing size rises, and in all cases, households are highly unlikely to move from large homes. This finding was expected. Larger units are more likely to be considered long-term homes which results in lower mobility rates. Also as expected, the effect of Airbnb and how it interacts with number of rooms, differs dramatically by residential type. For privately-owned housing, the effect of Airbnb is positive and large for smaller units but wanes completely for larger units. Simply put, those living in small homes become increasingly

more likely than others to move as Airbnb rentals in their neighbourhood increase. This effect weakens as housing size increases. The story for cooperative housing and rental units is very different. Although the effect is smaller, Airbnb has a positive impact on mobility only for one room units; for large units there is a statistically significant negative effect, though it is substantively small.

The second row of Figure 5 displays fitted values derived from Model 4, which specifies number of rooms to interact with the tourism and housing cost variables. The general patterns in these graphs are very similar to those for Model 3 but there is one noteworthy difference. For privately-owned homes, a large portion of the differences in the Airbnb effect by housing size is moderated by tourism and housing costs. This is not the case for cooperative housing and rental units, for which the impact of Airbnb by housing size is virtually unchanged from Model 3.[3] We conclude that Airbnb's presence increases both tourism and housing prices, which encourages some small homeowners to sell and move. The impact of Airbnb is much smaller for those in moderately sized homes, and non-existent for owners of large homes.

The number of Airbnb rentals in the CMA has clearly risen over time. For all zip-codes, there were yearly increases from 2012 and onwards. To isolate this trend, we have included interactions between time (measured by year) and the zip-code fixed effects.[4] To further investigate the sensitivity of our results to possible spurious effects from a time trend, Table 5 present results from placebo regressions. These regressions specify Airbnb levels to be six years back in time. That is, we use 2006 levels for 2012, and so forth. The results from these models increase confidence in the robustness of our findings. Of the 15 null hypothesis tests in these three models, only two—both for rental units—are statistically significant. Moreover, the signs of these two estimates are the opposite of those from the regular regressions, suggesting that we may have underestimated the effect of Airbnb for rental units. In other words, a difference in difference analysis[5], where the estimated placebo effects are subtracted from the corresponding coefficients in Model 3, suggests even larger effects of Airbnb than our main analysis provides. Most importantly, the placebo regression provides further support of the robustness of the findings for privately-owned homes.

[3] The significant "effects" from Model 4 shown in Figure 4 for private ownership differ somewhat from the non-significant effects suggested by the coefficients in Table 4 because the values in the figure are calculated at average levels of the background characteristics (except duration, which is fixed at x years). These characteristics vary considerably by number of rooms and ownership types, and hence the fitted values would also differ dramatically if different typical values, instead of the mean, were used.
[4] Our main models include a parametric trend for time. Table A1 also shows results from a non-parametric time trend interacted with zip-code fixed effects.
[5] Under the assumption that the placebo regressions yield a true baseline.

Table 5: Estimates from Model 5 (placebo regressions). All regressions are structured identically to Model 3 except Airbnb intensity is replaced by its measure from six years earlier.

	Private ownership	**Cooperative ownership**	**Rental units**
Airbnb exposure (10K)	0.0269	0.0002	-0.0068***
	(0.0491)	(0.0019)	(0.0025)
2 rooms * Airbnb	-0.0433	-0.0000	-0.0021
	(0.0490)	(0.0014)	(0.0016)
3 rooms * Airbnb	-0.0378	0.0014	0.0016
	(0.0489)	(0.0014)	(0.0016)
4 rooms * Airbnb	-0.0460	0.0022	0.0011
	(0.0489)	(0.0014)	(0.0018)
5+ rooms * Airbnb	-0.0500	-0.0014	0.0199***
	(0.0489)	(0.0016)	(0.0063)
Number of Flickr pictures (1K)	0.0052	0.0114****	0.0028
	(0.0039)	(0.0021)	(0.0032)
Square meter prices	-0.0684****	-0.1018****	-0.1014****
	(0.0021)	(0.0027)	(0.0028)
Control variables	X	X	X
Year trend	X	X	X
FE Duration	X	X	X
FE Zipcode	X	X	X
FE Zipcode * Year	X	X	X
Observations	322,478	417,132	427,551
R^2	0.080	0.119	0.125

Note: standard errors are in parentheses.
****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

Conclusion

Few businesses have played a larger role in the sharing economy that Airbnb. As the sharing economy grows, much is left unanswered with respect to its impact not just on other businesses and the labour market, but also society more generally. This is the first research to investigate the effects of Airbnb on residential mobility. We started by providing evidence that residential mobility in the Copenhagen metropolitan area decreased between 2008 and 2016. This decrease in mobility largely corresponds with the expansion of Airbnb after its introduction to Copenhagen in 2012.

Before moving to an analysis of the relationship between Airbnb and residential mobility, we provide some theory linking the two. Our theory holds that households that can benefit from renting their home through Airbnb—in particular, those that live in homes that they own and that have many rooms—are unlikely to move out of the neighbourhood. On the other hand, an increasing presence of Airbnb might encourage those who own smaller homes to sell and move. It is usually impractical to rent rooms in small houses, especially on a regular basis. However, small homeowners can profit financially from selling their home and moving to another neighbourhood where they can also escape the negative consequences of increased tourism. Households that live in rental units or cooperative housing have fewer options. They are subject to constraints on renting rooms and are unlikely to profit from a surge in housing prices, both of which make them less likely to move as Airbnb increases its presence.

Modelling repeated spells of the occupancy of units, we plausibly estimated the causal effect of Airbnb on the propensity to move out of a unit. Our findings are consistent with our theory: both the type of ownership and the size of the housing unit influence the propensity to move from the neighbourhood. For privately owned housing, the larger the unit, the weaker the effect of Airbnb. We also find that tourism and housing prices moderate the impact of Airbnb on the residential mobility of homeowners. However, for cooperative housing and rental units Airbnb's presence has little impact.

We have confidence that our results reflect a causal impact of Airbnb. First, the introduction of Airbnb was an unexpected exogenous shock. Secondly, we control for an extensive array of possibly confounding variables, including household and time fixed effects. Finally, placebo regressions provide further support for the conclusion that rental activity through Airbnb has had a positive impact on the residential mobility, especially of household in small privately-owned homes.

References

Airbnb Newsroom. 2020: About Airbnb Airbnb Newsroom.

Alves, Sónia. 2017: Poles Apart? A Comparative Study of Housing Policies and Outcomes in Portugal and Denmark Housing, Theory and Society 34(2), 221–48.

Andersen, Hans Skifter. 2007: Housing Market and Housing Policy in Copenhagen. In Åke E. Andersson, Lars Pettersson, & Ulf Strömquist (eds.) , European Metropolitan Housing Markets. Advances in Spatial Science. Berlin, Heidelberg: Springer, pp. 297–321.

Andersen, Hans Skifter, Hans Thor Andersen, and Thorkild Ærø. 2000: Social polarisation in a segmented housing market: Social segregation in Greater Copenhagen Geografisk Tidsskrift-Danish Journal of Geography 100(1), 71–83.

Angloinfo. 2018: Property Taxes in Denmark - Denmark Property Taxes in Denmark. http://www.angloinfo.com/how-to/denmark/money/danish-taxes/property-taxes.

Barron, Kyle, Edward Kung, and Davide Proserpio. 2018: *The Sharing Economy and Housing Affordability: Evidence from Airbnb*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Boehm, Thomas P, and Keith R Ihlanfeld. 1986: Residential Mobility and Neighborhood Quality* Journal of Regional Science 26(2), 411–24.

Borgersen, Trond-arne, and Dag einar Sommervoll. 2012: Housing Careers, Price–Rent Ratios and Rental Equivalence Housing, Theory and Society 29(3), 276–87.

Bruun, Maja Hojer. 2011: Egalitarianism and Community in danish housing Cooperatives: Proper Forms of Sharing and Being Together Social Analysis 55(2), 62–83.

City of Amsterdam. 2020: Property tax (onroerendezaakbelasting, OZB)Unpublished webpagina Property tax (onroerendezaakbelasting, OZB). https://www.amsterdam.nl/en/municipal-taxes/property-tax-ozb/. Gemeente Amsterdam.

Clark, William AV, MC Deurloo, and FM Dieleman. 1984: Housing Consumption and Residential Mobility Annals of the Association of American Geographers 74(1), 29–43.

Deloitte, Statsautoriseret Revisionspartnerselskab. 2020: *Working and Living in Denmark*. Member of Deloitte Touche Tohmatsu Limited.

Diamond, Rebecca, Tim McQuade, and Franklin Qian. 2019: The Effects of Rent Control Expansion on Tenants, Landlords, and Inequality: Evidence from San Francisco American Economic Review 109(9), 3365–94.

DLA Piper Realworld. 2020: Taxation of asset deals in DenmarkUnpublished Information Taxation of asset deals. https://www.dlapiperrealworld.com/law/index.html?t=sale-and-purchase&s=taxation-of-real-estate-sales-and-purchases&c=DK.

Dogru, Tarik, Makarand Mody, Courtney Suess, Nathan Line, and Mark Bonn. 2020: Airbnb 2.0: Is it a sharing economy platform or a lodging corporation? Tourism Management 78, 104049.

Elíasson, Lúðvík, and Önundur Páll Ragnarsson. 2018: Short-term renting of residential apartments. Effects of Airbnb in the Icelandic housing market IDEAS Working Paper Series from RePEc; St. Louis.

Farronato, Chiara, and Andrey Fradkin. 2018: *The Welfare Effects of Peer Entry in the Accommodation Market: The Case of Airbnb*Unpublished Working Paper. National Bureau of Economic Research.

Fraiberger, Samuel P, and Arun Sundararajan. 2017: *Peer-to-Peer Rental Markets in the Sharing Economy*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Frenken, Koen. 2017: Political economies and environmental futures for the sharing economy Phil. Trans. R. Soc. A 375(2095), 20160367.

Frenken, Koen, and Juliet Schor. 2017: Putting the sharing economy into perspective Environmental Innovation and Societal Transitions 23. Sustainability Perspectives on the Sharing Economy, 3–10.

Gant, Agustín Cócola. 2015: Tourism and commercial gentrification. , "The Ideal City: between myth and reality. Representations, policies, contradictions and challenges for tomorrow's urban life". Urbino (Italy), pp. 27–29.

Garcia-López, Miquel-Àngel, Jordi Jofre-Monseny, Rodrigo Martínez-Mazza, and Mariona Segú. 2020: Do short-term rental platforms affect housing markets? Evidence from Airbnb in Barcelona Journal of Urban Economics 119, 103278.

Gurran, Nicole, and Peter Phibbs. 2017: When Tourists Move In: How Should Urban Planners Respond to Airbnb? Journal of the American Planning Association 83(1), 80–92.

Guttentag, Daniel, Stephen Smith, Luke Potwarka, and Mark Havitz. 2018: Why Tourists Choose Airbnb: A Motivation-Based Segmentation Study Journal of Travel Research 57(3), 342–59.

Housing People. 2020: Cooperative / Andelsbolig Housing People.

Jae Hong Kim, Francesca Pagliara, and John Preston. 2005: The intention to move and residential location choice behaviour Urban Studies (Routledge) 42(9), 1621–36.

KAB. 2019: Feriefremleje KAB. https://www.kab-bolig.dk/beboer/fremleje-og-boligbytte/feriefremleje.

Katz, Lawrence F, and Alan B Krueger. 2019: The Rise and Nature of Alternative Work Arrangements in the United States, 1995–2015 ILR Review 72(2), 382–416.

Kesar, Oliver, Renata Deželjin, and Martina Bienenfeld. 2015: Tourism gentrification in the city of zagreb: time for a debate? Interdisciplinary Management Research 11, 657–68.

Koster, Hans, Jos van Ommeren, and Nicolas Volkhausen. 2018: *Short-Term Rentals and the Housing Market: Quasi-Experimental Evidence from Airbnb in Los Angeles*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Nieuwland, Shirley, and Rianne van Melik. 2020: Regulating Airbnb: how cities deal with perceived negative externalities of short-term rentals Current Issues in Tourism 23(7), 811–25.

Obst, Hartmut. 2020: Property Taxes in Germany 2020 German Properties.

Oseland, NA, and GJ Raw. 1991: Room size and adequacy of space in small homes Building and Environment 26(4), 341–47.

Paris Property Group. 2017: Local property taxes in Paris among the lowest in the world, and unchanged for the 6th year This Paris Life. https://parispropertygroup.com/blog/2017/local-property-taxes-in-paris-among-the-lowest-in-the-world-and-unchanged-for-the-6th-year/.

Quattrone, Giovanni, Davide Proserpio, Daniele Quercia, Licia Capra, and Mirco Musolesi. 2016: Who Benefits from the 'Sharing' Economy of Airbnb? , Proceedings of the 25th International Conference on World Wide Web. WWW '16. Republic and Canton of Geneva, CHE: International World Wide Web Conferences Steering Committee, pp. 1385–94.

Rasmussen, Jørgen Munksgaard. 2019: Hvad er reglerne for at leje sin lejlighed ud med AirBnB? Videncentret Bolius. https://www.bolius.dk/airbnb-her-er-reglerne-for-at-udleje-din-bolig-35638.

Reuters. 2018: Airbnb to report homeowners' income to Danish tax authorities Reuters, May 17.

Ritsilä, Jari, and Marko Ovaskainen. 2001: Migration and regional centralization of human capital Applied Economics 33(3), 317–25.

Rossi, Peter H. 1980: *Why Families Move: A Study in the Social Psychology of Urban Residential Mobility*. 2. ed. Beverly Hills, Calif: Sage.

Schor, Juliet. 2016: Debating the Sharing Economy Journal of Self-Governance and Management Economics; Woodside 4(3), 7–22.

Sheppard, Stephen, and Andrew Udell. 2016: *Do Airbnb Properties Affect House Prices?* Unpublished Department of Economics Working Paper. Department of Economics, Williams College.

Skifter-Andersen, Hans. 2014: Denmark , Private Rental Housing: Comparative Perspectives. Edward Elgar Publishing, pp. 99–125.

Sørvoll, Jardar, and Bo Bengtsson. 2020: Mechanisms of Solidarity in Collaborative Housing – The Case of Co-operative Housing in Denmark 1980–2017 Housing, Theory and Society 37(1), 65–81.

Teleport, A Topia Company. 2017: Taxes in Oslo, Norway Teleport Cities. https://teleport.org/cities/oslo/taxes/.

The Danish Tax Agency. 2020: Taxation on purchase and sale of real propertyUnpublished Information Taxation on purchase and sale of real property. https://lifeindenmark.borger.dk/economy-and-tax/the-danish-tax-system/taxation-on-purchase-and-sale-of-real-property.

van der Vlist, Arno J, Cees Gorter, Peter Nijkamp, and Piet Rietveld. 2002: Residential Mobility and Local Housing-Market Differences Environment and Planning A: Economy and Space 34(7), 1147–64.

Wachsmuth, David, and Alexander Weisler. 2018: Airbnb and the rent gap: Gentrification through the sharing economy Environment and Planning A: Economy and Space 50(6), 1147–70.

Woo, Myungje, and Hazel A Morrow-Jones. 2011: Main factors associated with homeowners' intentions to move International Journal of Urban Sciences 15(3), 161–86.

Yrigoy, Ismael. 2018: Rent gap reloaded: Airbnb and the shift from residential to touristic rental housing in the Palma Old Quarter in Mallorca, Spain Urban Studies, 0042098018803261.

Zervas, Georgios, Davide Proserpio, and John W Byers. 2017: The Rise of the Sharing Economy: Estimating the Impact of Airbnb on the Hotel Industry Journal of Marketing Research (JMR) 54(5), 687–705.

Appendices

Table A1: Estimates demonstrating for the interaction between Airbnb and residential size (number of rooms), Flickr posts, and unit size (number of rooms), by housing type, with a nonparametric specification for time.

	Private ownership		**Cooperative ownership**		**Rental units**	
	Model 3b	Model 4b	Model 3b	Model 4b	Model 3b	Model 4b
Airbnb exposure (10K)	0.0134****	0.0033	0.0083****	0.0097****	0.0127****	0.0146****
	(0.0025)	(0.0032)	(0.0014)	(0.0014)	(0.0018)	(0.0018)
2 rooms * Airbnb (10K)	0.0020	0.0045	-0.0109****	-0.0126****	-0.0179****	-0.0205****
	(0.0026)	(0.0033)	(0.0014)	(0.0015)	(0.0019)	(0.0019)
3 rooms * Airbnb (10K)	-0.0029	0.0055*	-0.0110****	-0.0128****	-0.0178****	-0.0198****
	(0.0026)	(0.0033)	(0.0014)	(0.0015)	(0.0019)	(0.0019)
4 rooms * Airbnb (10K)	-0.0081***	0.0017	-0.0118****	-0.0129****	-0.0175****	-0.0191****
	(0.0026)	(0.0033)	(0.0014)	(0.0015)	(0.0019)	(0.0020)
5+ rooms * Airbnb (10K)	-0.0173****	-0.0059*	-0.0140****	-0.0136****	-0.0123****	-0.0150****
	(0.0025)	(0.0032)	(0.0015)	(0.0016)	(0.0029)	(0.0029)
Number of Flickr pictures (1K)	-0.0077****	-0.0211**	0.0062****	0.0058***	0.0068****	-0.0108****
	(0.0009)	(0.0100)	(0.0005)	(0.0019)	(0.0008)	(0.0029)
Square meter prices	-0.0029****	0.0294****	-0.0058****	-0.0109****	-0.0077****	-0.0181****
	(0.0003)	(0.0087)	(0.0003)	(0.0012)	(0.0004)	(0.0017)
2 rooms * Flickr		0.0200*		0.0017		0.0171****
		(0.0107)		(0.0021)		(0.0033)
3 rooms * Flickr		0.0105		-0.0014		0.0172****
		(0.0103)		(0.0021)		(0.0032)
4 rooms * Flickr		0.0149		0.0012		0.0279****
		(0.0102)		(0.0022)		(0.0035)
5+ rooms * Flickr		0.0146		-0.0010		0.0187****
		(0.0102)		(0.0024)		(0.0047)
2 rooms * Square meter prices		-0.0095		0.0063****		0.0123****
		(0.0090)		(0.0013)		(0.0018)
3 rooms * Square meter prices		-0.0296****		0.0064****		0.0104****
		(0.0088)		(0.0013)		(0.0018)
4 rooms * Square meter prices		-0.0317****		0.0041***		0.0086****
		(0.0087)		(0.0014)		(0.0019)

Table A1, comtinued

	Private ownership		**Cooperative ownership**		**Rental units**	
	Model 3b	Model 4b	Model 3b	Model 3b	Model 4b	Model 3b
5+ rooms * Square meter prices		-0.0345****		-0.0014		0.0110****
		(0.0087)		(0.0016)		(0.0024)
Control variables	X	X	X	X	X	X
Year trend	X	X	X	X	X	X
FE Duration	X	X	X	X	X	X
FE Zipcode	X	X	X	X	X	X
FE Zipcode * Year	X	X	X	X	X	X
Observations	2,781,341	2,781,341	2,680,445	2,680,445	2,428,767	2,428,767
R^2	0.047	0.047	0.058	0.058	0.056	0.056

Note: standard errors are in parentheses.
****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

Paper 3

The price to pay: Airbnb's influence on the housing market in the Greater Copenhagen area[*]

Aske Egsgaard[†]

Abstract

The increasing use of flexible short-term rental platforms such as Airbnb have led to policy-makers and academics worrying that this will contribute to, rather than resolve, the increasing socioeconomic segregation of cities by causing higher housing costs and changing residential sorting. This paper adds to the limited literature on the effect of Airbnb on residential prices, by combining the influence of Airbnb on residential prices together with households' housing choices. The paper uses a unique dataset, including detailed register data on all house transactions, as well as the socioeconomic characteristics of households in the Greater Copenhagen area from 2010 to 2016, which are linked with data on all Airbnb stays between 2012 and 2016. The results indicate that a high presence of Airbnb within a zip code is associated with a greater probability for households to either sell or buy a residence, and likewise that a doubling in the presence of Airbnb is associated with a 7% increase in residential prices. Given that this is the first time that the influence of Airbnb on housing choice and house prices have been investigated simultaneously, the preliminary estimates of this paper form the basis for other studies to build upon.

Keywords: sharing economy, housing, residential sorting,

JEL codes: D1, O3, R1, R2.

---

[*] I would especially like to thank Ismir Mulalic, Associate Professor, Department of Economics, Copenhagen Business School, for his valuable help in developing the ideas and analytical framework for this paper. Without his insights and comments, this paper would not have been possible.

[†] Department of Geoscience and Natural Resource Management, Geography Section, University of Copenhagen, and Department of the Build Environment, Aalborg University.

Introduction

Sharing economies, defined as digitally mediated systems of the exchange of goods and services, have become regularly debated topics among academics, technology specialists, policy-makers and urban planners (Wachsmuth and Weisler 2018; Lee 2016; Horn and Merante 2017; Ferreri and Sanyal 2018; Gurran and Phibbs 2017). With a presence in more than 30,000 cities around the world, the 'home-sharing' service Airbnb is one of the most noteworthy examples of a sharing economy in our time (Sans and Quaglieri 2016). In this paper, the implications of the rapid growth of Airbnb on residential sorting and the housing market in the Greater Copenhagen metropolitan area is investigated.

Airbnb, a digital platform that mediate short-term accommodation, dates back to 2008 and was a successful business already in 2010 (Sans and Quaglieri 2016, Anon 2013). In 2012 Airbnb made its first entrance in Denmark's short-term rental market and has since then has expanded its activity dramatically (Geerdsen et al. 2016). However, despite the large interest on the influence of Airbnb on cities and local neighbourhoods from both policy-makers and the general public, the potential impact of such housing-sharing systems on residential sorting and the housing market in general has received little academic attention so far. Nonetheless there does exist a vast amount of academic literature warning about the possible side effects of increasing urbanization in putting pressure on house prices and contributing to the increasing socioeconomic segregation of large cities (Florida 2017; Rodríguez-Pose and Storper 2019; Glaeser 2020; Scott 2008a; Storper et al. 2015). As neighbourhood house prices increase the variation in the socioeconomic attributes of those households that can afford to live there decreases, creating more socioeconomically homogeneous neighbourhoods. This can lead to what Richard Florida and Patrick Adler have dubbed 'the patchwork city', in which small pockets of more affordable and deprived neighbourhoods are surrounding by gentrified neighbourhoods composed of much more affluent households (Florida and Adler 2018). If Airbnb also influence residential prices to increase it hereby contributes to this unfortunate development of making the city more segregated. Up until now much of the focus within the academic literature of Airbnb has mainly been on questions regarding legalization, regulation, the relationship between supply and demand, and use of economy-sharing services (Zervas et al. 2015; Shabrina et al. 2021; Lee 2016; Dogru et al. 2019, 2020; Stabrowski 2017). Only a handful of studies have so far looked at the effect of Airbnb on residential prices, and next to none have examined its influence on housing choices. In this paper I therefore wish to add to the slowly increasing literature related to the influence of Airbnb on the housing market and neighbourhood composition by providing some preliminary estimates of the relationship of Airbnb to households housing choices and its impact on house prices. This is done by focusing on the rapid increase of Airbnb in Copenhagen, which is linked with micro-

data derived from administrative registers for all households within the Greater Copenhagen metropolitan area.

There is only a small handful of studies that have linked the upcoming of Airbbn together with residential and rental prices. Lee (2016) finds that Airbnb leads to increased rents for long-term renters in order to make it worthwhile for landlords to not shift to short-term renting through Airbnb. Likewise, Yrigoy (2018) shows that Airbnb can be attributed to increasing rental prices in Mallorca, as the long-term rental portfolio decreases and the short-term portfolio increases. Another study by Gurran and Phibbs (2017) describes how the rental market is affected by Airbnb and calculates that the amount of housing stock removed from the rental market equals about half of Sydney's rental vacancy rate. So far, only a small handful of studies have investigated the causal effect of Airbnb on the housing market. While they all find significant positive results for this effect, the size of the effect they find varies markedly. By using a combination of fixed effect and instrument-variable approaches together with an event study model, Garcia-López et al. (2020) find that the effect of Airbnb on rental prices in Barcelona entails a 1.9% increase in rents and a 4.6% increase in transaction prices for each 1% increase in Airbnb usage. Similarly, by using an instrument-variable approach, Baron et al. find that a 1% increase in Airbnb use leads to a rent increase of 0.018% and an increase in house prices by 0.026% in the United States (Barron et al. 2020). By using a difference-in-difference approach combined with hedonic price estimates, Shappard and Udell (2016) show that a doubling in Airbnb usage leads to an increase in house prices in New York City of between 6 and 11%. Furthermore, by using an inverse demand function, Elíasson and Ragnarsson (2018) find that Airbnb has caused a 2% annual increase in residential prices from 2014 to 2017 in the Icelandic housing market, equivalent to 15% of the total rise in residential prices within the period. Finally, by using policy restrictions on short-term rentals as a natural experiment, Koster et al. (2018b) find that Airbnb have caused a decline in both housing and rental prices of 3% within Airbnb restricted areas when compared with the neighbouring non-restricted areas

This paper is structured as follows. First, I will elaborate on the theoretical framework for how and why Airbnb can be thought as influencing the housing market. Thereafter the data used in the paper, together with the sampling strategy, are carefully described, including the evolution of Airbnb in Copenhagen's neighbourhoods. I then describe first the characteristics of the residences in the sample, both of those that were sold during the period of examination and those that were not, and then the characteristics of all the households within the sample, distinguishing between those that sold their residences, those that bought one and all the others. Afterwards I deploy my analysis, in which I first account for the control function approach used in the analysis

and for the instrument I used to avoid unobserved endogeneity, followed by a description of the weighted Airbnb variable that is used in place of the original Airbnb measure. The analysis itself is divided into two parts, where the first part focuses on how Airbnb influences the probability for selling and buying a residence, while the second part investigates how house prices are affected by Airbnb. The paper ends with some final remarks on its results and with a real-world estimate of the effects of Airbnb on residential prices, followed by a suggestion for possible next steps in the investigation on Airbnb's influence on housing markets and neighbourhoods.

Housing consumption and Airbnb

In this section, I will explain the underlaying framework regarding why Airbnb can be thought to affect people's housing choices and ultimately cause residential prices to rise.

Households can be thought of as consuming a set amount of housing in accordance with their housing services, which is equal to the sum of housing qualities connected with the residence and the household's available resources, from which they seek to maximize their acquired utility. The housing services represents aggregate characteristics about the residence, making it quantifiable and comparable with other residences (Muth 1974; Røed Larsen and Sommervoll 2009). However, using aggregated characteristics has been criticized for assuming that housing is homogeneous across residences and thus risks overlooking the unobserved heterogeneity between various residences (Rouwendal 1998). Instead, housing should whenever possible be applied at the residence level in order to avoid potential unobserved residential heterogeneity.

The housing services has characteristics that are directly connected to the residence, such as residence size, the number of rooms (Tatsiramos 2006; Chiuri and Jappelli 2010; Angelini and Laferrère 2012; Ball and Nanda 2013; Angelini et al. 2014), the number of bathrooms (Kain and Quigley 1970; Srour et al. 2002), access to a garage (Vyvere et al. 1998) etc. Housing services also has exterior characteristics that are not directly connected to the residence, such as the proximity to a workplace (Rouwendal 2002; Letdin and Shim 2019; Baum-Snow and Hartley 2020) or school (Vyvere et al. 1998; Frenette 2004; Bayer et al. 2007; Alm and Winters 2009; Pinjari et al. 2009). These have also been found to be of importance when assessing the potential acquired utility of a residence. Likewise, does access to green recreational areas (Guest 1972; Srour et al. 2002; Pinjari et al. 2009, 2011; Carlino and Saiz 2019) and distance to social networks (Champion and Fielding 1992; Dykstra et al. 2006; Mulder 2007) increase residential utility. Conversely, high levels of crime (Cullen and Levitt 1999; Tita et al. 2006; Ellen and O'Regan 2010; Xie and Mcdowall 2014; Bayer et al. 2016) and pollution (Harrison Jr. and Rubinfeld 1978; Zheng and Kahn 2008; Bayer et al. 2009) in a neighbourhood have been found to decrease household utility.

Over time, a household's preferences for the available housing services will most likely change, as they move to another stage in their lifecycle or life course (Clark and Van Lierop 1987; Browning and Crossley 2001; Painter and Lee 2009). Thus, as the difference between a household's housing preferences and the increased value of their current residence increases, so does the probability of the household choosing to move to a new residence. Households can therefore be thought to move when the potential utility gained by moving to a new residence exceeds the utility gained by staying in their current residence. When people move, it therefore happens as a result of a tipping point when the quality of the housing services in the new housing unit exceeds the quality of the housing services of the old housing units combined when the expenses of moving. The moving costs should also be factored in when exploring residential choices, as high moving costs can offset the choice of moving to a residence with otherwise higher quality of housing services(Amundsen 1985).

With the possibility of short-term renting through digital platforms such as Airbnb, households become capable of consuming more housing services than before while earning the same levels of income, thus increasing the utility they gain from their residence. Through Airbnb, households can be compensated for underutilized some of their residence connected with attributes such as residential size and the number of rooms, thus allowing the household to consume more housing services than they would otherwise choose to do (Stephany 2015; Belk 2014). In this case, some households will be more inclined to move to neighbourhoods with high levels of Airbnb, as this will allow them to consume more housing services and thus increasing utility. By doing so, the demand for residences in these neighbourhoods increase, thus increasing house prices (Turner et al. 2014). However, for some households Airbnb might lead to negative externalities, as increased renting in the neighbourhood can cause annoyance from noise levels, together with increased insecurity due to the high turnover of unknown people in the neighbourhood, thus leading to a decrease in people's willingness to live in such an area (Filippas and Horton 2017).

Data and sampling strategy

In this section, I describe the data used in the analysis of Airbnb's influence on housing prices and households' housing choices in the Greater Copenhagen metropolitan area. First, I describe the origin of the two datasets applied in the analysis – the Airbnb data, and register data from Statistics Denmark. Second, I show how the two datasets are linked together using the zip codes of individuals and residences in the two data sets. Third, I described the sampling strategy I use in the analysis of house prices and residential choice.

Data sources: Airbnb and Statistics Denmark

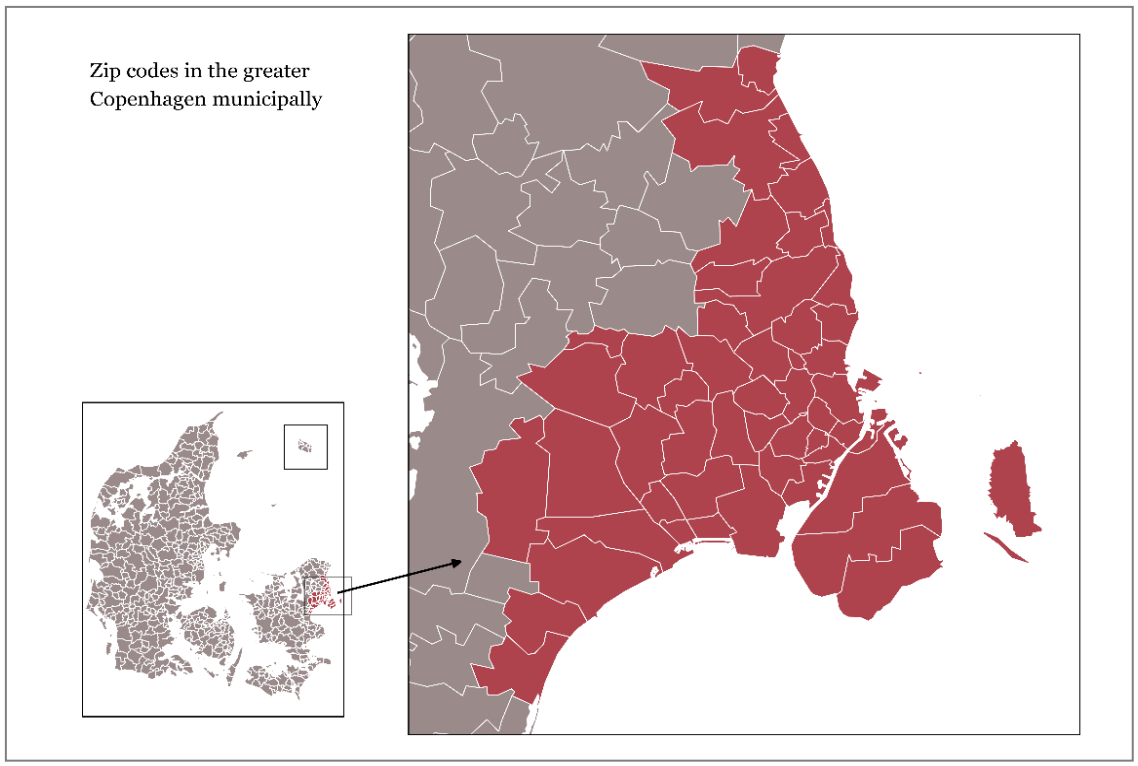
The data on Airbnb listings used in this paper originate from Airbnb, who has provided access to its administrative data on Airbnb usage in Copenhagen for selected outcomes. The data include, among others, the annual number of guests arriving with Airbnb, the average number of nights each guest stayed and the average price per night for both the entire residence and private rooms. The data are measured on an annual basis within the period from 2012 to 2016 and are aggregated on the zip-code level within the Greater Copenhagen metropolitan area.

Besides Airbnb's data on households, their moving patterns and the prices of traded residences are also used. These data stem from Statistics Denmark, and the available administrative micro-data contain both socioeconomic and social information on each individual, including their residence. The administrative data from Statistics Denmark also contain information on the date of when a property is traded, at what priceand who sold it and who bought it, making it possible to link the data on residential attributes with those on household characteristics.

Merging Airbnb data with the Danish administrative data

The natural link between the data from Airbnb and Statistics Denmark that I use to merge the two sets of data together with is the zip code identifier, as this is the smallest shared spatial unit in both sets of data. Figure 1 below illustrates the different sizes and layouts of the zip codes in the greater Copenhagen municipality, coloured red and divided by a white border. In the older parts of Copenhagen especially, the zip codes are very small both geographically and residence-wise. I have therefore clustered some of the smaller zip codes that are situated in close proximity to each other. The resulting number of zip codes in the data falls to 49 where the number of residents within each zip code varies from 600 to 87,000 residents.

Figure 1. Zip codes in the Greater Copenhagen Municipally



By merging the Airbnb data with register data from Statistics Denmark identified by zip codes, I obtain information on both residences and the residing households within Greater Copenhagen annually from 2010 to 2016 and Airbnb activity within each zip code from 2012 to 2016.

I sample the population using the administrative register data on completed real-estate transactions within the Greater Copenhagen area in combination with demographic information on both the buyers and the sellers for the period 2010 to 2016. Since the Greater Copenhagen area can be considered to be a single integrated labour market and a single integrated housing market, I avoid the potential effect that spatial differences in productivity and local urban amenities or their absence can have through their influence on spatial equilibrium (Roback 1982; Kahn 1995). Following Taylor (2003), I exclude transactions among family members and transactions resulting from foreclosure auctions. The sample includes 76,626 completed real-estate transactions.[1] I also take into account dwelling attributes, such as floor area, the number of rooms and the age at construction.

[1] Transaction data also has drawbacks since the included transactions do not necessarily represent a random sample of the total housing stock. Ihlanfeldt and Martinez-Vazquez (1986) tested whether implicit prices from transaction data differ systematically from those from a complete property value database, but found no systematic difference. I expect the selection bias to be relatively minor, since the data cover all realized transactions.

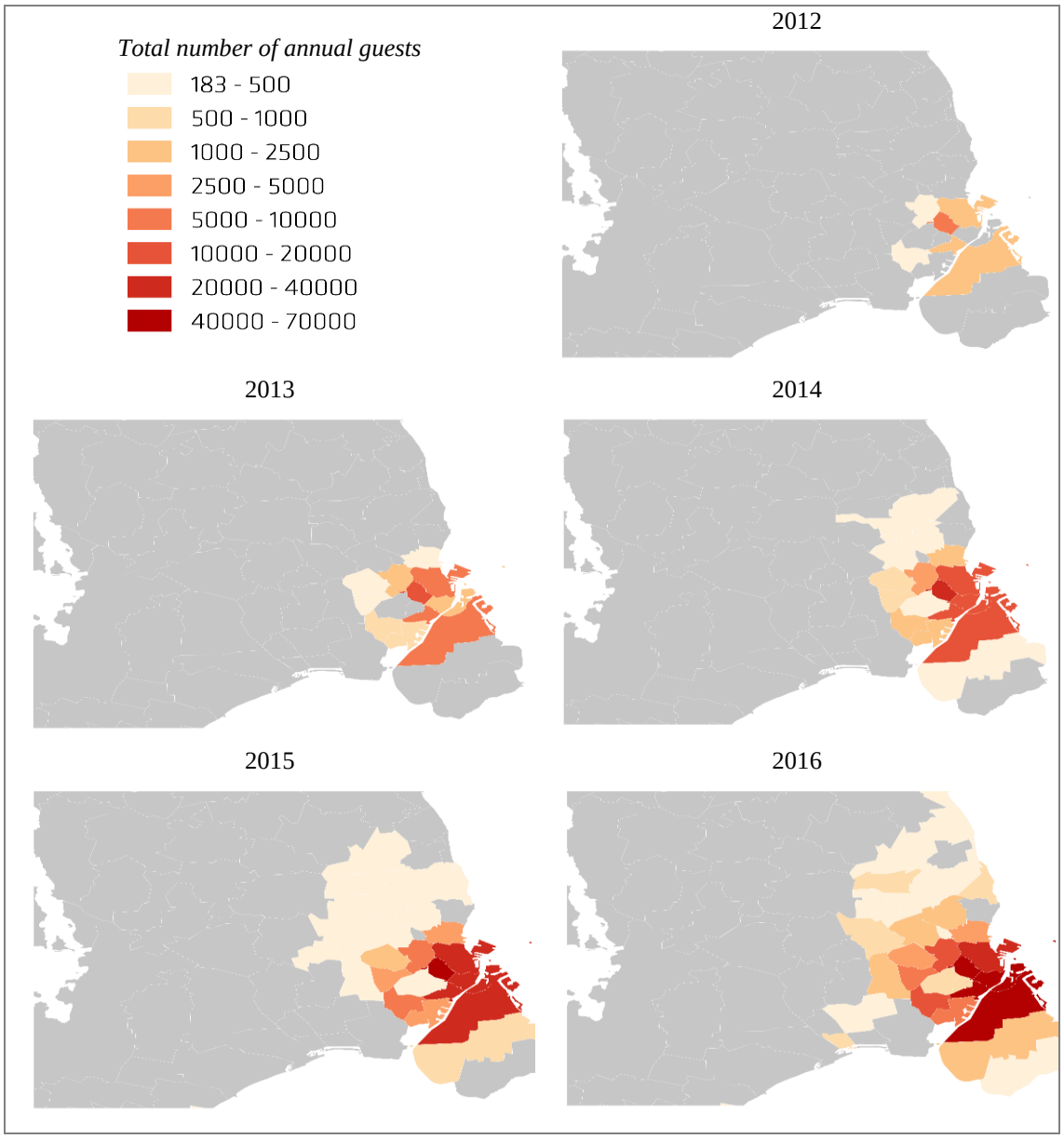
Descriptive statistics

In this section, I further describe the key characteristics of the data in the sample, starting with Airbnb, then moving on to all residences, including a comparison of the attributes of the residence that are traded and those that are not. Finally, I consider the characteristics of the households in the sample, which is further divided into those who buy and those who sell.

Airbnb's expansion in Greater Copenhagen

Use of Airbnb in Greater Copenhagen has increased drastically from its first introduction in 2012, when 13,110 guests spent a total of 72,247 nights in Copenhagen, rising up to 388,022 guests spending 1,656,159 nights in 2016. Likewise, there is significant variation in the adoption of Airbnb across city neighbourhoods during the period. The maps in Figure 2 show how the use of Airbnb increased in the order of both geography and magnitude across zip codes within Greater Copenhagen from 2012 to 2016. Figure 2 also shows how the number of Airbnb guests each year has increased and spread across zip codes during the four years from 2016 to 2020. Appendix 1 shows a similar development in the average number of nights spent with Airbnb. In the first years the number of guests could be counted in the hundreds, but from 2014 onwards the number of guests, especially in the centre of Copenhagen, has been well above 10,000 a year. Furthermore, use of Airbnb is spreading, especially to the northern suburbs of Greater Copenhagen.

Figure 2. Development in annual number of guests using Airbnb in the Greater Copenhagen area.



Source: own calculation based on data from Airbnb

These data show that there has been a steep increase in the number of guests and available Airbnb listings in the Greater Copenhagen area and that Airbnb has spread out from the centre of Copenhagen to the suburbs.

Privately owned residences in Greater Copenhagen

In Table 1 descriptive statistics for key attributes of residences in the Greater Copenhagen area are presented. The first thing to note is that more than half of the traded residences consist of apartments, even though this type of residence only makes up about forty percent of the total residential market. Furthermore, the traded residences are generally smaller and have fewer rooms than the non-traded residences, which is consistent with the larger share of traded apartments.

Moreover, there is a high degree of variation in almost every attribute within the same year, which is very useful in identifying implicit prices (Sheppard 1999).

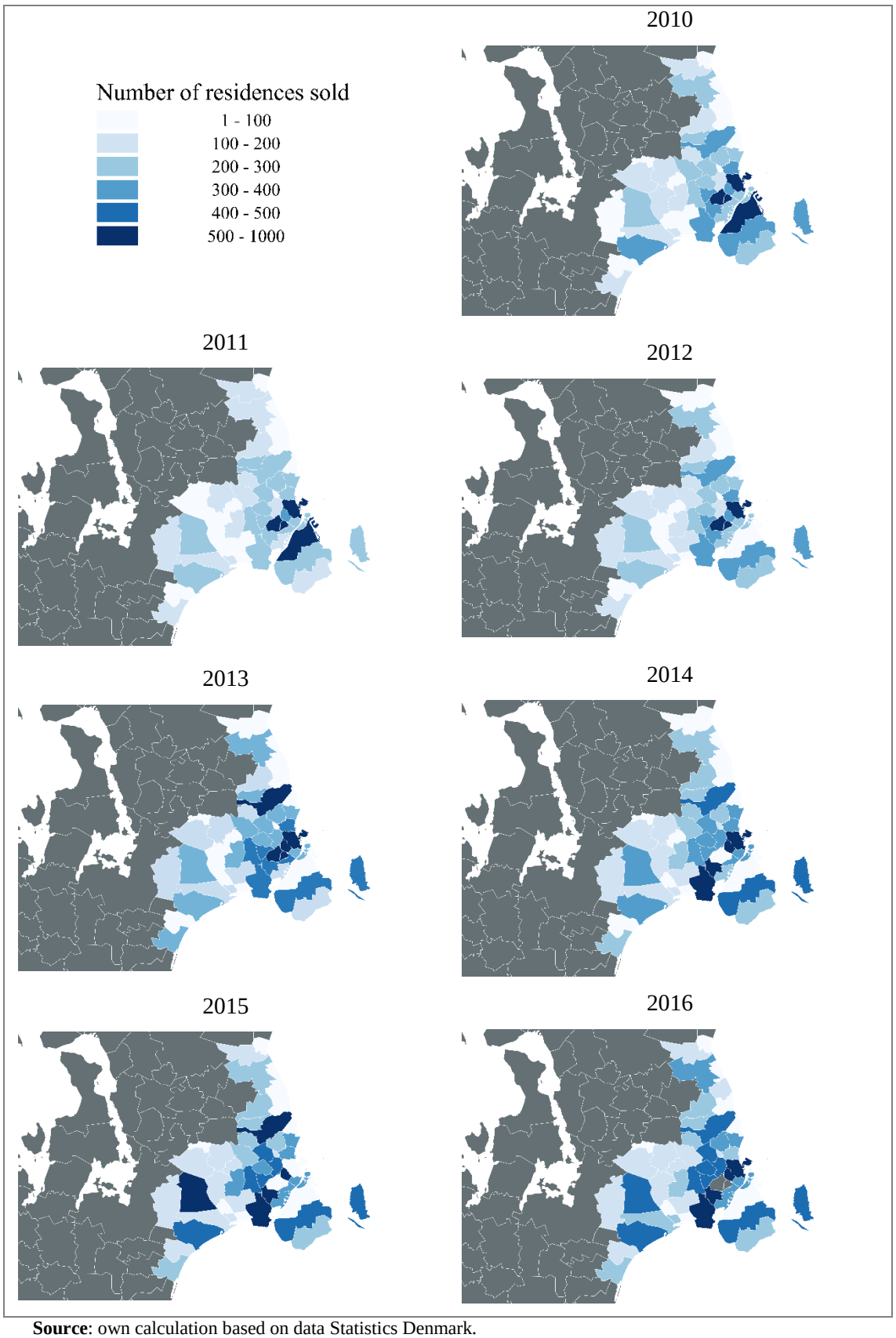
Table 1. Housing descriptions, including t-test for differences between traded and non-traded residences.

	All residences	Traded residences	Non-traded residences	T-test: traded vs. non-traded
Apartments	0.410	0.565	0.400	93.39****
	(0.492)	(0.496)	(0.490)	
Single family house	0.439	0.301	0.448	16.07****
	(0.496)	(0.459)	(0.497)	
Townhouse	0.152	0.134	0.153	97.61****
	(0.359)	(0.341)	(0.360)	
Number of rooms	4.034	3.570	4.064	96.68****
	(01.605)	(01.475)	(01.608)	
Residence size (sqm)	115.527	102.427	116.376	-16.26****
	(48.325)	(41.839)	(48.594)	
Building year	1949.008	1950.744	1948.895	12.86****
	(31.314)	(33.464)	(31.167)	
Age of construction	64.015	62.640	64.104	18.78****
	(31.338)	(33.506)	(31.190)	
Number of observations	1,503,004	76,626	1,411,555	

Source: own calculation based on data from Statistics Denmark. **Note:** standard errors are in parentheses. ****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

The number of residences sold between zip codes has increased overall from the 2010–2016 period, as depicted in Figure 3. However, while the number of residences sold in the zip codes closest to the centre of Copenhagen have seen the least variation during this period, the zip codes further away from the centre have experienced a greater increase and year to year variation.

Figure 3. Number of residences sold between zip codes from 2010 to 2016.



Source: own calculation based on data Statistics Denmark.

Households in Greater Copenhagen

The data used in the paper contain information on all households living in a privately owned residence in Copenhagen from 2010 to 2016. Furthermore, information on both the head and the potential partner of the household is given in a detailed table in Appendix 2. Data on households cover household disposable income, mean age, a dummy indicating single households, the number of children in the household, labour market attachment and highest level of completed education.

Table 2 reports descriptive statistics for all households and for the subsamples of buyers as well as sellers. One thing to note from the table is that the standard deviation is rather large, meaning that there is a lot of variation within the sample. Furthermore, the table shows that households that buy a residence are on average younger, better educated, have more children and are still more active on the labour market, as well as having marginally higher disposable incomes and being less likely to be single than those who sell their residence. Overall Table 2 shows that there are significant differences between the social and socioeconomic characteristics of those households that buy and sell their residences, including when compared to households that do neither.

Table 2. Descriptive statistics: buyers and sellers

	All	Sellers	Buyers
Household disposable income (1,000 DKK)	673,101	639,989	653,188
	(605,930)	(545,003)	(546,210)
Age (years)	49.7	45.4	37.7
	(17.1)	(17.5)	(13.9)
Single households	0.433	0.489	0.470
	(0.495)	(0.50)	(0.499)
Number of children			
No children	0.669	0.660	0.635
	(0.471)	(0.474)	(0.481)
1 child	0.130	0.159	0.176
	(0.336)	(0.366)	(0.381)
2 children	0.156	0.147	0.153
	(0.363)	(0.354)	(0.360)
3 children	0.039	0.031	0.031
	(0.195)	(0.174)	(0.174)
4+ children	0.006	0.004	0.004
	(0.075)	(0.060)	(0.064)
Primary labour attachment			
Working	0.367	0.361	0.421
	(0.482)	(0.480)	(0.494)
Student	0.137	0.178	0.202
	(0.344)	(0.383)	(0.401)
Unemployed	0.252	0.273	0.306
	(0.434)	(0.446)	(0.461)
Retired	0.243	0.187	0.071
	(0.429)	(0.390)	(0.257)
Highest completed education			
Elementary school	0.104	0.101	0.076
	(0.306)	(0.302)	(0.266)
High school	0.095	0.100	0.168
	(0.293)	(0.299)	(0.374)
Vocational	0.279	0.257	0.190
	(0.449)	(0.437)	(0.392)
College	0.245	0.236	0.218
	(0.430)	(0.425)	(0.413)
University	0.277	0.306	0.347
	(0.448)	(0.461)	(0.476)
Observations	1,954,620	77,913	74,903

Source: own calculation based on data from Statistics Denmark
Note: standard errors are in parentheses.

Analysis

In this section, I first investigate the impact of rising Airbnb usage in Copenhagen on households that choose to buy or sell their residence, followed by an analysis of Airbnb's effects on the overall prices of traded residences. Initiating each part of the analysis, the specific empirical strategy used will be presented. However, first the control-function instrument approach and the grid search strategy to find the optimal distance decay of Airbnb, which enters into both parts of the analysis, will be described.

Control-function approach

As a way of reducing the likelihood of unobserved endogeneity in the estimation results, related to zip codes with a high presence of Airbnb, a control-function approach using an instrument variable is implemented. This approach is chosen over other instrument-variable approaches such as the two-stage least squares, as the control function has the advantage that it also provides usable R-squared compared to the two-stage least square approach while yielding similar results to the two-stage least square instrument variable approach under linear model specifications (Guo and Small 2016). In the control function approach, a control variable is inserted into a model in order to control the unobserved endogeneity of the explanatory variable of interest. Or, as in equation 1, it is assumed that y_2 is correlated with the unobserved u_1 and is therefore endogenous:

$$y_1 = \alpha_1 y_2 + z_1 \delta_1 + u_1 \quad (1)$$

Where z_1 represents a vector of exogenous explanatory control variables. If an instrument z_2 exists that fulfils the assumption of weakest exogeneity and is therefore not correlated with the unobserved u_1 or $E(I(z_2)u_1) = 0$, but is correlated with y_2, it is possible to use this as a means to control for the unobserved endogeneity (Petrin and Train 2010; Wooldridge 2015). To do this, regress y_2 on the instrument z_2 and preserve the predicted residual, as shown in equation 2:

$$y_2 = z_2 + v_2, \mathrm{E}(z_2 v_2) = 0 \quad (2)$$

Given that the usual requirements to the instrument are fulfilled, equation 2 shows that the instrument z_2 and the residual v_2 are uncorrelated and that the residual, together with an unobserved error term e_1, explains the unobserved u_1 from equation 1, as shown in equation 3:

$$u_1 = p_1 v_2 + e_1 \quad (3)$$

Therefore, all that is left in order to control for the endogeneity in the explanatory variable of interests from equation 1, y_2 is to insert the residual and the new error term into the equation:

$$y_1 = \alpha_1 y_2 + z_1 \delta_1 + p_1 v_2 + e_1 \quad (4)$$

As an instrument in the first stage of the control function approach, the distance in meters to the neighbouring zip code with the most Airbnb activity is used. The instrument has the advantage that besides correlating with the presence of Airbnb, it also varies from one year to the next, as the zip code with the highest presence of Airbnb fluctuates. At the same time, it is unlikely that the distance to the zip code with the most Airbnb activity should be correlated with other unobserved phenomena that also influence the dependent variable.

Throughout the analysis, an additional instrument will be used as a robustness check of the primary instrument and a way to secure the empirical results further. The additional instrument used is the average number of tourists visiting the nearby tourist amenities, weighted by the distance to the tourist amenities of the top ten most visited attractions in Copenhagen within the year calculated by VisitDenmark.[2] This instrument has a close resemblance to what Garcia-López et al. use in their paper, where they used data from TripAdvisor to locate and measure the distance to Barcelona's tourist amenities, which turned out to be a strong instrument (Garcia-López et al. 2020). Given that there is some variation in the top ten most popular tourist amenities in Copenhagen from one year to the next and that the number of tourists visiting these amenities also varies, there should not be any reason to believe that this should not also be the case in this paper.

Grid search of Airbnb's distance decay

In order to identify Airbnb's impact on house prices and residential choice, I construct a measure of Airbnb's presence in the vicinity of each household. I use annual data on the total number of nights spent in Airbnb accommodation within each zip code, given that the possible impact of Airbnb is likely to depend on the proximity and not on the administrative border of a zip code, and that the number of nights spent in Airbnb accommodation in nearby neighbourhoods is more relevant than in neighbourhoods further away (Rengert et al. 1999; Taylor and Openshaw 1975). I therefore use the weighted sum of number of nights spent in Airbnb accommodation, *WAirbnb*, in which the closer neighbours have a higher weight. The value of this variable *WAirbnb* for zip code z is calculated as:

$$WAirbnb_z = \sum_z {}'Airbnb'_z \, e^{-\delta \, d_{z\,z'}}$$

Where the summation runs over all zip codes *z'*, *Airbnb* is the total number of nights tourists spent in Airbnb accommodation, and *d* denotes distance to all other zip codes measured in meters. Through a grid search for the optimal distance decay using the control function and including the

[2] Visit Denmark is the national tourist organisation in Denmark in charge of promoting and expanding tourism in the country (Visit Denmark 2021).

distance to neighbouring zip codes in which thousands of different δ values are tried, I find that the decay value providing the best fit with the data is at 0.00604. See Appendix 3 for figure of optimal decay. This implies that the effect of Airbnb is a local phenomenon relative to the zip code, as the nights spent in Airbnb accommodation 'around the corner or in the same building' have a weight of 1, while the weight of having spent a night in Airbnb accommodation is halved after 110 meters, is 10% at about 400 meters and completely disappears after more than 1,000 meters. Had the grid search showed that the optimal decay was at a lower δ value, that would imply that Airbnb was a less local phenomenon, while a higher δ value would have meant that it was an even greater local phenomenon. See Appendix 4 for a figure showing how the Airbnb weight decays over distance.

Analysis and model setup – I: Likelihood to sell and buy residences

The first part of the analysis focuses on how the presence of Airbnb within zip codes can have an influence on the probability that households choose either to sell or buy a residence. I will first go over the model set up used to estimate the probability to both sell and buy a residence and then present the empirical results before briefly covering the robustness tests used to back up the initial results.

The model used to estimate how the probability of selling or buying a residence is influenced by Airbnb is the linear probability function and is given by:

$$P(Sell) = \beta_0 + \beta_1 \log(Airbnb) + \alpha\vartheta_{Residence} + \sigma\vartheta_{Husehold} + \beta_2 Year + \beta_3 ZipCode + u$$
$$P(Buy) = \beta_0 + \beta_1 \log(Airbnb) + \alpha\vartheta_{Residence} + \sigma\vartheta_{Husehold} + \beta_2 Year + \beta_3 ZipCode + u$$

Estimating the probability of households both selling and buying a residence depended on the magnitude of Airbnb present in their zip code I, besides the Airbnb measurement, including several control variables as mediators. Whereas the variable $\alpha\vartheta_{Residence}$ represents a vector of the residential characteristics in Table 1, $\sigma\vartheta_{Household}$ represents a vector of all the household characteristics from Table 2, $\beta_2 Year$ is a vector of year fixed effects, and $\beta_3 ZipCode$ is a vector of zip-code fixed effects. Furthermore, Airbnb, residential size and household disposable income are included in logarithmic form, as the range of all these variables are very wide, making their interpretation more straightforward. The model and all other models in this part of the analysis are estimated using robust standard errors to decrease the risk of a false negative being reported. Besides the standard linear probability function, the probability of selling and buying a residence is also estimated using the control function instrument approach in which first the residuals from Airbnb, being regressed on the distance to the nearest zip code, are stored and then included in the model from above, giving:

$$P(Sell) = \beta_0 + \beta_1 \log(Airbnb) + \alpha\vartheta_{Residence} + \sigma\vartheta_{Husehold} + \beta_2 Year + \beta_3 ZipCode + \beta_4 Residual + \varepsilon$$

$$P(Buy) = \beta_0 + \beta_1 \log(Airbnb) + \alpha\vartheta_{Residence} + \sigma\vartheta_{Husehold} + \beta_2 Year + \beta_3 ZipCode + \beta_4 Residual + \varepsilon$$

As expected, the correlation in the first step of the control function estimation is negative, highly significant and produces an F-test value well above 16, which further validates the strength of the instrument (Yogo and Stock 2005; Sanderson and Windmeijer 2016). The results of the first step means that the longer the distance to a nearby zip code, the less Airbnb will be represented in that zip code. This is in agreement with the development of Airbnb in Copenhagen depicted in Figure 2, showing that Airbnb has a larger presence in the centre of Copenhagen, where zip codes are closer to each other, while on the outskirts of Copenhagen zip codes are father apart and Airbnb's presence is less. See Appendix 5 for a table of the coefficients from the first-stage model.

Table 3 gives the results of the linear probability model and control function instrument estimations on the correlation between selling or buying a residence, the exposure to Airbnb within the zip code and the corresponding control variables. As Table 3 shows, there is a positive and highly significant correlation between either selling or buying a residence and the presence of Airbnb in the zip code. Furthermore, the control function estimates for Airbnb for both selling and buying an apartment is also highly significant and positive. Since Airbnb is given in logarithmic form, the coefficient shows that, when the presence of Airbnb increases by 1%, the likelihood of selling increases by 0.006 % and the likelihood of buying increases by 0.004 %. While perhaps at first glance this does not seem like a lot, one should keep in mind that the presence of Airbnb increased by several hundred percent from its first introduction in 2012 up to 2016. Besides the positive correlation with Airbnb, Table 3 shows that small apartments with few rooms are more likely to be sold, while buyers seek larger apartments and townhouses with more rooms. Likewise, those who either choose to sell or to buy a residence are more likely to live in single households with a single child and to have an upper secondary education degree. However, those who choose to sell are more likely to do so if they are single and have a child than those who buy, while buyers are more likely to have a high income and a college or university education. These differences between the household composition of those who choose to sell and those that buy is consistent the with the descriptive differences shown in Table 2.

Table 3. Likelihood to either sell or buy a residence.

	Model 1: Sellers		**Model 2: Buyers**	
	LPM	CF	LPM	CF
Airbnb (log)	0.00006****	0.00006****	0.00003****	0.00004****
	(0.00001)	(0.00001)	(0.00001)	(0.00001)
Distance residual		0.00001		-0.00003**
Apartment (ref.)		(0.00001)		(0.00001)
Single family house	-0.00803****	-0.00803****	-0.00408****	-0.00408****
	(0.00049)	(0.00049)	(0.00046)	(0.00046)
Town house	-0.00424****	-0.00424****	0.00120**	0.00120**
	(0.00054)	(0.00054)	(0.00052)	(0.00052)
Number rooms	-0.00139***	-0.00139***	0.00425****	0.00425****
	(0.00043)	(0.00043)	(0.00042)	(0.00042)
Number rooms squared	0.00001	0.00001	-0.00060****	-0.00060****
	(0.00003)	(0.00003)	(0.00003)	(0.00003)
Residence size (log, m2)	-0.00655****	-0.00655****	0.00638****	0.00639****
	(0.00076)	(0.00076)	(0.00072)	(0.00072)
Building age (Years)	-0.00036****	-0.00036****	-0.00025****	-0.00025****
	(0.00002)	(0.00002)	(0.00002)	(0.00002)
Building age squared	1.347e-06****	1.349e-06****	2.016e-07	1.972e-07
No children (ref.)	(1.302e-07)	(1.302e-07)	(1.274e-07)	(1.274e-07)
1 child	0.01125****	0.01125****	0.00498****	0.00499****
	(0.00052)	(0.00052)	(0.00051)	(0.00051)
2 children	0.00077	0.00077	-0.01500****	-0.01500****
	(0.00049)	(0.00049)	(0.00048)	(0.00048)
3 children	-0.00273****	-0.00272****	-0.02136****	-0.02136****
	(0.00073)	(0.00073)	(0.00071)	(0.00071)
4+ children	-0.00612****	-0.00612****	-0.01898****	-0.01898****
	(0.00156)	(0.00156)	(0.00161)	(0.00161)
Single household	0.01036****	0.01036****	0.00773****	0.00773****
	(0.00047)	(0.00047)	(0.00041)	(0.00041)
Disposable income (log)	0.00848****	0.00848****	0.01017****	0.01017****
	(0.00032)	(0.00032)	(0.00030)	(0.00030)
Age (Years)	-0.00300****	-0.00300****	-0.00626****	-0.00626****
	(0.00006)	(0.00006)	(0.00006)	(0.00006)
Age squared	0.00002****	0.00002****	0.00004****	0.00004****
Employed (ref.)	(6.134e-07)	(6.134e-07)	(4.925e-07)	(4.925e-07)
Student	-0.00189***	-0.00189***	-0.00752****	-0.00752****
	(0.00068)	(0.00068)	(0.00066)	(0.00066)
Unemployed	-0.00399****	-0.00399****	-0.00857****	-0.00857****
	(0.00053)	(0.00053)	(0.00049)	(0.00049)
Retired	0.00335****	0.00335****	0.00447****	0.00447****

Table 3. Likelihood to either sell or buy a residence – Continued.

	Model 1: Sellers		**Model 2: Buyers**	
	LPM	CF	LPM	CF
Elementary school (ref.)	(0.00053)	(0.00053)	(0.00042)	(0.00042)
High school	-0.01285****	-0.01285****	0.00609****	0.00609****
	(0.00068)	(0.00068)	(0.00071)	(0.00071)
Vocational	0.003905****	0.003905****	0.00438****	0.00438****
	(0.00053)	(0.00053)	(0.00044)	(0.00044)
College	0.00350****	0.00350****	0.00860****	0.00860****
	(0.00055)	(0.00055)	(0.00048)	(0.00048)
University	0.00304****	0.00304****	0.01187****	0.01187****
	(0.00058)	(0.00058)	(0.00053)	(0.00053)
FE Year	Yes	Yes	Yes	Yes
FE Zip code	Yes	Yes	Yes	Yes
Observations	1,954,620	1,954,620	1,954,620	1,954,620
R^2	0.011	0.011	0.030	0.030

Source: own calculation based on data from Statistics Denmark. **Note:** standard errors are in parentheses.
****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

To supplement the results, and as a robustness check, the above probability models for both sellers and buyers are estimated again using the control function approach, where an additional instrument, number of visiting tourists, is used instead. This additional instrument shows a positive and highly significant correlation with Airbnb in the first step of the control function procedure. Furthermore, the accompanying F-test shows a value well above 16, supporting the belief in the instrument's strength. The results of the second step of the control function procedure in which the residual from the first step is incorporated supports the initial results in Table 3. A table showing the first- and second-step results from the control function approach using the number of visiting tourists instrument can be found in Appendix 6.

Analysis and model setup, II – Changes in residential prices

The second part of the analysis looks at the impact of Airbnb on housing prices after its introduction into the short-term residential rental market. As in the first part of the analysis, I will first go over the model set up used to estimate how Airbnb has influenced housing prices in Copenhagen using a hedonic price model. I will then present the results of the hedonic price estimates for both an ordinary OLS estimate and the control function approach in which the distance to the nearest zip code with Airbnb is used as an instrument for the presence of Airbnb.

The model that is estimated in order to detect changes in housing prices due to the presence of Airbnb is the hedonic price model in which the transaction prices of residences is

explained as a function of the observable attributes connected to the residence. In this case this is given by:

$$\log(Price) = \beta_0 + \beta_1 \log(Airbnb) + \alpha\vartheta_{Residence} + \beta_2 Year + \beta_3 ZipCode + u$$

When estimating the change in housing prices through the hedonic price model, housing prices are used in logarithmic form together with Airbnb and the size of the residence, as was the case in the first part of the analysis. Furthermore, as in the first part of the analysis, the term $\alpha\vartheta_{Residence}$ is a vector of the residentially specific characteristics shown in Table 1, while $\beta_2 Year$ is a vector of year fixed effect and $\beta_3 ZipCode$ is a vector of zip-code fixed effects. Since the hedonic price model estimates the price of the attributes attached to the residence, the household characteristics are not included in the model as in the first part of the analysis. Furthermore, the hedonic price models estimated in this part of the analysis are all estimated with robust standard errors, as in the first part of the analysis. Also as in the first part of the analysis, the standard OLS estimate of the hedonic price model will be supplemented by the control function approach in which the residual from an estimate between Airbnb and the distance to the nearest zip code with the Airbnb instrument is inserted into the model:

$$\log(Price) = \beta_0 + \beta_1 \log(Airbnb) + \alpha Residence + \beta_2 Year + \beta_3 ZipCode + \beta_4 Residual + \varepsilon$$

The first step in the control function procedure showed that the correlation between Airbnb and the distance to nearest the zip code with Airbnb is both negative, highly significant and produces a F-test value well above 16. This should come to no surprise, given that it is the same instrument as in the first part of the analysis, and thus the first step in the control function approach is also almost identical. See Appendix 7 for a table including the coefficients from the first-stage model.

Table 4 presents an OLS and instrument variable hedonic price estimation on the correlation between the amount of Airbnb within zip codes and the price of traded owner-occupied residences. The table shows that there is a significant positive correlation between the price of traded owner-occupied residences and the presence of Airbnb within the zip code. Likewise, the second step of the control function estimation shows that the distance to the nearest zip code with the Airbnb instrument also produces a positive and highly significant estimate. The coefficients for Airbnb in both the OLS and control function variant of the hedonic price estimation shows that whenever the presence of Airbnb increases by 1% in a zip code, it is accompanied by increases in residential prices of 0.07% and 0.09% respectively. Bearing in mind the drastic increase in the presence of Airbnb in some zip codes from 2012 to 2016, this accounts for the substantial increase in some residential prices and lies in close proximity to the results found by Barron et al. (Barron et al. 2020). Beyond this the results of Table 4 follow the consensus

on residential prices. Single family houses and townhouses are more expensive than apartments, and the price of a residence increases with an increase in residential size and the number of rooms. Finally, the age of the residence brings the price down, which can partly be attributed to the houses in the suburbs and the newly constructed residence within the city, as Copenhagen's housing stock is relatively old, on average having been built at the beginning of the 1950s as shown in Table 1.

As in the first part of the analysis, the additional instrument, the number of tourists visiting tourist amenities, is again used in the control function approach in order to test the robustness the results in Table 4. Seeing that the first step in the control function approach is almost identical to that in the first part of the analysis, it is to be expected that the results should be close to similar, which is also the case, accompanied by an F-test value well above 16. Likewise, the second-step procedure in the control function approach using the additional instrument supported the initial results reported in Table 4. See Appendix 8 for a table including the first- and second-step results for the control function approach using the additional instrument.

Table 4. Simple hedonic estimation for residential price

	OLS	CF
Airbnb (log)	0.0007****	0.0009****
	(0.0001)	(0.0001)
Distance residual		-0.0009****
Apartment (ref.)		(0.0001)
Single family house	0.3119****	0.3118****
	(0.0036)	(0.0037)
Town house	0.2413****	0.2411****
	(0.0036)	(0.0036)
Number rooms	0.1510****	0.1511****
	(0.0055)	(0.0054)
Number rooms squared	-0.0149****	-0.0149****
	(0.0006)	(0.0006)
Residence size (log m2)	0.7744****	0.7746****
	(0.0064)	(0.0064)
Building age (Years)	-0.0076****	-0.0076****
	(0.0001)	(0.0001)
Age of construction squared	0.0001****	0.0001****
	(8.766e-07)	(8.753e-07)
Year FE	Yes	Yes
Zip code FE	Yes	Yes
Observations	76,626	76,626
R^2	0.776	0.777

Source: own calculation based on data from Statistics Denmark. **Note:** standard errors are in parentheses. ****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

Discussion and final remarks

The introduction of Airbnb and other platforms like it has created new possibilities in the short-term rental market, allowing people a flexible way of maximizing their residential consumption. However, this new trend has also made it possible for people to be more strategic in their residential choices and the rethink how to optimize housing into the value of the residence, thus potentially causing an increase in residential prices and selecting what types of households are drawn towards areas where the presence, and thereby the opportunities, of Airbnb are larger. Legislators in many cities popular with tourists have become concerned about this development and have already launched initiatives aimed at reducing the spread of flexible short-term rentals in the hope of reducing the perceived negative effects of Airbnb, like increased residential prices and socioeconomical segregation in the city. However, these actions can end up having unintended consequences, since that the link between the rising presence of Airbnb and outcomes on the housing market, such as residential prices and housing choices, have still not been fully uncovered and understood. However, in recent years studies that have documented the causality between Airbnb and housing prices have begun to emerge, although there is still a lot left to be unravelled, thus calling for additional research on the topic.

In this paper, I therefore seek to partake in and add to the literature aimed at untangling Airbnb's influence on the future development of cities by providing initial results on how the presence of Airbnb affects people's housing choices, as well as providing support to earlier literature linking Airbnb to increasing house prices. In order to do this, I used detailed register data on all housing transactions from 2010 to 2016 in the Greater Copenhagen area that contained information not only on residential characteristics and transaction prices, but also on the socioeconomic characteristics of both sellers and buyers, all coupled with data on the actual number of nights tourists had spent with Airbnb in the zip code. The data showed just how rapidly Airbnb spread out and increased in the city in just the four years from 2012 to 2016. Given that the presence of Airbnb from one zip code to another is not as discrete in reality as it is presented in the data, a weighted Airbnb estimate was used instead based on the distance to nearby zip codes, which was weighted using an optimal distance decay estimate of the magnitude of Airbnb present in that zip code. Furthermore, a control function instrument approach was implemented in order to account for unobserved endogeneity on the presence of Airbnb.

The results from the first part of the empirical analysis showed that there is a significant correlation between the presence of Airbnb within a zip code and the probability that the households living in the zip code choose to sell their residences and that other households choose to buy them. Although at first glance the impact of Airbnb could be viewed as marginal, in reality

the impact is likely to be several magnitudes greater, given the steep increase in the presence of Airbnb from 2012 to 2016. Furthermore, the first part of the analysis showed that there is a difference in some of the key socioeconomic characteristics of the households that sell and buy a residence in the Greater Copenhagen area, particularly when it comes to income and education. The results from the second part of the analysis likewise showed that the increasing presence of Airbnb has led to a significant increase in house prices. The results showed that, whenever the presence of Airbnb within a neighbourhood doubled, it was accompanied by an increase of 7% in residential prices, or what amounts, on average, to almost $30,000. Together the results from the first and second parts of the analysis show that the increasing presence of flexible short-term rentals such as Airbnb in cities and neighbourhoods does have an influence on how the socioeconomic composition of these neighbourhoods develops. However, still more work needs to be done in this area before the picture of how Airbnb affects neighbourhood composition becomes perfectly clear. A natural next step would be to bring the first and second parts of the analysis together and combine them in order to explore the socioeconomic heterogeneity of those who choose to sell residences as a result of Airbnb and of those who choose to buy them. This would increase further our knowledge about Airbnb and the role of other flexible short-term rental portals on the course of development of future cities if left untouched and help policy-makers draw up policies for or against these types of rental platforms on a more informed basis, thus reducing the unforeseen side effects.

References

Alm, James, and John V Winters. 2009: Distance and intrastate college student migration Economics of Education Review 28(6), 728–38.

Amundsen, Eirik S. 1985: Moving costs and the microeconomics of intra-urban mobility Regional Science and Urban Economics 15(4), 573–83.

Angelini, Viola, Agar Brugiavini, and Guglielmo Weber. 2014: The dynamics of homeownership among the 50+ in Europe Journal of Population Economics 27(3), 797–823.

Angelini, Viola, and Anne Laferrère. 2012: Residential Mobility of the European Elderly CESifo Economic Studies 58(3), 544–69.

Anon. 2013: The rise of the sharing economy The Economist, March 9.

Ball, Michael, and Anupam Nanda. 2013: Household attributes and the future demand for retirement housing International Journal of Housing Markets and Analysis 6(1), 45–62.

Barron, Kyle, Edward Kung, and Davide Proserpio. 2020: *The Effect of Home-Sharing on House Prices and Rents: Evidence from Airbnb*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Baum-Snow, Nathaniel, and Daniel Hartley. 2020: Accounting for central neighborhood change, 1980–2010 Journal of Urban Economics 117, 103228.

Bayer, Patrick, Fernando Ferreira, and Robert McMillan. 2007: A Unified Framework for Measuring Preferences for Schools and Neighborhoods Journal of Political Economy 115(4), 588–638.

Bayer, Patrick, Nathaniel Keohane, and Christopher Timmins. 2009: Migration and hedonic valuation: The case of air quality Journal of Environmental Economics and Management 58(1), 1–14.

Bayer, Patrick, Robert McMillan, Alvin Murphy, and Christopher Timmins. 2016: A Dynamic Model of Demand for Houses and Neighborhoods Econometrica 84(3), 893–942.

Belk, Russell. 2014: You are what you can access: Sharing and collaborative consumption online Journal of Business Research 67(8), 1595–1600.

Browning, Martin, and Thomas F Crossley. 2001: The Life-Cycle Model of Consumption and Saving Journal of Economic Perspectives 15(3), 3–22.

Carlino, Gerald A, and Albert Saiz. 2019: Beautiful city: Leisure amenities and urban growth Journal of Regional Science 59(3), 369–408.

Champion, Tony, and Tony Fielding. 1992: *Migration processes and patterns / Vol. 1, Research progress and prospects.* London: Belhaven Press.

Chiuri, Maria Concetta, and Tullio Jappelli. 2010: Do the elderly reduce housing equity? An international comparison Journal of Population Economics 23(2), 643–63.

Clark, William AV, and WFJ Van Lierop. 1987: Chapter 3 Residential mobility and household location modelling , Handbook of Regional and Urban Economics. Regional Economics. Elsevier, pp. 97–132.

Cullen, Julie Berry, and Steven D Levitt. 1999: Crime, Urban Flight, and the Consequences for Cities Review of Economics and Statistics 81, 159–69.

Dogru, Tarik, Makarand Mody, and Courtney Suess. 2019: Adding evidence to the debate: Quantifying Airbnb's disruptive impact on ten key hotel markets Tourism Management 72, 27–38.

Dogru, Tarik, Makarand Mody, Courtney Suess, Nathan Line, and Mark Bonn. 2020: Airbnb 2.0: Is it a sharing economy platform or a lodging corporation? Tourism Management 78, 104049.

Dykstra, Pearl, Matthijs Kalmijn, Trudie Knijn, Aafke Komter, Aart Liefbroer, and Clara Mulder. 2006: *Family solidarity in the Netherlands*.

Elíasson, Lúðvík, and Önundur Páll Ragnarsson. 2018: Short-term renting of residential apartments. Effects of Airbnb in the Icelandic housing market IDEAS Working Paper Series from RePEc; St. Louis.

Ellen, Ingrid Gould, and Katherine O'Regan. 2010: Crime and urban flight revisited: The effect of the 1990s drop in crime on cities Journal of Urban Economics 68, 247–59.

Ferreri, Mara, and Romola Sanyal. 2018: Platform economies and urban planning: Airbnb and regulated deregulation in London Urban Studies, 0042098017751982.

Filippas, Apostolos, and John J Horton. 2017: *The Tragedy of Your Upstairs Neighbors: When Is the Home-Sharing Externality Internalized?*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Florida, Richard. 2017: *The New Urban Crisis: Gentrification, Housing Bubbles, Growing Inequality, and What We Can Do about It*. London, UNITED KINGDOM: Oneworld Publications.

Florida, Richard, and Patrick Adler. 2018: The patchwork metropolis: The morphology of the divided postindustrial city Journal of Urban Affairs 40(5), 609–24.

Frenette, Marc. 2004: Access to College and University: Does Distance to School Matter? Canadian Public Policy 30(4), 427–43.

Garcia-López, Miquel-Àngel, Jordi Jofre-Monseny, Rodrigo Martínez-Mazza, and Mariona Segú. 2020: Do short-term rental platforms affect housing markets? Evidence from Airbnb in Barcelona Journal of Urban Economics 119, 103278.

Geerdsen, Lars Pico, Ditte Håkonsson Lyngemark, and Ismir Mulalic. 2016: Hvad ved vi om Airbnb i København? Deleby: Et samskabt magasin om byens deleøkonomi, November.

Glaeser, Edward L. 2020: *Urbanization and its Discontents*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Guest, Avery M. 1972: Patterns of Family Location Demography 9(1), 159–71.

Guo, Zijian, and Dylan S Small. 2016: Control function instrumental variable estimation of nonlinear causal effect models The Journal of Machine Learning Research 17(1), 3448–82.

Gurran, Nicole, and Peter Phibbs. 2017: When Tourists Move In: How Should Urban Planners Respond to Airbnb? Journal of the American Planning Association 83(1), 80–92.

Harrison Jr., David, and Daniel L Rubinfeld. 1978: Hedonic housing prices and the demand for clean air Journal of Environmental Economics and Management 5(1), 81–102.

Horn, Keren, and Mark Merante. 2017: Is home sharing driving up rents? Evidence from Airbnb in Boston Journal of Housing Economics 38, 14–24.

Ihlanfeldt, Keith R, and Jorge Martinez-Vazquez. 1986: Alternative value estimates of owner-occupied housing: Evidence on sample selection bias and systematic errors Journal of Urban Economics 20(3), 356–69.

Kahn, Matthew E. 1995: A Revealed Preference Approach to Ranking City Quality of Life Journal of Urban Economics 38(2), 221–35.

Kain, John F, and John M Quigley. 1970: Measuring the Value of Housing Quality Journal of the American Statistical Association 65(330), 532–48.

Koster, Hans RA, Jos van Ommeren, and Nicolas Volkhausen. 2018: *Short-term rentals and the housing market: Quasi-experimental evidence from Airbnb in Los Angeles*Unpublished CEPR Discussion Paper. C.E.P.R. Discussion Papers.

Lee, Dayne. 2016: How Airbnb Short-Term Rentals Exacerbate Los Angeles's Affordable Housing Crisis: Analysis and Policy Recommendations Student Notes Harvard Law & Policy Review 10, 229–54.

Letdin, Mariya, and Hyoung S Shim. 2019: Location choice, life cycle and amenities Journal of Regional Science 59(3), 567–85.

Mulder, Clara H. 2007: The family context and residential choice: A challenge for new research Population, Space and Place 13(4), 265–78.

Muth, Richard F. 1974: Moving costs and housing expenditure Journal of Urban Economics 1(1), 108–25.

Painter, Gary, and KwanOk Lee. 2009: Housing tenure transitions of older households: Life cycle, demographic, and familial factors☆ Regional Science and Urban Economics 39, 749–60.

Petrin, Amil, and Kenneth Train. 2010: A Control Function Approach to Endogeneity in Consumer Choice Models Journal of Marketing Research 47(1), 3–13.

Pinjari, Abdul Rawoof, Chandra R Bhat, and David A Hensher. 2009: Residential self-selection effects in an activity time-use behavior model Transportation Research Part B: Methodological 43(7), 729–48.

Pinjari, Abdul Rawoof, Ram M Pendyala, Chandra R Bhat, and Paul A Waddell. 2011: Modeling the choice continuum: an integrated model of residential location, auto

ownership, bicycle ownership, and commute tour mode choice decisions Transportation 38(6), 933.

Rengert, George F, Alex R Piquero, and Peter R Jones. 1999: Distance Decay Reexamined Criminology 37(2), 427–46.

Roback, Jennifer. 1982: Wages, Rents, and the Quality of Life Journal of Political Economy 90(6), 1257–78.

Rodríguez-Pose, Andrés, and Michael Storper. 2019: *Housing, urban growth and inequalities: the limits to deregulation and upzoning in reducing economic and spatial inequality*. LSE Research Online Documents on Economics. London School of Economics and Political Science, LSE Library.

Røed Larsen, Erling, and Dag Einar Sommervoll. 2009: The impact on rent from tenant and landlord characteristics and interaction Regional Science and Urban Economics 39, 316–22.

Rouwendal, Jan. 1998: On Housing Services Journal of Housing Economics 7(3), 218–42.

Rouwendal, Jan. 2002: *A Dynamic Model of Commutes*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Sanderson, Eleanor, and Frank Windmeijer. 2016: A weak instrument F-test in linear IV models with multiple endogenous variables Journal of Econometrics 190(2). Endogeneity Problems in Econometrics, 212–21.

Sans, Albert Arias, and Alan Quaglieri. 2016: Unravelling Airbnb: Urban Perspectives from Barcelona , Reinventing the local in tourism: Producing, consuming and negotiating place. New York: Channel View Publications, pp. 209–28.

Scott, Allen J. 2008: *Social Economy of the Metropolis: Cognitive-Cultural Capitalism and the Global Resurgence of Cities*. Oxford ; New York: Oxford University Press.

Shabrina, Zahratu, Elsa Arcaute, and Michael Batty. 2021: Airbnb and its potential impact on the London housing market Urban Studies, 0042098020970865.

Sheppard, Stephen. 1999: Chapter 41 Hedonic analysis of housing markets Handbook of Regional and Urban Economics 3, 1595–1635.

Sheppard, Stephen, and Andrew Udell. 2016: *Do Airbnb Properties Affect House Prices?*Unpublished Department of Economics Working Paper. Department of Economics, Williams College.

Srour, Issam M, Kara M Kockelman, and Travis P Dunn. 2002: Accessibility Indices: Connection to Residential Land Prices and Location Choices Transportation Research Record 1805(1), 25–34.

Stabrowski, Filip. 2017: 'People as businesses': Airbnb and urban micro-entrepreneurialism in New York City Cambridge Journal of Regions, Economy and Society 10(2), 327–47.

Stephany, Alex. 2015: *The Business of Sharing: Making it in the New Sharing Economy*. Springer.

Storper, Michael, Thomas Kemeny, Taner Osman, and Institutional Research Information Service Makarem Naji. 2015: *The Rise and Fall of Urban Economies*. Post-Print. HAL.

Tatsiramos, Konstantinos. 2006: *Residential Mobility and Housing Adjustment of Older Households in Europe*Unpublished IZA Discussion Paper. Institute for the Study of Labor (IZA).

Taylor, Laura O. 2003: The Hedonic Method. In Patricia A. Champ, Kevin J. Boyle, & Thomas C. Brown (eds.) , A Primer on Nonmarket Valuation. The Economics of Non-Market Goods and Resources. Dordrecht: Springer Netherlands, pp. 331–93.

Taylor, Peter J, and S Openshaw. 1975: Distance decay in spatial interactions , Concepts and Techniques in Modern Geography.

Tita, George E, Tricia L Petras, and Robert T Greenbaum. 2006: Crime and Residential Choice: A Neighborhood Level Analysis of the Impact of Crime on Housing Prices Journal of Quantitative Criminology 22, 299–317.

Turner, Matthew A, Andrew Haughwout, and Wilbert van der Klaauw. 2014: Land Use Regulation and Welfare Econometrica 82(4), 1341–1403.

Visit Denmark. 2021: Welcome to Denmark! VisitDenmark. https://www.visitdenmark.com/.

Vyvere, Yves van de, Harmen Oppewal, and Harry Timmermans. 1998: The Validity of Hierarchical Information Integration Choice Experiments to Model Residential Preference and Choice Geographical Analysis 30(3), 254–72.

Wachsmuth, David, and Alexander Weisler. 2018: Airbnb and the rent gap: Gentrification through the sharing economy Environment and Planning A: Economy and Space 50(6), 1147–70.

Wooldridge, Jeffrey M. 2015: Control Function Methods in Applied Econometrics Journal of Human Resources 50(2), 420–45.

Xie, Min, and David Mcdowall. 2014: Impact of Victimization on Residential Mobility: Explaining Racial and Ethnic Patterns Using the National Crime Victimization Survey Criminology 52(4), 553–87.

Yogo, Motohiro, and James H Stock. 2005: Identification and inference for econometric models , Identification and Inference for Econometric Models: Essays in Honor of Thomas Rothenberg. Cambridge University Press.

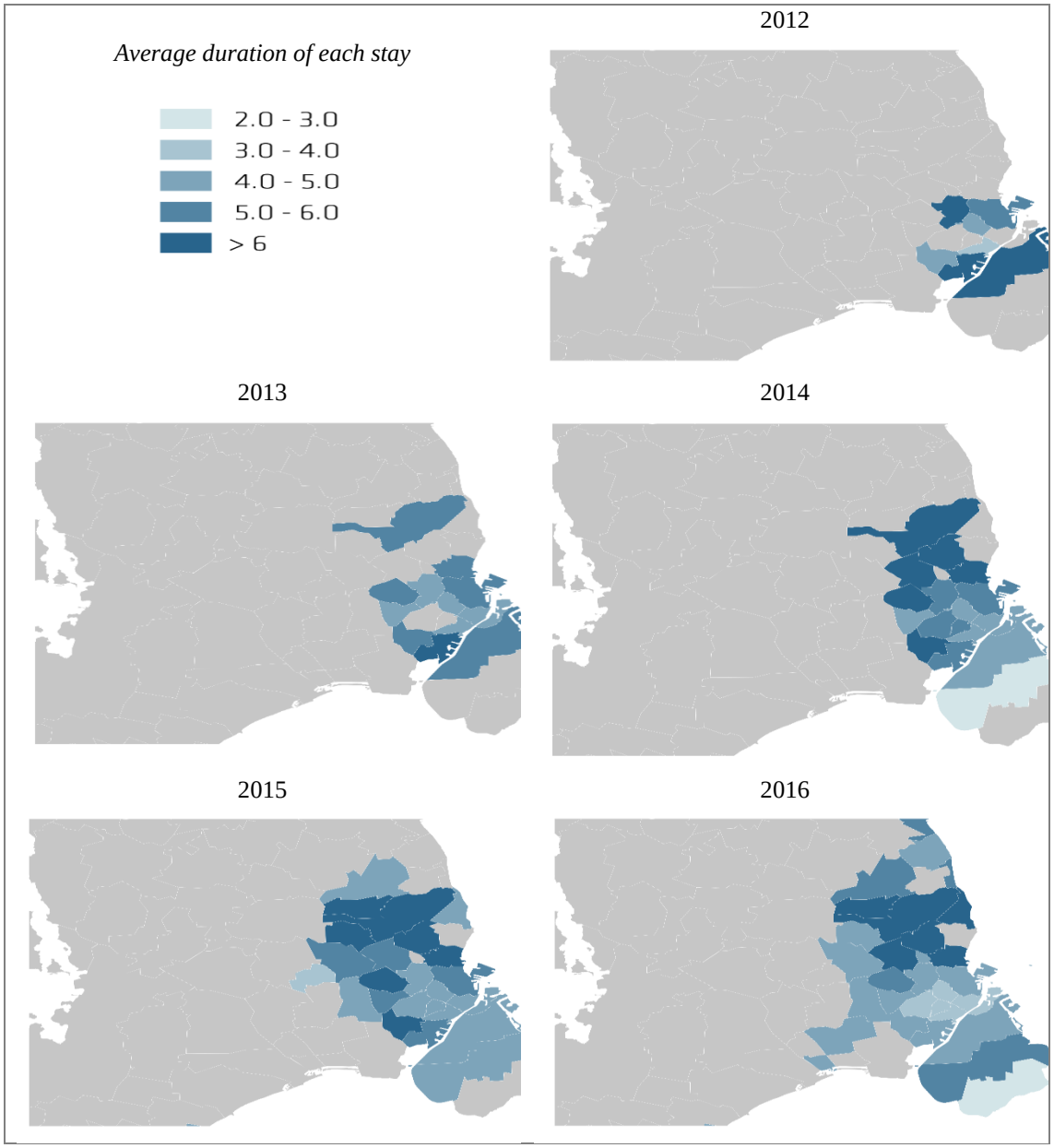
Yrigoy, Ismael. 2018: Rent gap reloaded: Airbnb and the shift from residential to touristic rental housing in the Palma Old Quarter in Mallorca, Spain Urban Studies, 0042098018803261.

Zervas, Georgios, Davide Proserpio, and John Byers. 2015: *A First Look at Online Reputation on Airbnb, Where Every Stay is Above Average*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Zheng, Siqi, and Matthew E Kahn. 2008: Land and residential property markets in a booming economy: New evidence from Beijing Journal of Urban Economics 63(2), 743–57.

Appendices

Appendix 1. Average number of nights spent per stay with Airbnb in Greater Copenhagen area.



Source: own calculation based on data from Airbnb.

Appendix 2. Detailed household characteristics.

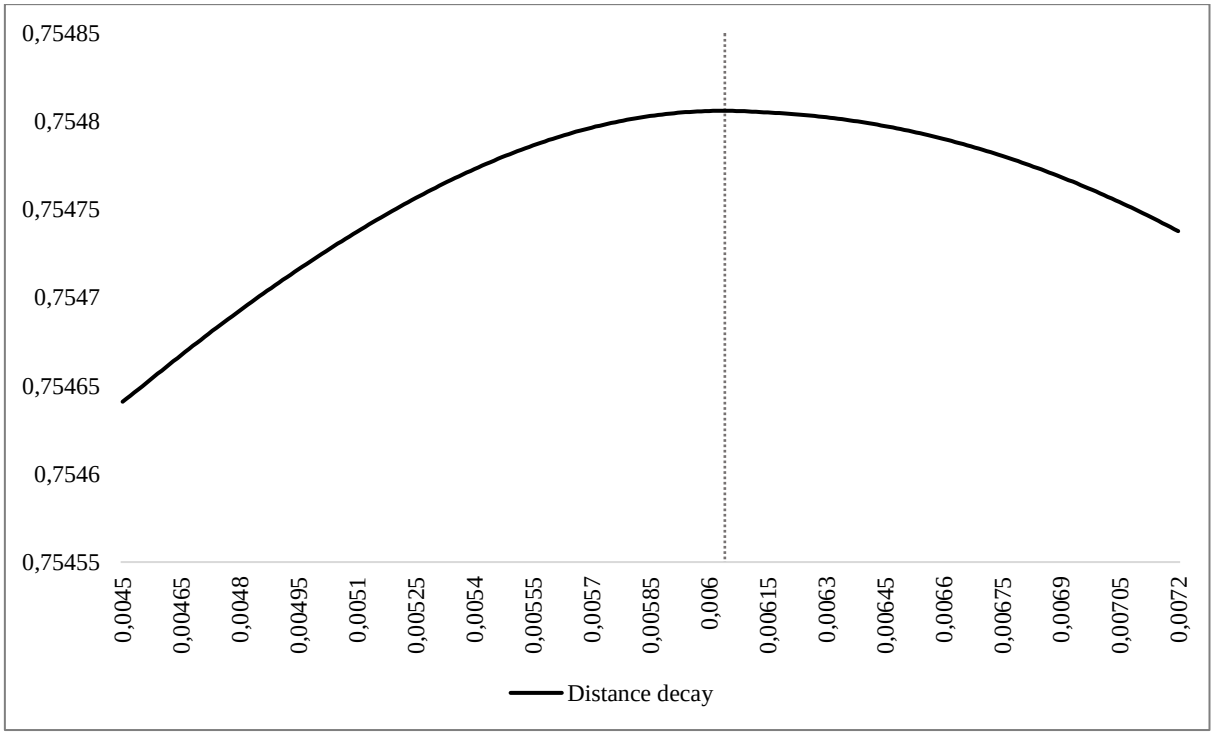
	All	Sellers	Buyers
Tenure (Years)	15.7	11.7	4.9
	(16.7)	(15.7)	(8.8)
# Children	0.6	0.6	0.6
	(0.9)	(0.9)	(0.9)
No children	0.676	0.66	0.523
	(0.468)	(0.474)	(0.499)
1 child	0.122	0.159	0.144
	(0.327)	(0.366)	(0.351)
2 children	0.149	0.147	0.124
	(0.356)	(0.354)	(0.330)
3 children	0.038	0.031	0.025
	(0.192)	(0.174)	(0.158)
4+ children	0.014	0.004	0.184
	(0.119)	(0.060)	(0.387)
Single household	0.438	0.489	0.471
	(0.496)	(0.500)	(0.499)
Family income (1,000 DKK)	665.949	639.902	658.564
	(610.304)	(544.727)	(557.294)
Head gender (Male)	0.765	0.734	0.757
	(0.424)	(0.442)	(0.429)
Head age	50.5	45.4	37.8
	(17.2)	(17.5)	(14.)
Head income (1,000 DKK)	320.153	308.205	305.556
	(294.312)	(248.366)	(259.484)
Working (Head)	0.689	0.739	0.843
	(0.463)	(0.439)	(0.363)
Student (Head)	0.026	0.028	0.049
	(0.159)	(0.166)	(0.215)
Unemployed (Head)	0.058	0.061	0.044
	(0.235)	(0.239)	(0.205)
Retired (Head)	0.227	0.172	0.064
	(0.419)	(0.377)	(0.245)
Elementary school (Head)	0.153	0.137	0.106
	(0.360)	(0.344)	(0.307)
High school (Head)	0.12	0.126	0.195
	(0.325)	(0.332)	(0.397)
Vocational (Head)	0.304	0.279	0.218
	(0.460)	(0.448)	(0.413)
College (Head)	0.201	0.206	0.194
	(0.401)	(0.405)	(0.396)

Appendix 2. Detailed household characteristics - Continued

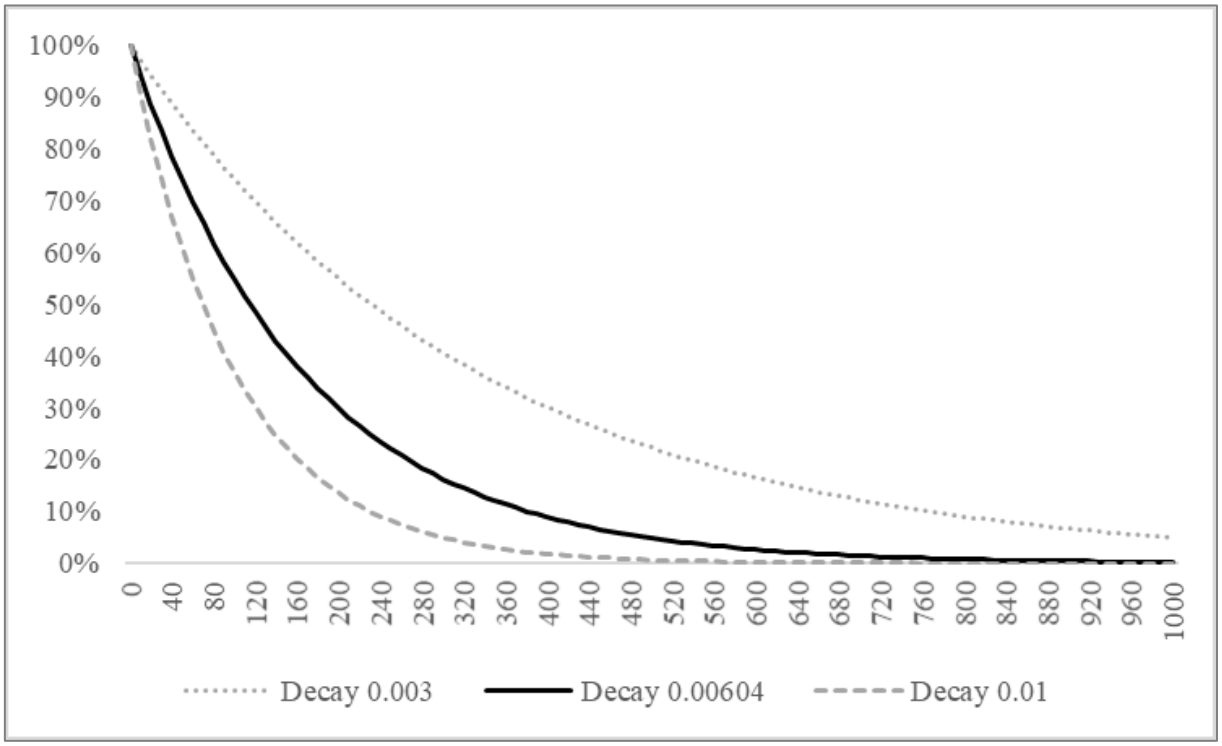
	All	Sellers	Buyers
University (Head)	0.222	0.251	0.287
	(0.416)	(0.434)	(0.452)
Partner age	49.8	42.1	37
	(14.3)	(14.2)	(11.7)
Partner income (1,000 DKK)	261.616	255.460	257.759
	(168.450)	(147.872)	(137.555)
Working (Partner)	0.399	0.396	0.445
	(0.490)	(0.489)	(0.497)
Student (Partner)	0.198	0.242	0.247
	(0.399)	(0.428)	(0.431)
Unemployed (Partner)	0.286	0.303	0.28
	(0.452)	(0.459)	(0.449)
Retired (Partner)	0.117	0.059	0.027
	(0.321)	(0.236)	(0.163)
Elementary school (Partner)	0.137	0.105	0.08
	(0.344)	(0.306)	(0.271)
High school (Partner)	0.078	0.094	0.118
	(0.268)	(0.293)	(0.323)
Vocational (Partner)	0.302	0.252	0.197
	(0.459)	(0.434)	(0.397)
College (Partner)	0.279	0.271	0.27
	(0.449)	(0.444)	(0.444)
University (Partner)	0.203	0.278	0.335
	(0.402)	(0.448)	(0.472)
Observations	1,690,939	78,069	82,347

Source: own calculation based on data from Statistics Denmark. **Note:** standard errors are in parentheses. ****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

Appendix 3. Figure showing search for optimal distance decay weight.



Appendix 4. Figure showing Airbnb weight decay over distance with delta 0.032.



Appendix 5. First-stage estimate of distance to nearby zip code instrument – buyers and sellers.

	1 step CF on Airbnb
Number of tourists	*-7.12685*****
	(0.00105)
Observations	1,954,620
F-test value	*4,6e+07*
R^2	*0.84*

Source: Own calculation based on data from Statistics Denmark. **Note:** standard errors are in parentheses. ****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

Appendix 6. First- and second-step estimate of number of tourists by attraction instrument

	1 step CF on Airbnb	Sellers	Buyers
Number of tourists	26.62517****		
	(0.03380)		
Airbnb (log)		0.00047****	0.00056****
		(0.00011)	(0.00010)
Distance residual		-0.00041****	-0.00052****
Apartment (ref.)		(0.00010)	(0.00010)
Single family house		-0.00802****	-0.00406****
		(0.00049)	(0.00046)
Town house		-0.00423****	0.00121**
		(0.00054)	(0.00052)
Number rooms		-0.00139***	0.00425****
		(0.00042)	(0.00042)
Number rooms squared		0.00001	-0.000598****
		(0.00003)	(0.00003)
Residence size (log, m2)		-0.00654****	0.00638****
		(0.00076)	(0.00072)
Building age (Years)		-0.00036****	-0.00025****
		(0.00002)	(0.00002)
Building age squared		1.350e-06****	2.052e-07
No children (ref.)		(1.302e-07)	(1.274e-07)
1 child		0.01125****	0.00498****
		(0.00052)	(0.00051)
2 children		0.00077	-0.01500****
		(0.00049)	(0.00048)
3 children		-0.00273****	-0.02137****
		(0.00073)	(0.00071)

Appendix 6. First- and second-step estimate of number of tourists by attraction instrument - continued

	1 step CF on Airbnb	Sellers	Buyers
4+ children		-0.00612****	-0.01898****
		(0.00156)	(0.00161)
Singe household		0.01036****	0.00773****
		(0.00047)	(0.00041)
Disposable income (log)		0.00849****	0.01017****
		(0.00032)	(0.00030)
Age (Years)		-0.0030****	-0.00626****
		(0.00006)	(0.00006)
Age squared		0.00002****	0.00004****
Employed (ref.)		(6.134e-07)	(4.925e-07)
Student		-0.00189***	-0.00752****
		(0.00068)	(0.00066)
Unemployed		-0.00399****	-0.00856****
		(0.00053)	(0.00049)
Retired		0.00335****	0.00447****
Elementary school (ref.)		(0.00053)	(0.00042)
High school		-0.01285****	0.00609****
		(0.00068)	(0.00072)
Vocational		0.00390****	0.00438****
		(0.00053)	(0.00044)
College		0.00350****	0.00860****
		(0.00055)	(0.00048)
University		0.00303****	0.01187****
		(0.00058)	(0.00053)
FE Year	Yes	Yes	Yes
FE Zip code	Yes	Yes	Yes
Observations	1,954,620	1,954,620	1,954,620
F-test value	6.2e+05		
R^2	0.23	0.011	0.030

Source: own calculation based on data from Statistics Denmark. **Note:** standard errors are in parentheses. ****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

Appendix 6 First-stage estimate of distance to nearby zip-code instrument – hedonic model.

	1 step CF on Airbnb
Number of tourists	*-6.8881*****
	(0.0065)
Observations	76,626
F-test value	*1,1e+06*
R^2	*0.85*

Source: own calculation based on data from Statistics Denmark. **Note:** standard errors are in parentheses. ****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

Appendix 8. *S*econd estimate of number of tourists by attractions instrument – hedonic model.

		1 step CF on Airbnb	CF
	Number of tourists	25.30678****	
		(0.1654)	
	Airbnb (log)		0.0062****
			(0.0010)
	Distance residual		-0.0054****
Apartment (ref.)			(0.0009)
	Single family house		0.3119****
			(0.0037)
	Town house		0.2412****
			(0.0036)
	Number rooms		0.1512****
			(0.0056)
	Number rooms squared		-0.0150****
			(0.0006)
	Residence size (log m2)		0.7741****
			(0.0064)
	Age of construction (years)		-0.0076****
			(0.0001)
	Age of construction squared		0.0001****
			(8.764e-07)
	Year FE		Yes
	Zip code FE		Yes
	Observations	76,626	76,626
	F-test value	23417.01	
	R^2	0.22	0.777

Source: own calculation based on data from Statistics Denmark. **Note:** standard errors are in parentheses. ****, ***, **, * indicate significance at the 0.001, 0.01, 0.05 and 0.10 levels, respectively.

Paper 4

Home after widowhood: A longitudinal study of residential mobility and housing preferences following a partner's death

Aske Egsgaard*

Abstract

As the proportion of people passing the age of retirement rises across the world, the task of ensuring adequate housing for them is becoming increasingly important. This paper investigates one aspect of this challenge by studying the effect of a cohabiting partner's death on the survivor's subsequent residential mobility and choice. By using unique Danish administrative panel data following all Danish people between the ages of 50 and 90 over a 35-year period, all residential moves within the period are observed, for widow(er)s and couples alike. The results show that both men and women have a greater likelihood of moving in the years following their partner's death, but also that women are significantly more residentially mobile than men. Furthermore, the results show that those who have transitioned into widowhood are more likely to move closer to independent children and to downsize compared to couples. This indicates that widows and widowers alter their residential consumption after the death of their partners.

Keywords: Residential mobility, Housing preference, Widowhood, Aging

JEL codes: J14¸R21, R23,

* Department of Geoscience and Natural Resource Management, geography Section, University of Copenhagen and Department of the Build Environment, Aalborg University.

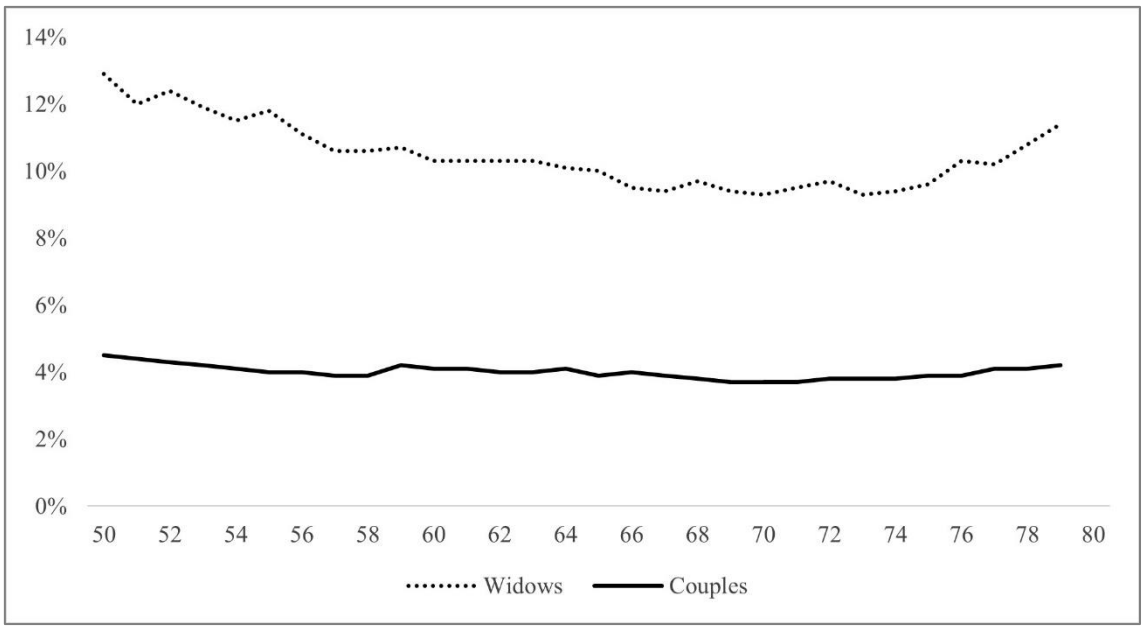
Introduction

As the population grows older, issues related to aging become more pressing, which in the end can have large impacts on society if left unchecked. The United Nations projects that the number of people worldwide over the age of 65 will increase by 78 per cent by 2050 (United Nations 2020). This is also the case in Denmark, where the number of people over the age of 65 in 2050 is expected to increase by over 35 per cent to make up about a quarter of the total population by that date (Danmarks Statistik 2018). Besides affecting health care and financial systems, an aging population is also likely to have an impact on the future demand for available housing (Martini et al. 2007; Myers and Ryu 2008; Velculescu 2010).

Studies also show that the demand for housing changes over the lifetime, a trend correlated among other factors with age, income, employment, health status and family situation (Herbers et al. 2014). With an aging population, we should therefore expect to see changes in the general demand for housing. As still more people grow older and an increasing proportion of the population passes the age of retirement, more countries should also be prepared to see an increase in the number of people transitioning into widowhood. However, the residential mobility of widows and widowers is a subject that has been somewhat neglected in the literature on aging and residential mobility. Few studies have empirically investigated how a cohabiting partner's death can affect the surviving partner's subsequent housing career and moving patterns (van Ham 2012). Also, even fewer studies, if any, have looked at how men's and women's residential mobility differs following a partner's death.

Figure 1 illustrates the proportion of residential moves among couples in Denmark at different age points when divided between ordinary couples and those whose partner has died the previous year. The figure shows that the moving frequency of couples who stay together in the observed period is stable at about 4 per cent across all age groups, whereas those whose partners have died the previous year have a much higher moving frequency. Almost 13 per cent of those aged fifty who lost a partner the previous year move to a new residence, which is nearly three times the rate for couples. Although a slightly negative trend can be observed, the difference in moving frequency between ordinary couples and those who have just lost their partner is still substantial, and it increases as people get older.

Figure 1: Proportion of widow(er)s and couples moving at different ages.



Note: *Widow(er)s* mark the proportion of widows and widowers who move within the sequential year after their spouse died. *Couples* are all other couples in the sample that neither die nor break up in the sample period. **Source:** own calculation based on data from Statistics Denmark.

As well as having a large emotional impact on the surviving partner, the death of a partner can also have significant economic consequences (Burkhauser et al. 1991, 2005). Where the transition into widowhood following the death of a partner has been connected with a subsequent decline in the overall household income (Balkwell 1981; Berardo 1968; Burkhauser et al. 1991, 2005). This is likely to have some effect on the forthcoming housing situation as the proportion of total household budget that goes on our homes in the form of rent or mortgages has increased in recent years (OECD 2019b). The death of a partner can therefore be a large economic burden potentially forcing the surviving partner to move to a less expensive residence.

Likewise, the death of a partner can lead to a change in the housing needs of the survivor, as the residence they had occupied together no longer meets his or her requirements. Studies have also shown that as people, especially the elderly, move late in their housing careers, they are more likely to downsize (Banks et al. 2012; Bian 2016). Furthermore, the importance of proximity to other relatives, such as children and grandchildren, is also likely to increase after losing a partner (Feijten 2005).

This paper investigates how the death of a partner affects the residential mobility of the surviving partner, as well as subsequent changes in the housing requirements for all widows and widowers in Denmark. By using unique Danish administrative panel data on all citizens between the ages of 50 and 90 over a period of 35 years from 1981 to 2016, it is possible to identify both

widow(er)s and ordinary couples, together with their housing situations, thus making it possible to explore the relationship between losing a partner and subsequent changes in housing.

The Impact of Losing a Partner

The transition into widowhood has been found to affect several different aspects of the surviving spouse's life. There is a well-documented literature on the negative effect on the survivor's subsequent physical and mental health after the transition into widowhood (Barrett and Schneweis 1981; Berardo 1968; Clayton 1974; Parkes 1970; Stroebe et al. 2007). Whereas the effect on the survivor's psychological well-being is found to be almost homogeneous regardless of the different causes of one's partner's death (Balkwell 1981; Grad and Zavasnik 1999; Lowenstein and Rosen 1989), mixed results have emerged when comparing expected and unexpected transitions into widowhood (Carr et al. 2001; Barry et al. 2002). Likewise, the transition into widowhood may have a negative effect on the survivor's social networks (Berardo 1968; Lowenstein and Rosen 1989). In particular, those whose partners have died due to illness tend to experience feeling more socially isolated subsequently compared to those whose partner died due to suicide or an accident (Grad and Zavasnik 1999).

When it comes to residential mobility and downsizing, most studies have focused on how these aspects have been affected by events like divorce and retirement (Angelini et al. 2014; Ball and Nanda 2013; Banks et al. 2012; Blundell et al. 2016). In relation to the phenomenon of the aging population, studies find that as people grow older their demand for housing becomes more specialized in respect of their increasing needs, for example, for smaller dwellings that are located closer to sought-after amenities, as is particularly the case for people over 65 years of age (Angelini et al. 2014; Ball and Nanda 2013; Bian 2016). Conversely, other studies have revealed national differences and that the mobility of survivors depends on moving costs and distance (Banks et al. 2012; Blundell et al. 2016). However, while residential mobility and people's choices as they grow older have received some attention in the literature on residence, the same is not the case for widow(er)s, as noted by van Ham in *The SAGE Handbook of Housing Studies* of 2012 (van Ham 2012). Since then a few studies have taken up van Ham's call in identifying a positive relationship between the transition into widowhood and subsequent residential mobility (Clark 2013; Clark and Lisowski 2017; Feijten 2005), but more and harder evidence is still needed on this subject. In any case, this positive correlation only applies temporarily, as some studies find that widows' increased propensity to move declines to vanishing point four to five years after their partner's death (Bonnet et al. 2010; Chevan 1995; Herbers et al. 2014). Previous theories (Feijten 2005), Bonnet et al. (2010) have also suggested that widows who move on average settle closer to adult children when they are compared to both regular couples and other widows who

do not move. Likewise, in this study, widows were more likely to downsize when they move (Bonnet et al. 2010).

All the studies of widows and their subsequent residential mobility either look exclusively at women, thus excluding all widowers and therefore leaving out a significant part of the population, or lump men and women together, thus risking overlooking substantial differences between men and women. This paper thus contributes to the literature by uncovering the differences in residential mobility for both women and men after losing a cohabiting partner. Furthermore, the paper also explores the residential mobility of widow(er)s in combination with changes to their housing preferences with a more detailed data source than has been used before. The transition into widowhood following the death of a cohabiting partner is likely to change the survivor's preferences regarding the structural characteristics of the new place of residence, the characteristics of the neighbourhood and distance from areas of interest.

Data and Sampling

In order to investigate the effects of a partner's death on the survivor's subsequent residential mobility and choice, information is needed on family relations, social and socioeconomic characteristics, and current and future residences. Furthermore, the data need to provide information on deaths within families and preferably the causes of death to be able to differentiate between expected and sudden deaths.

This paper therefore utilizes register data for the whole population of Denmark over a long time period, thereby eliminating participation bias, as well minimizing data attrition. The data originates from two sources, Statistics Denmark (DST) and Statens Serum Institut (SSI). By combining these two sources, it is possible not only to identify which families have experienced a partner's death but also their geographical location at the time and their subsequent residential choices. The data from DST give access to micro-data on all individuals living in Denmark from 1981 to 2016, including social and socioeconomic information, as well as residential information. Furthermore, the data make it possible to identify other family members such as independent children and their residential locations. The administrative health data gathered from SSI contains health information on all citizens, including hospitalizations, deaths and their causes, from 1994 to 2012. Combining these data sources makes it possible to observe residential moving patterns after a partner's death and also to identify the distance from independent children both before and after a partner's death.

All men and women residing in Denmark between 1981 and 2016 who live together with another person in a relationship are sampled, thus excluding singles and divorcees. This also

means that, if a couple living together separate and one or both move away, they will both be right censored from the sample. The sample is also limited to couples where at least one person is between the ages of 50 and 90 during the period being examined. This is due to the fact that younger couples are much less likely to experience a partner's death and are expected to be more firmly rooted in their residence because of the greater probability of their having small children living at home. This gives them other incentives for choosing a future residence following the death of a partner than people closer to the age of retirement. Appendix 1 presents a kernel density plot for the age distribution among widow(er)s, which show that about 99 per cent fall between 50 and 90 years of age.

As a precaution, and in order to minimize the bias to confounders, all those who have lost a partner are matched with someone who has not experienced a partner's death through a one to one nearest-neighbour method on the propensity to transition into widowhood. Those who have lost a partner are matched with other couples in order to control for their age at the time of their partner's death, cohort, gender, educational level, type of residence, number of children, income, income five years before the death of the partner, and the difference between that income and present income. Appendix 2 presents a propensity plot between widow(er)s and those still in couplehood before and after matching, showing that the two groups are much more closely aligned after the matching compared to before. The time of the matching will act as the point zero (0) from which widow(er)s and couples will be followed until they either move or the time period comes to an end.

As a final precaution, the first part of the analysis exploring the effect of a partner's death on the surviving partner's subsequent residential mobility will conduct a natural experiment in order to ensure that the death of a partner produces an exogenous shock. Therefore, only cases where the partner died suddenly and unexpectedly will be used. In the rest of the analysis, all those who have lost a partner will be included, given the aim of describing the differences in residential choice after the death of a partner rather than the effects of the partner's death itself.

Descriptive statistics

Following the sampling strategy described above, the final sample ended up with a total of 35 383 526 observations across all years, equal to 2 580 811 unique individuals living in 1 725 108 different families, of whom 595 452 individuals or about 23 per cent experienced a partner dying

during the period from 1981 to 2016[1]. After the 1 to 1 matching of widow(er)s and those still in couplehood, the sampling ended with 744 659 unique individuals in 683 209 different families, totalling up to 4 777 375 observations over the full period, of whom 452 645 individuals or about 60 per cent of the sample had lost a partner[2,3].

Residential Move and Duration

A residential move is defined as a change in residential address from one year to another, regardless of how long those concerned have stayed in the residence or how far they move away from it. The largest caveat regarding this definition is that it excludes the rare cases in which a couple move to a new residence, only to move back to their old residence again within the same year, resulting in the move not being taken into account. Likewise, couples who move residence multiple times within the same year will only be counted in relation to their last move in this definition, though these cases too are likely to be rare, and in the latter case they will continue to be defined as including a residential move. This means that actual residential mobility is potentially being underestimated, though this is not likely to affect the conclusion of the analysis. Residential duration is defined as the number of years a household has lived in its current residence measured as the difference between the current year and the year it originally moved into their residence. This also entails that, when a household moves to a new address, the period of residence starts again. The families in the matched sample have moved on average 0.3 times within the observation period and have lived on average 33 years in the residence the first time they are observed. This should be compared to the averages of 0.7 moves and 26 years in the same residence in the pre-matched sample. This suggests that the matched families are less residentially mobile thus indicating that widow(er)s are indeed less mobile than those still in couplehood. The difference between the sampled and matched populations is presented in Table 1.

[1] As some people can be in a relationship with several different individuals throughout the period of observation and thus be part multiple households in said period, the number of unique individuals in the sample is not exactly double the number of unique households but instead slightly below.

[2] The number of families does not match 1 to 1 with the number of individuals who have lost a partner and the number of families, as in some cases both the husband and the wife from the same family have been matched with people that have lost their partner.

[3] The proportion of individuals who have lost a partner in the final sample after matching is higher than 50 per cent, as the matching was done with the replacement in the couples group meaning that some individuals whose partner had not died were matched with multiple surviving spouses.

Table 1. Descriptive statistics on sample before and after matching.

	Before matching	After matching
Total observations	35 383 526	4 777 375
Unique individuals	2 580 811	744 659
Unique families	1 725 108	683 209
Mean years of residential duration	26	33
Mean number of residential moves	0.7	0.3
Number who lost a partner	595 452	452 645
Number of unexpected deaths	45 377	45 191

Source: own calculation based on data from Statistics Denmark.

Death of a Partner and Duration after Death

The partner's death is defined by the year of death, regardless of the cause of death or whether the death was sudden or had been expected for some time. Furthermore, unexpected or sudden deaths are defined as cases where the partner dies due to either a stroke or a heart attack, had not been hospitalized within the five years prior to the death, and had died within three months of the event. Appendices 3 and 4 present kernel density plots for the years after the partner's last hospitalization and the number of days between a partner's stroke or heart attack and their death, showing that the majority of partners were admitted within five years and died within thirty days of the event. By using this definition, 45,350 or about 7.4 per cent of all deaths are labelled sudden deaths, of which 8 per cent were of males and 6.2 per cent of females. This definition lies well within what has elsewhere been used as an unexpected timeframe when studying the effects of exogenous shocks (Abbring and Berg 2003; Svarer and Verner 2003). Duration after the death of a spouse is defined as the number of years lived in the residence following the partner's death, until they either move to a new residence or are right censored. Table 2 presents the distribution of the duration after a partner's death in the matched sample and shows that less than half of those who experienced the death of a spouse were still living in the same residence three years later. This indicates that this group is more residentially mobile in the first years following the death of a partner.

Table 2. Residential duration after death of a spouse

# Years	Number	Per cent	Cumulative per cent
1	116 043	25.6 per cent	25.6 per cent
2	67 434	14.9 per cent	40.5 per cent
3	46 723	10.3 per cent	50.9 per cent
4	36 940	08.2 per cent	59.0 per cent
5	30 568	06.8 per cent	65.8 per cent
6	25 527	05.6 per cent	71.4 per cent
7	21 593	04.8 per cent	76.2 per cent
8	18 488	04.1 per cent	80.3 per cent
9	15 550	03.4 per cent	83.7 per cent
10+	73 799	16.3 per cent	100 per cent
Total	452 645	100 per cent	100 per cent

Source: own calculation based on data from Statistics Denmark.

In Table 3, widow(er)s is compared with those still in couplehood on some of their key socioeconomic and residential characteristics observed in the year they were matched using a simple t-test for significant differences. Looking at the table, it becomes evident that there are still significant differences between the two groups on almost all characteristics. Surviving spouses come significantly lower both in terms of their socioeconomic characteristics, such as education and income, and in terms of residence, where widow(er)s lives in smaller residences than those still in couplehood. Furthermore, the surviving spouses tend to be older, and a larger proportion of them have already retired, while fewer live in the same municipality as their adult children, although in general they live closer to them than the those still in couplehood. Lastly, Table 3 shows that widow(er)s in general are more prone to live in an apartment than a house and are also more likely to rent than own their residences. This means that, even though surviving spouses and those still in couplehood were matches across several characteristics, there are still significant differences between the two groups, which must be accounted for by controlling for socioeconomic and residential characteristics in the analysis.

Table 3. Descriptive overview of widow(er)s and couples with between group t-test

	Couples		Widow(er)s	
Men	0.348	(0.476)	0.327****	(0.469)
Women	0.652	(0.476)	0.673****	(0.469)
Age	68.2	(8.4)	68.7****	(8.3)
Preschool or High School	0.548	(0.498)	0.576****	(0.494)
Vocational education	0.318	(0.466)	0.305****	(0.461)
Higher education	0.134	(0.340)	0.118****	(0.323)
Working	0.248	(0.432)	0.199****	(0.399)
Retired	0.674	(0.469)	0.722****	(0.448)
Other labour-marked affiliation	0.078	(0.267)	0.079*	(0.269)
Gross income (DKK)	111 687	(122 360)	106 527****	(107 295)
No adult children	0.563	(0.372)	0.59****	(0.373)
Adult children	0.438	(0.496)	0.41****	(0.492)
Urban municipally	0.449	(0.497)	0.443****	(0.497)
Intermediary municipally	0.157	(0.364)	0.162****	(0.369)
Rural municipally	0.285	(0.451)	0.285	(0.452)
Peripheral municipally	0.11	(0.312)	0.11	(0.313)
House	0.723	(0.447)	0.717****	(0.451)
Apartment	0.265	(0.442)	0.268***	(0.443)
Other type of residence	0.011	(0.105)	0.015****	(0.123)
Rented residence	0.691	(0.462)	0.673****	(0.469)
Privately owned residence	0.105	(0.307)	0.114****	(0.318)
Other residential owner types	0.611	(0.487)	0.588****	(0.492)
1-2 rooms	0.071	(0.257)	0.104****	(0.305)
3-4 room	0.582	(0.493)	0.599****	(0.490)
5 or more rooms	0.346	(0.476)	0.297****	(0.457)
Residence size (square meters)	121.7	(63.5)	119.0****	(126.4)
Same municipality as adult children	0.434	(0.496)	0.413****	(0.492)
Distance to nearest adult child (km)	23.595	(46.392)	22.947****	(45.816)
Observations	413 224		452 645	

Notes: standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01, **** p < 0.001
Source: own calculation based on data from Statistics Denmark.

Methodological Approach

Residential mobility follows a form of path dependency, as one of the more important predictors of whether a household moves or not is the time it has already lived in the residence (Clark and Huff 1977; Eluru et al. 2009; Goodman 2002; Lee and Waddell 2010b; Morrison and Clark 2016; Speare 1974; Thomas et al. 2016). Furthermore, the duration after the death of a spouse also seems to affect the residential mobility of the recently widowed (Bonnet et al. 2010; Chevan 1995; Herbers et al. 2014).

With these factors in mind, this paper therefore utilizes a duration model approach that can account for both the duration in the residence and the duration that has passed since the spouse's death. This is feasible, as the detailed panel data make it possible to follow households in their residences while also identifying whose partner dies and at what time. The hazard function of the duration model for residential mobility is given by:

$$h(t) = \lim_{dt \to 0} \frac{\Pr\{t \leq T < t + dt | T \geq t\}}{dt} \quad (1)$$

where $\Pr\{t \leq T < t + dt | T \geq t\}$ indicates the joint probability of moving residence *(T)* within an infinite small time interval (*t* + *dt*, when *dt* goes towards zero), given that the residential move has not happened yet but still lies within the total time of the spell (Berg 2001). Since the time-indicating parameter, duration of period in residence, in nature is continuous, but in the data is observed as discrete, as residents are observed on 1 January each year, the chance of moving is modelled using a complementary log-log form. The discrete complementary log-log hazard (*h*) for moving in time period *t* has the following form:

$$h(a_j, X) = 1 - \exp\left[-exp\left(B'X + \gamma_j\right)\right] \quad (2)$$

where *j* is the time-varying indicator for the variables *a*, given the relevant variables *X*.
In the empirical model, equation #2 is written as:

$$h(t_{ist}; A_{ist}, X_{ist}, u_l) = 1 - \exp[-exp(\gamma' t_{ist} + c'_{ist} + \theta' A_{ist} + \beta' X_{ist} + u_l)] \quad (3)$$

where t_{ist} is an indicator variable representing the spell duration at time *t* for individual *i* in spell *s*, and *c'* is a vector for the parameters corresponding to the spell constant. *A* is the independent variable, representing duration since the partner's death, and θ is therefore the parameter of interest that should be interpreted as the direct effect on people's likelihood of moving in the year since the partner's death. X_{ist} is a vector of both individually and residentially specific parameters, including sex, age, education and employment status, gross income, children, residential type, and size and type of municipality. u_l is one of $l = 1, \ldots, L$ time-constant error terms.

While the complementary log-log hazard model will be the primary model used in the analysis, other types of models will also be taken up later. A multinomial logit model to model will be used to model the likelihood of choosing between competing outcomes, while straightforward OLS models will be used in describing the differences in size of residence and distance from adult children.

All estimates will be clustered at the municipality level to take into account the uneven distribution of durations across municipalities. The unit of observation in the duration analysis is the duration each individual has lived in his or her current residence. This variable will be confronted with a dummy variable for the partner's death that has the value of 0 when the partner is alive and 1 when the partner is dead and subsequently.

Analysing the Effect of a Partner's Death on Future Residence

The first part of the analysis investigates whether the death of a partner has an effect on the surviving partner's subsequent residential mobility and whether the effect is different between men and women. For the purposes of this analysis, the more restricted sample is used where only widow(er)s whose partners have died from a heart attack or stroke and who have not been admitted to a hospital five years prior to the death are included. The assumption is that the death of a partner causes the surviving partner to seek out a new residence in the period immediately after their partner's death as a response to the sudden change in their housing consumption. Table 4 gives complementary log-log coefficients for the likelihood of the survivor moving in the years following the death of a spouse when compared to a matched selection of people whose partners have not died. The estimation results in Table 4 show a clear and significant effect of the death of a partner on the subsequent likelihood of moving within the first four years of one's partner's death, although the fourth year is only significant at a 10 per cent level. Thereafter the likelihood falls to match that of those still in couplehood.

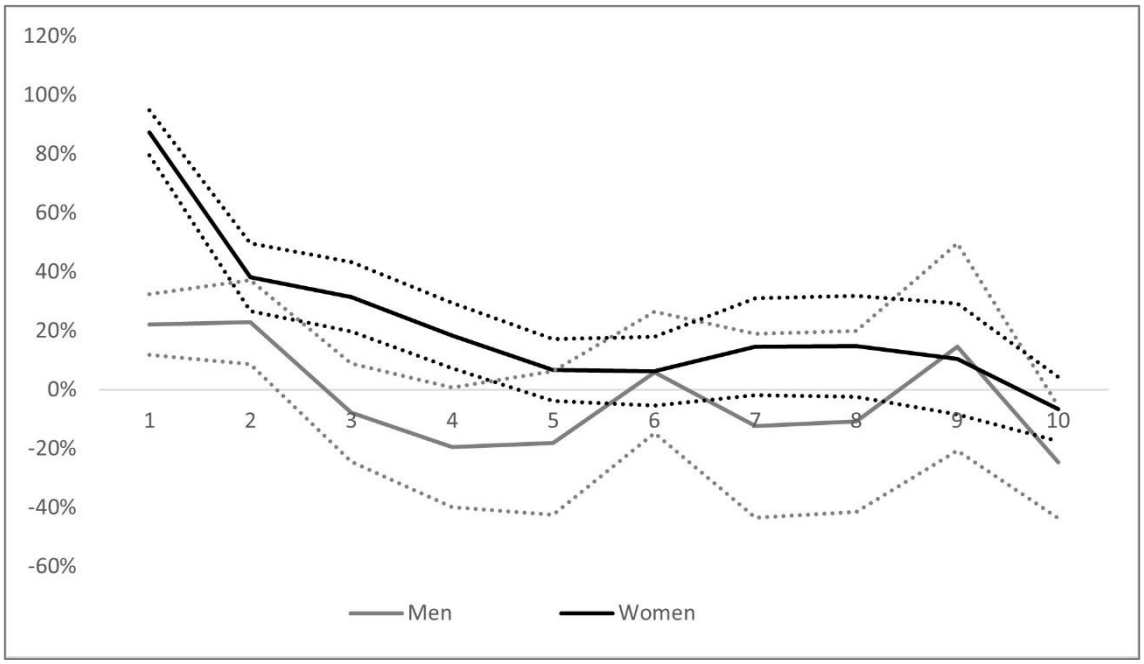
Table 4. Likelihood to move duration after partner's death

	All	Men	Women
1 year after partners death	0.704****	0.221****	0.872****
	(0.033)	(0.053)	(0.039)
2 years after partners death	0.344****	0.230***	0.381****
	(0.046)	(0.073)	(0.059)
3 years after partners death	0.202****	-0.079	0.315****
	(0.054)	(0.085)	(0.060)
4 years after partners death	0.089*	-0.196*	0.183***
	(0.053)	(0.104)	(0.057)
5 years after partners death	0.001	-0.182	0.067
	(0.051)	(0.124)	(0.054)
6 years after partners death	0.053	0.058	0.063
	(0.054)	(0.105)	(0.060)
7 years after partners death	0.068	-0.123	0.146*
	(0.081)	(0.159)	(0.084)
8 years after partners death	0.070	-0.108	0.147*
	(0.080)	(0.157)	(0.087)
9 years after partners death	0.106	0.146	0.104
	(0.086)	(0.179)	(0.096)
10+ years after partners death	-0.108**	-0.246**	-0.066
	(0.050)	(0.097)	(0.055)
Common duration from time of matching	Yes	Yes	Yes
FE residential duration	Yes	Yes	Yes
Individual specific control variables	Yes	Yes	Yes
Residence specific control variables	Yes	Yes	Yes
Location specific variables	Yes	Yes	Yes
Observations	473 781	115 038	358 395

Notes: standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01, **** p < 0.001
Source: own calculation based on data from Statistics Denmark.

Table 4 also shows that there is a clear difference in how men's and women's residential mobility is affected by a partner's death. While women whose partners have died are in general much more likely to move in the first four years after the death, this is only the case in the first two subsequent years for men. Likewise, the magnitude of the effect is smaller for men than for women. Figure 2 illustrates the difference in the probability of moving, including the 95 per cent confidence intervals, between women and men following the death of a partner. The figure shows that women have a higher likelihood overall of moving than men, and also that this increased likelihood lasts for a longer period compared to men.

Figure 2: Change in the likelihood of moving subsequent a cohabiting partner's death with 95 per cent confidence intervals.



Source: own calculation based on data from Statistics Denmark.

The difference between men and women in how their residential mobility is affected by a partner's death could be explained by men being much more financially secure than women. It could also reflect the fact that women tend to be younger than men when they lose a partner and are therefore in better health and thus more able to manage the stress involved in first finding and then moving to a new residence. Whatever the case, women seem to be more residentially mobile than men following the death of a partner.

As a precaution, a model is also estimated where the duration period from five years prior to the partner's death is included. This model showed no real difference in the likelihood of moving between widow(er)s and those still in couplehood prior to the death of a partner, which also supports the claim that the death is somewhat unexpected. In Appendix 5 a table is provided covering the pre-period leading up to the partner's death.

Distance from Children

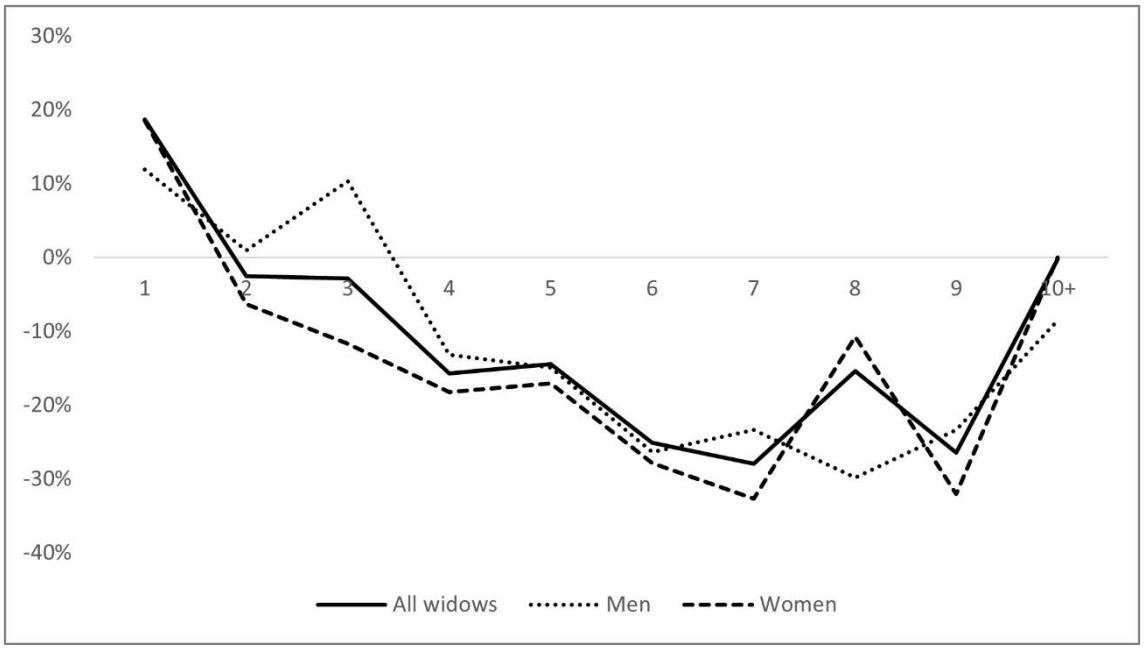
After finding that widow(er)s is indeed more likely to move within the first years following the death of a partner, the next step is to investigate whether they move closer to independent children when doing so. This will be done by modelling the difference in distance from the closest independent child before and after a residential move. The distance from independent children is defined as the mean distance in kilometres between the zip code of the widow(er) or couple and the zip code of the child. In the rest of the analysis, the original sample, including all widow(er)s

and their matched counterparts still in couplehood, will be used. However, for this part of the analysis only people who have children living independently on their own are included, as otherwise including people without children would interfere with the results.

It is assumed that the death of a partner makes the surviving partner more likely to move closer to an independent child compared to those still in couplehood as a way of restoring some of the social interaction that was lost when their partner died (Feijten 2005). The likelihood of moving closer to independent children is estimated using a competing risk model that simultaneously estimates the likelihood of not moving one's residence, of moving closer to independent children and of moving to a residence placed as far away or further from their independent children as their current residence. The outcome of moving as far away or further away from independent children serves as the reference category.

Figure 3 shows the from the competing risk estimates on the likelihood for those who have lost a partner to move closer to independent children compared to moving as far or further away. Appendix 6 provides a table for the competing risk coefficients. The figure shows that those whose partners have died are more likely to move closer to independent children, but only in the first year following their partner's death. After the first year, the difference in the likelihood of moving closer to independent children between widow(er)s and those still in couplehood becomes insignificant. When dividing the sample up between men and women, the likelihood of moving closer to independent children is only significant at a 10 per cent level for men, while it for women is highly significant.

Figure 3: Change in the likelihood of moving closer to adult children in the years after the death of a partner when compared to moving as far away or further.



Source: own calculation based on data from Statistics Denmark.

When calculating the mean difference in distances to independent children, it was found that surviving spouses who move just after the death of a partner on average move 0.7 kilometres closer to their independent children compared to couples where both partners are still alive. When looking at the difference for men and women separately, women who have lost a partner in general move two kilometres closer to an independent child, while men move 1.2 kilometres further away from their independent children compared to their counterparts who were still in couplehood. Appendix 7 provides an OLS table for the change in the distance from independent children after moving residence. This shows that there are indeed big differences between men and women in how they value closeness to relatives after the death of a partner.

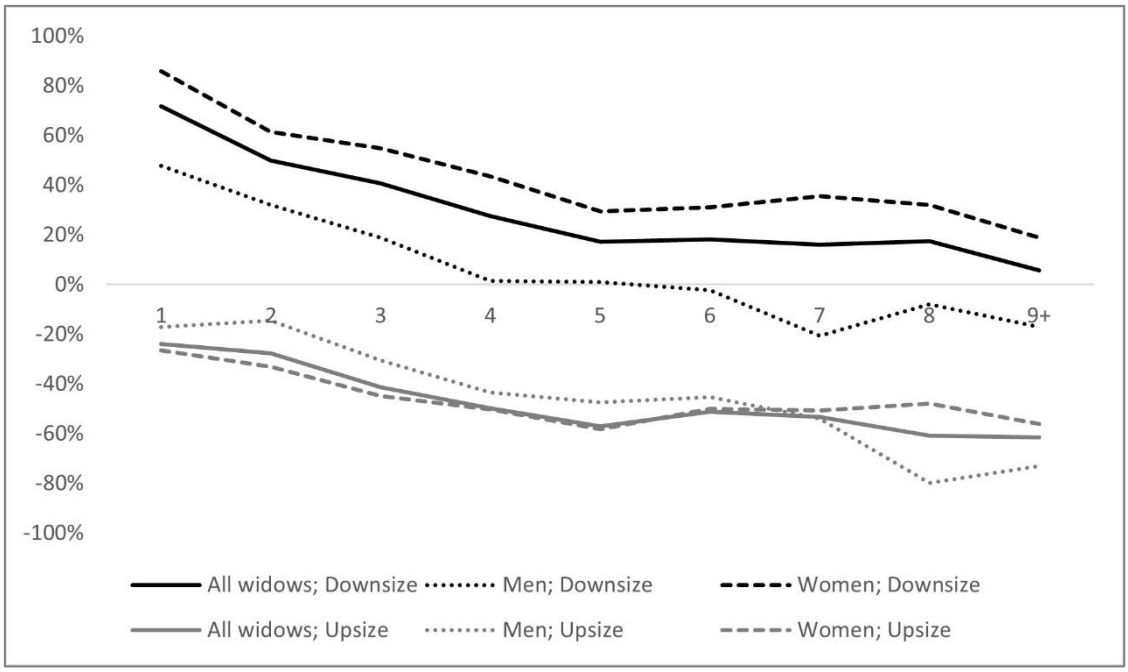
As a precaution, a model is also run for the change in the difference in distance from grandchildren after the death of a partner, as it could be that being closer to one's grandchildren was more important than being close to independent children. The model shows that the difference in distance from grandchildren has the same tendency as the difference in distance from independent children after the death of a partner. Appendix 8 gives a table of estimates for the competing chance of moving closer to one's grandchildren.

Downsizing

The next task is to explore how the residence characteristics change when widow(er)s move to a new residence compared to their counterparts who are still living in couplehood. More specifically, we investigate whether surviving spouses are more likely to downsize when moving to a new residence compared to other couples. It is believed that widow(er)s are more likely to do this as their housing needs are highly likely to have decreased as well. The change in residential size is measured as the difference between the size of the current residence and the new residence measured in square meters.

A competing risk model estimates the likelihood of downsizing between the outcomes not to move residence, to move to a smaller residence and to move to a same or larger residence, where not moving serves as the reference category. The results of the competing risk estimate are given in Figure 4, from which it is clear that surviving spouses are more likely to move to a smaller residence after their partner has died and less likely to move to a larger residence. Appendix 9 provides a table for the competing risk estimate. Figure 4 does show a small reduction in the difference regarding downsizing between those who have lost a partner and those still in couplehood over time and indicates that these findings are consistent for both men and women, as well as highly significant. However, after four years have passed there is no longer a significant difference between the likelihood of downsizing for men who have lost a partner and men whose partner is still alive. This means that, whenever a man or woman whose partner has died chooses to move to a new residence, they are significantly more likely to move to a smaller residence compared to someone whose partner is still alive. This indicates that people adjust their housing consumption after the death of a partner, as expected.

Figure 4: Change in the likelihood of downsizing or upsizing the years after the death of a partner when compared to not moving.



Source: own calculation based on data from Statistics Denmark.

Looking at the actual change in residential size when moving, in general widow(er)s downsize by almost 11 square meters compared to those still in couplehood. This is the case for both men and women, where men downsize by about 9 square meters and women by about 11.5 square meters when moving compared to their counterparts who still live in couplehood, as shown in Appendix 10.

As a precaution, downsizing is also defined as the change in the number of rooms instead of the change in square meters. This estimate confirms the previous results, as it shows that in general people whose partners have died move to a residence with about 0.5 fewer rooms compared to couples, a figure which holds true for both men and women. A table of estimates for the change in the number of rooms after a residential move can be found in Appendix 11.

Robustness Test

Throughout the analysis, the durability of the results has continuously been tested by running alternative estimates, which so far have only supported the findings. As a final precaution, this section will describe a robustness test of the initial findings, namely that widow(er)s is more likely to move to a new residence in the years subsequent to their partner's death. For the robustness test a synthetic death-shock is used for the those that lose a partner so that a simulated death of a partner fifteen years before the partner actual dies is imposed. Similarly, the matched people still

in couplehood are also traced back fifteen years. The widow(er)s and those still in couplehood are then tracked from the time of this synthetic death, as in the original estimate, using a complementary log-log model.

To be true to the initial analysis and ensure that the robustness test is comparable, the more restricted sample is used of those whose partners died from either a stroke or a heart attack and who died seemingly unexpectedly. Appendix 12 gives a table of estimates for the robustness test, which shows that surviving spouses are not significantly more likely to move after the synthetic death of their partner than their counterparts still living in couplehood, thus supporting the initial result that it is the actual death of their partners that make them move residence. This is also the case when looking at men and women separately, showing that only 10+ years after the simulated death of their partner do the surviving spouse become more likely to move, which coincides with when their partner actually dies.

Discussion

Up until this point, the empirical results of the analysis have been presented in a straightforward way without going into too much discussion regarding the magnitude of the results and their potential societal impacts. This section will therefore aim to do just that.

When looking at the magnitude of the initial results using a linear probability model (LPM), we see that in general widow(er)s are five percentage points more likely to move than those still in couplehood in the year following the death of their spouse. This falls to two percentage points regarding the increased likelihood of moving the following year and one percent the year after that. A five percentage-point increase in the likelihood of moving is a substantiable increase when we recall that Figure 1 at the beginning of the paper showed that the overall proportion of couples between the ages of 50 and 90 who moved each year was just under 4 per cent This indicates that there is a more than 100 per cent increase in the likelihood of moving subsequent to a partner's death.

Likewise, it was found that in general widow(err)s move 0.7 kilometres closer to their adult children compared to those still living in couplehood, equivalent to a decrease in distance of about 3 per cent whereas men show a 5 per cent increase in distance and women a 9 per cent decrease. Table 5 shows the proportion of those who have lost a partner and those still living in couplehood who have either moved or stayed and who live within 25, 20, 15 and 10 kilometres of their independent children.

Table 5. Proportion or widow(er)s and those still living in couplehood who live within different distances of independent children

	Widow(er)s		**Couples**	
Distance from adult children	*Not moved*	*Moved*	*Not moved*	*Moved*
Under 25 kilometres	54.9 per cent	59.3 per cent	59.0 per cent	58.8 per cent
Under 20 kilometres	52.8 per cent	57.0 per cent	56.6 per cent	56.6 per cent
Under 15 kilometres	49.6 per cent	53.4 per cent	52.9 per cent	52.8 per cent
Under 10 kilometres	44.3 per cent	47.7 per cent	46.8 per cent	47.1 per cent
Under 5 kilometres	36.4 per cent	39.9 per cent	38.2 per cent	39.0 per cent

Source: own calculation based on data from Statistics Denmark.

According to the table, a higher proportion of widow(er)s reside closer to their independent children after a move compared to those widow(er)s who have not moved. By contrast, 52.8 per cent of widow(er)s who have not moved live within twenty kilometres of their independent children, compared to 57 per cent of widow(er)s who have moved, a difference of four percentage points or nearly 8 per cent more. Likewise, 44.3 per cent of surviving spouses who have not moved live within ten kilometres of their independent children compared to 47.7 of widow(er)s who have moved, a difference of 3.4 percentage points, or also nearly 8 per cent more. However, although there is a slightly greater proportion of those who have lost a partner who live closer to adult children after a move to a new residence than non-widows, the magnitude of the difference is not as significant as first anticipated. Whereas 57 per cent of widow(er)s who have moved live within twenty kilometres of their independent children, so do 56.6 per cent of those still in couplehood, a difference in only 0.4 percentage points or under 1 per cent Likewise, 47.7 per cent of widow(er)s who have moved live within ten kilometres of their independent children, but so do 47.1 per cent of those still in couplehood, a difference of only 0.6 percentage points or only just above 1 per cent This could be explained by the fact that Denmark is a small country and thus the distances will never be that great in the first place, or else that in general those who have lost a partner live further away from their independent children than those still in couplehood.

When looking at the change in residential size for widow(er)s compared to those in couplehood, the difference seems more substantial, as in general survivors downsize 9 per cent more than their counterparts who are still in couplehood (7.5 per cent for men and 9.5 per cent for women). Like Table 5, Table 6 gives the proportions of widow(er)s and those still in couplehood who either do not move or who have moved into residences smaller than 120, 100, 80, 60 and 40 square meters. Table 6 shows that a larger proportion of widow(er)s live in smaller residences of all sizes both before and after they move when compared with couples.

Table 6. Proportion of widow(er)s and those still living in couplehood who live in residences of different sizes

	Widow(er)s		**Couples**	
Residence size	*Not moved*	*Moved*	*Not moved*	*Moved*
Smaller than 120 m^2	63.9 per cent	64.1 per cent	50.8 per cent	56.9 per cent
Smaller than 100 m^2	46.2 per cent	46.9 per cent	32.8 per cent	39.5 per cent
Smaller than 80 m^2	19.8 per cent	23.3 per cent	11.6 per cent	16.5 per cent
Smaller than 60 m^2	2.8 per cent	4.7 per cent	1.4 per cent	2.9 per cent
Smaller than 40 m^2	0.1 per cent	0.4 per cent	0.1 per cent	0.3 per cent

Source: own calculation based on data from Statistics Denmark.

From Table 6, it can be seen that there is a noticeably larger difference in residential size between those who have lost a partner and those still in couplehood when they move to a new residence, as in general widow(er)s move to smaller residences than those still in couplehood. Whereas 46.9 per cent of survivors move to a residence under 100 square meters, only 39.5 per cent of those still in couplehood do so, a difference of 7.4 percentage points or nearly 19 per cent. Likewise, 23.3 per cent of widow(er)s move to a residence under 80 square meters, whereas that is only the case for 16.5 per cent of those still in couplehood, a difference of 6.8 percentage points or 41 per cent Only when comparing the proportion of those who have lost a partner and those who have not who move to a residence under 40 square meters do the two groups show similar numbers at 0.4 per cent for widow(er)s and 0.3 per cent for those still in couplehood. These differences in residential size after a move is what would be expected, since surviving spouses require less space due to them suddenly becoming single households compared to those still in couplehood who remain in dual households. However, as in general widow(er)s already live in smaller residences than those still in couplehood, the difference between the surviving spouses who move and those who stay put only becomes noticeable for those living in residences under 80 square meters. Furthermore, only about half of the surviving spouses who move after their partners' deaths move to a residence under 100 square meters. This means that the majority of survivors who find a new residence choose one over 100 square meters, which is still somewhat large for just one person, seeing as the mean residential area per person in Denmark in 2017 was 52 square meters (Toft 2019). Whether this is due to a lack of vacant housing that matches the widow(er)'s preferences or something else cannot at present be answered, but it could form the potential subject of another paper delving further into questions regarding the housing preferences and choices of widow(er)s.

Conclusion

As many countries are experiencing increases in the proportion of people over the age of retirement, the problem of providing adequate housing for the elderly is becoming a pressing issue that needs to be addressed by policymakers and housing planners alike. In particular, housing for recently widowed men and women is an issue that needs to be addressed, as pandemics like COVID-19 have been shown to target primarily the elderly demographic cohort in the population. This paper has therefore examined how the death of a cohabiting partner affects the surviving partner's subsequent residential mobility and residential choice in an effort to shed some light on some of these challenges.

The results indicate that those who have recently transitioned into widowhood are about twice as likely to move to a new residence within the first four years subsequent to their partner's death compared to those whose cohabiting partner is still alive. Significant differences between men and women who have lost a partner were also found, as women in general become more residentially mobile compared to men after losing a partner. Furthermore, it is found that, while both men and women are more likely to downsize when moving following a partner's death, women in general move closer to their adult children, while men are more likely to move further away. Finally, the results show that both women and men are more likely to downsize after their partner's death than to stay or move to a larger residence.

This paper has contributed to the literature on widows and widowers and residential mobility by exploring the impact of a bereavement on residential mobility for all those who have lost a partner by using a broad and detailed dataset that uncovers some of the differences between male and female widow(er)s and couples. However, the paper also showed that more research is needed in order to uncover some of the underlying motives behind surviving spouses' residential choices, especially whether or not the reason for their very small tendency actually to move closer to their adult children and to downsize is due to failures by the housing market and by policy-makers and housing planners to provide appropriate residences for them.

References

Abbring, Jaap H, and Gerard J Van Den Berg. 2003: The Nonparametric Identification of Treatment Effects in Duration Models Econometrica 71(5), 1491–1517.

Angelini, Viola, Agar Brugiavini, and Guglielmo Weber. 2014: The dynamics of homeownership among the 50+ in Europe Journal of Population Economics 27(3), 797–823.

Balkwell, Carolyn. 1981: Transition to Widowhood: A Review of the Literature Family Relations 30(1), 117–27.

Ball, Michael, and Anupam Nanda. 2013: Household attributes and the future demand for retirement housing International Journal of Housing Markets and Analysis 6(1), 45–62.

Banks, James, Richard Blundell, Zöe Oldfield, and James P Smith. 2012: Housing Mobility and Downsizing at Older Ages in Britain and the USA Economica 79(313), 1–26.

Barrett, Carol J, and Karen M Schneweis. 1981: An Empirical Search for Stages of Widowhood OMEGA - Journal of Death and Dying 11(2), 97–104.

Barry, Lisa C, Stanislav V Kasl, and Holly G Prigerson. 2002: Psychiatric disorders among bereaved persons: The role of perceived circumstances of death and preparedness for death The American Journal of Geriatric Psychiatry; Washington 10(4), 447–57.

Berardo, Felix M. 1968: Widowhood Status in the United States: Perspective on a Neglected Aspect of the Family Life-Cycle The Family Coordinator 17(3), 191–203.

Berg, Gerard J Van Den. 2001: Chapter 55 - Duration Models: Specification, Identification and Multiple Durations. In James J. Heckman and Edward Leamer (ed.) , Handbook of Econometrics. Elsevier, pp. 3381–3460.

Bian, Xun. 2016: Leverage and Elderly Homeowners' Decisions to Downsize Housing Studies 31(1), 20–41.

Blundell, Richard, Rowena Crawford, Eric French, and Gemma Tetlow. 2016: Comparing Retirement Wealth Trajectories on Both Sides of the Pond Fiscal Studies 37(1), 105–30.

Bonnet, Carole, Laurent Gobillon, and Anne Laferrère. 2010: The effect of widowhood on housing and location choices Journal of Housing Economics 19(2), 94–108.

Burkhauser, Richard V, JS Butler, and Karen C Holden. 1991: How the Death of a Spouse Affects Economic Well-Being after Retirement: A Hazard Model Approach Social Science Quarterly 72(3), 504–19.

Burkhauser, Richard V, Philip Giles, Dean R Lillard, and Johannes Schwarze. 2005: Until Death Do Us Part: An Analysis of the Economic Well-Being of Widows in Four Countries The Journals of Gerontology Series B: Psychological Sciences and Social Sciences 60(5), S238–46.

Carr, Deborah, James S House, Camille Wortman, Randolph Nesse, and Ronald C Kessler. 2001: Psychological Adjustment to Sudden and Anticipated Spousal Loss Among Older Widowed Persons The Journals of Gerontology: Series B 56(4), S237–48.

Chevan, Albert. 1995: Holding On and Letting Go Residential Mobility During Widowhood Research on Aging 17(3), 278–302.

Clark, William AV. 2013: Life course events and residential change: unpacking age effects on the probability of moving Journal of Population Research; Dordrecht 30(4), 319–34.

Clark, William AV, and JO Huff. 1977: Some Empirical Tests of Duration-of-Stay Effects in Intraurban Migration Environment and Planning A: Economy and Space 9(12), 1357–74.

Clark, William AV, and William Lisowski. 2017: Decisions to move and decisions to stay: life course events and mobility outcomes Housing Studies 32(5), 547–65.

Clayton, Paula J. 1974: Mortality and Morbidity in the First Year of Widowhood Archives of General Psychiatry 30(6), 747–50.

Danmarks Statistik. 2018: Befolkningsfremskrivninger 2018-2060 Nyt Fra Danmarks Statistik(180), 2.

Eluru, Naveen, Ipek N Sener, Chandra R Bhat, Ram M Pendyala, and Kay W Axhausen. 2009: Understanding Residential Mobility: Joint Model of the Reason for Residential Relocation and Stay Duration Transportation Research Record 2133(1), 64–74.

Feijten, Peteke. 2005: Union Dissolution, Unemployment and Moving Out of Homeownership European Sociological Review 21(1), 59–71.

Goodman, A. 2002: Estimating Equilibrium Housing Demand for “Stayers” Journal of Urban Economics 51, 1–24.

Grad, Onja T, and Anka Zavasnik. 1999: Phenomenology of bereavement process after suicide, traffic accident and terminal illness (in spouses) Archives of Suicide Research 5(2), 157–72.

van Ham, Maarten. 2012: Housing Behaviour , The SAGE Handbook of Housing Studies. London: SAGE Publications Ltd, pp. 47–65.

Herbers, Daniël J, Clara H Mulder, and Juan A Mòdenes. 2014: Moving Out of Home Ownership in Later Life: The Influence of the Family and Housing Careers Housing Studies 29(7), 910–36.

Lee, Brian HY, and Paul Waddell. 2010: Residential mobility and location choice: a nested logit model with sampling of alternatives Transportation 37(4), 587–601.

Lowenstein, Ariela, and Aaron Rosen. 1989: The relation of widow’s needs and resources to perceived health and depression Social Science & Medicine 29(5), 659–67.

Martini, E Mary, Nancy Garrett, Tammie Lindquist, and George J Isham. 2007: The Boomers Are Coming: A Total Cost of Care Model of the Impact of Population Aging on Health Care Costs in the United States by Major Practice Category Health Services Research 42(1p1), 201–18.

Morrison, Philip S, and William AV Clark. 2016: Loss aversion and duration of residence Demographic Research 35, 1079–1100.

Myers, Dowell, and SungHo Ryu. 2008: Aging Baby Boomers and the Generational Housing Bubble: Foresight and Mitigation of an Epic Transition Journal of the American Planning Association 74(1), 17–33.

OECD, Affordable Housing Database. 2019: HC1.2. housing cost over income. OECD - Social Policy Division - Directorate of Employment, Labour and Social Affairs.

Parkes, Colin Murray. 1970: The First Year of Bereavement Psychiatry 33(4), 444–67.

Speare, Alden. 1974: Residential satisfaction as an intervening variable in residential mobility Demography 11(2), 173–88.

Stroebe, Margaret, Henk Schut, and Wolfgang Stroebe. 2007: Health outcomes of bereavement The Lancet 370(9603), 1960–73.

Svarer, Michael, and Mette Verner. 2003: *Do Children Stabilize Marriages?*Unpublished Economics Working Paper. Department of Economics and Business Economics, Aarhus University.

Thomas, Michael J, John CH Stillwell, and Myles I Gould. 2016: Modelling the duration of residence and plans for future residential relocation: a multilevel analysis Transactions of the Institute of British Geographers 41(3), 297–312.

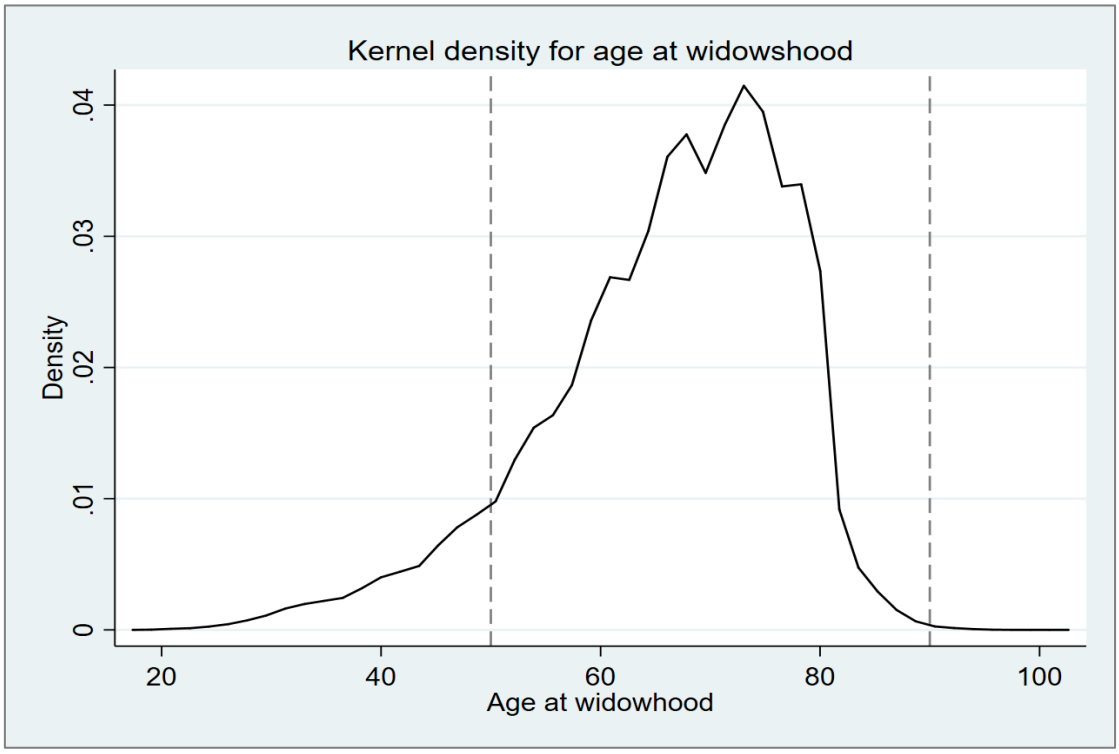
Toft, Lasse Vej. 2019: Udviklingen i den gennemsnitlig boligstørrelse. KL - Kommunernes Landsforening.

United Nations, Department of Economic and Social Affairs, Population Division. 2020: *World Population Ageing 2019*. (ST/ESA/SER.A/444).

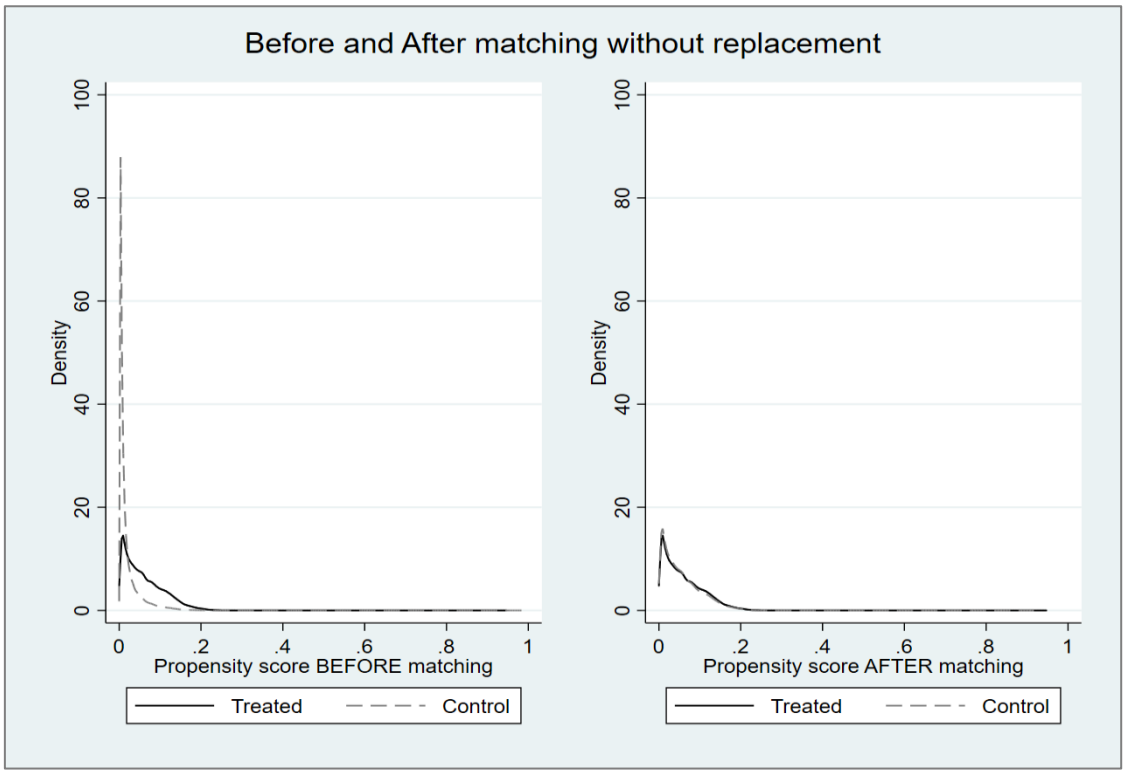
Velculescu, Delia. 2010: *Some Uncomfortable Arithmetic Regarding Europe'S Public Finances*Unpublished SSRN Scholarly Paper. Social Science Research Network, Rochester, NY.

Appendices

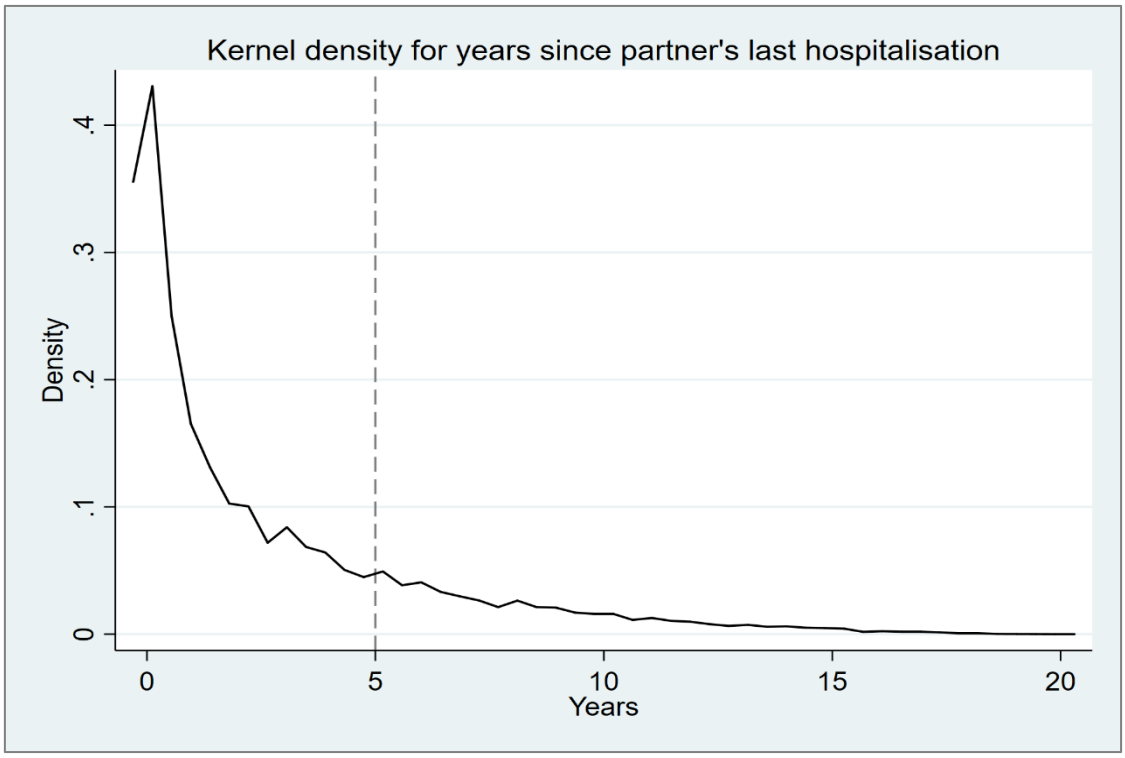
Appendix 1: Kernel density plot for the age distribution among widows



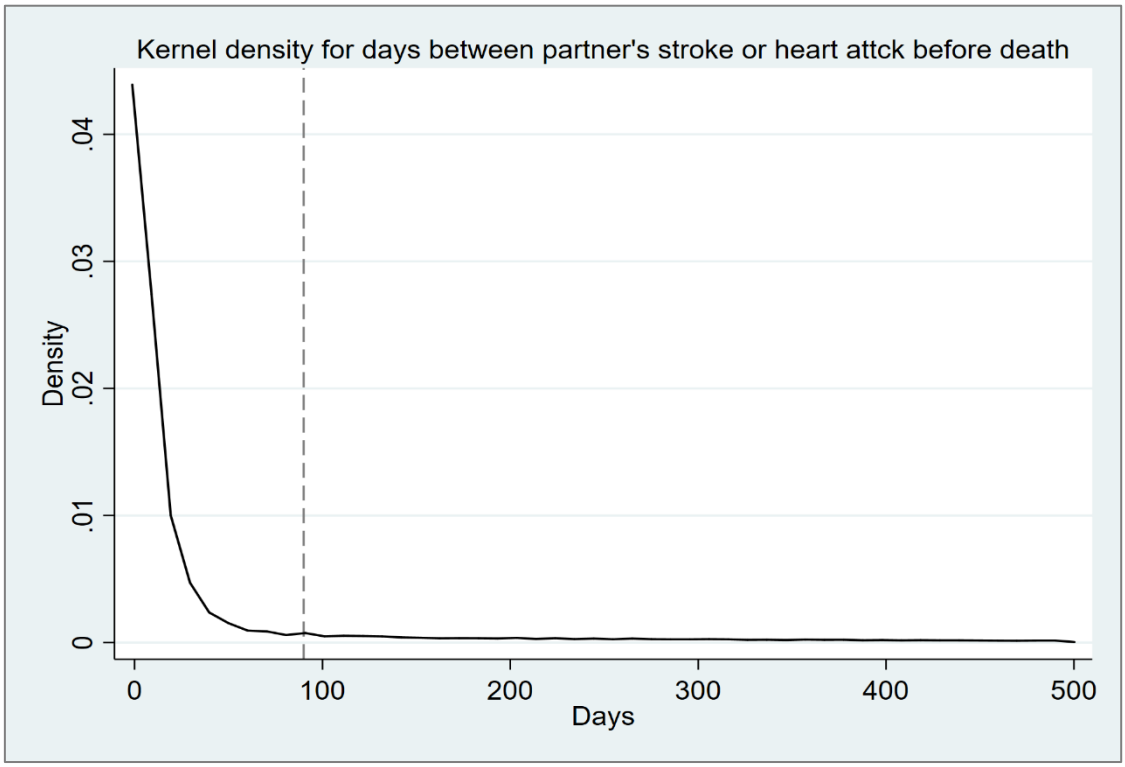
Appendix 2: Propensity score for widowhood before and after matching



Appendix 3: Kernel density plot for years since partner's last hospitalisation (dotted line mark 5 years)



Appendix 4: Kernel density for number of days between a partner's stroke or heart attack and their death (dotted line mark 90 days)



Appendix 5: Complementary log-log model for the likelihood to move after partners death with control variables coefficients & pre-period duration

	All	**Men**	**Women**
5 years before partner death	-0.1364****	-0.1831***	-0.1217***
	(0.0386)	(0.0664)	(0.0426)
4 years before partner death	-0.0352	-0.0698	-0.0222
	(0.0426)	(0.0698)	(0.0450)
3 years before partner death	-0.0362	0.0597	-0.0725
	(0.0404)	(0.0654)	(0.0481)
2 years before partner death	-0.0315	-0.0178	-0.0363
	(0.0377)	(0.0680)	(0.0445)
1 year before partner death	-0.0334	-0.0909	-0.0113
	(0.0318)	(0.0630)	(0.0362)
1 year after partners death	0.7025****	0.2256****	0.8673****
	(0.0324)	(0.0531)	(0.0382)
2 years after partners death	0.3418****	0.2352***	0.3751****
	(0.0462)	(0.0715)	(0.0581)
3 years after partners death	0.2010****	-0.0705	0.3103****
	(0.0544)	(0.0858)	(0.0602)
4 years after partners death	0.0874	-0.1862*	0.1786***
	(0.0539)	(0.1049)	(0.0570)
5 years after partners death	-0.0015	-0.1732	0.0615
	(0.0508)	(0.1234)	(0.0544)
6 years after partners death	0.0503	0.0642	0.0565
	(0.0543)	(0.1052)	(0.0604)
7 years after partners death	0.0645	-0.1118	0.1395*
	(0.0813)	(0.1609)	(0.0843)
8 years after partners death	0.0655	-0.1021	0.1406
	(0.0802)	(0.1556)	(0.0879)
9 years after partners death	0.1004	0.1485	0.0959
	(0.0864)	(0.1788)	(0.0966)
10+ years after partners death	-0.1643	-0.2456	-0.1303
	(0.1038)	(0.1812)	(0.1219)
	(0.0367)	(0.0504)	(0.0359)
Common duration from time of matching	Yes	Yes	Yes
FE residential duration	Yes	Yes	Yes
Individual specific control variables	Yes	Yes	Yes
Residence specific control variables	Yes	Yes	Yes
Location specific variables	Yes	Yes	Yes
Observations	872 820	227 169	645 442

Source: Own calculation based on data from Statistics Denmark.
Notes: standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01, **** p < 0.001

Appendix 6: Logit model for competing risk to move closer or farther away from independent children (no move reference)

	All		**Men**		**Women**	
	Not moving	*Move closer to children*	*Not moving*	*Move closer to children*	*Not moving*	*Move closer to children*
1 year after partners death	-0.9296****	0.1937****	-0.5864****	0.1232*	-1.1068****	0.1950****
	(0.0406)	(0.0469)	(0.0494)	(0.0717)	(0.0435)	(0.0578)
2 years after partners death	-0.6102****	-0.0176	-0.3902****	0.0139	-0.7542****	-0.0512
	(0.0355)	(0.0550)	(0.0456)	(0.0833)	(0.0410)	(0.0691)
3 years after partners death	-0.4127****	-0.0214	-0.2925****	0.1072	-0.5066****	-0.1060
	(0.0400)	(0.0549)	(0.0483)	(0.0927)	(0.0464)	(0.0677)
4 years after partners death	-0.3543****	-0.1494**	-0.2311****	-0.1280	-0.4480****	-0.1710**
	(0.0304)	(0.0685)	(0.0452)	(0.1108)	(0.0424)	(0.0842)
5 years after partners death	-0.2236****	-0.1365**	-0.0143	-0.1457	-0.3722****	-0.1590*
	(0.0355)	(0.0657)	(0.0539)	(0.1038)	(0.0419)	(0.0859)
6 years after partners death	-0.1610****	-0.2435***	-0.0038	-0.2597*	-0.2825****	-0.2670***
	(0.0393)	(0.0748)	(0.0657)	(0.1372)	(0.0487)	(0.0900)
7 years after partners death	-0.1613****	-0.2718****	0.0004	-0.2300*	-0.2842****	-0.3156****
	(0.0388)	(0.0749)	(0.0704)	(0.1385)	(0.0452)	(0.0882)
8 years after partners death	-0.0614	-0.1466	0.2592****	-0.2958**	-0.2475****	-0.0956
	(0.0477)	(0.1015)	(0.0777)	(0.1495)	(0.0600)	(0.1310)
9 years after partners death	-0.1495***	-0.2579***	0.0799	-0.2324	-0.3103****	-0.3097***
	(0.0508)	(0.0949)	(0.0907)	(0.1674)	(0.0541)	(0.1089)
10+ years after partners death	0.0203	0.0053	0.1998****	-0.0824	-0.0906**	0.0121
	(0.0290)	(0.0660)	(0.0450)	(0.1049)	(0.0378)	(0.0841)
	(0.0495)	(0.1156)	(0.0543)	(0.1139)	(0.0493)	(0.1228)
Common duration from time of matching	Yes	Yes	Yes	Yes	Yes	Yes
FE residential duration	Yes	Yes	Yes	Yes	Yes	Yes
Individual specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Residence specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Location specific variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,372 566		447 687		924 879	

Source: Own calculation based on data from Statistics Denmark.
Notes: standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01, **** p < 0.001

Appendix 7: OLS estimation on change in distance (kilometers) to indenpendent children after residential move.

	Distance all	**Distance men**	**Distance women**
Partner death chock	-0.727**	1.270***	-1.939****
	(0.311)	(0.453)	(0.397)
Common duration from time of matching	Yes	Yes	Yes
FE residential duration	Yes	Yes	Yes
Individual specific control variables	Yes	Yes	Yes
Residence specific control variables	Yes	Yes	Yes
Location specific variables	Yes	Yes	Yes
Observations	76 102	24 167	51 935
R^2	0.020	0.021	0.019

Source: Own calculation based on data from Statistics Denmark.
Notes: standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01, **** p < 0.001

Appendix 8: Logit model for competing risk to move closer or farther away from grandchildren (ref no move).

	All		**Men**		**Women**	
	Not moving	*Move closer to grandkid*	*Not moving*	*Move closer to grandkid*	*Not moving*	*Move closer to grandkid*
1 year after partners death	-0.6283****	-0.0228	-0.3875****	0.0475	-0.7815****	-0.0857
	(0.0370)	(0.0661)	(0.0485)	(0.1045)	(0.0438)	(0.0767)
2 years after partners death	-0.4255****	-0.0731	-0.2904****	0.0669	-0.5212****	-0.1576**
	(0.0411)	(0.0634)	(0.0529)	(0.1029)	(0.0484)	(0.0786)
3 years after partners death	-0.3495****	-0.1761**	-0.1846****	-0.1456	-0.4636****	-0.2058**
	(0.0316)	(0.0762)	(0.0537)	(0.1377)	(0.0442)	(0.0868)
4 years after partners death	-0.2325****	-0.1159	-0.0410	-0.2777**	-0.3721****	-0.0875
	(0.0403)	(0.0758)	(0.0614)	(0.1301)	(0.0481)	(0.0929)
5 years after partners death	-0.1780****	-0.2537***	0.0023	-0.2336	-0.3066****	-0.2827***
	(0.0428)	(0.0837)	(0.0701)	(0.1485)	(0.0541)	(0.1045)
6 years after partners death	-0.1857****	-0.2655***	0.0104	-0.0652	-0.3272****	-0.3872****
	(0.0459)	(0.0893)	(0.0820)	(0.1543)	(0.0508)	(0.1107)
7 years after partners death	-0.0364	-0.1120	0.3618****	-0.2118	-0.2641****	-0.1094
	(0.0497)	(0.1159)	(0.0864)	(0.1984)	(0.0625)	(0.1372)
8 years after partners death	-0.1582***	-0.2735**	0.0710	-0.3498*	-0.3089****	-0.2781**
	(0.0568)	(0.1143)	(0.0989)	(0.1942)	(0.0588)	(0.1328)
9+ years after partners death	0.0142	0.0432	0.2310****	0.1555	-0.1074**	-0.0224
	(0.0335)	(0.0763)	(0.0457)	(0.1113)	(0.0442)	(0.1029)
Common duration from time of matching	Yes	Yes	Yes	Yes	Yes	Yes
FE residential duration	Yes	Yes	Yes	Yes	Yes	Yes
Individual specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Residence specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Location specific variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1 061 847		343 654		718 193	

Source: Own calculation based on data from Statistics Denmark.
Notes: standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01, **** p < 0.001

Appendix 9: Logit model for competing risk to move to smaller or larger residence (ref no move)

	All		**Men**		**Women**	
	Downsize	*Upsize*	*Downsize*	*Upsize*	*Downsize*	*Upsize*
1 year after partners death	0.7172****	-0.2398****	0.4769****	-0.1698**	0.8578****	-0.2636****
	(0.0275)	(0.0520)	(0.0376)	(0.0722)	(0.0304)	(0.0499)
2 years after partners death	0.4990****	-0.2771****	0.3199****	-0.1447**	0.6152****	-0.3303****
	(0.0249)	(0.0549)	(0.0358)	(0.0726)	(0.0295)	(0.0595)
3 years after partners death	0.4069****	-0.4128****	0.1900****	-0.3037****	0.5494****	-0.4485****
	(0.0264)	(0.0445)	(0.0361)	(0.0618)	(0.0350)	(0.0532)
4 years after partners death	0.2752****	-0.4970****	0.0153	-0.4353****	0.4364****	-0.5017****
	(0.0287)	(0.0359)	(0.0459)	(0.0750)	(0.0324)	(0.0503)
5 years after partners death	0.1728****	-0.5697****	0.0095	-0.4729****	0.2940****	-0.5826****
	(0.0282)	(0.0493)	(0.0418)	(0.0833)	(0.0362)	(0.0552)
6 years after partners death	0.1822****	-0.5118****	-0.0232	-0.4532****	0.3109****	-0.5009****
	(0.0278)	(0.0663)	(0.0495)	(0.1052)	(0.0373)	(0.0728)
7 years after partners death	0.1608****	-0.5331****	-0.2048****	-0.5399****	0.3547****	-0.5072****
	(0.0314)	(0.0617)	(0.0560)	(0.1072)	(0.0382)	(0.0681)
8 years after partners death	0.1740****	-0.6068****	-0.0799	-0.7978****	0.3206****	-0.4793****
	(0.0357)	(0.0718)	(0.0663)	(0.1382)	(0.0385)	(0.0875)
9+ years after partners death	0.0583***	-0.6142****	-0.1714****	-0.7297****	0.1882****	-0.5610****
	(0.0205)	(0.0368)	(0.0387)	(0.0774)	(0.0264)	(0.0443)
Common duration from time of matching	Yes	Yes	Yes	Yes	Yes	Yes
FE residential duration	Yes	Yes	Yes	Yes	Yes	Yes
Individual specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Residence specific control variables	Yes	Yes	Yes	Yes	Yes	Yes
Location specific variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3 291 407		1 080 579		2 210 828	

Source: Own calculation based on data from Statistics Denmark.
Notes: standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01, **** p < 0.001

Appendix 10: OLS estimation on change in residence size (in square meters) after residential move.

	Reisndece size All	**Reisndece size Men**	**Reisndece size Women**
Partner death chock	-10.8586****	-9.1242****	-11.6079****
	(0.3226)	(0.3604)	(0.3664)
Common duration from time of matching	Yes	Yes	Yes
FE residential duration	Yes	Yes	Yes
Individual specific control variables	Yes	Yes	Yes
Residence specific control variables	Yes	Yes	Yes
Location specific variables	Yes	Yes	Yes
Observations	178 070	56 439	121 631
R^2	0.526	0.484	0.548

Source: Own calculation based on data from Statistics Denmark.
Notes: standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01, **** p < 0.001

Appendix 11: OLS estimation on change in number of rooms after residential move.

	Rooms All	**Rooms Men**	**Rooms Women**
Partner death chock	-0.4305****	-0.3778****	-0.4533****
	(0.0089)	(0.0125)	(0.0093)
Common duration from time of matching	Yes	Yes	Yes
FE residential duration	Yes	Yes	Yes
Individual specific control variables	Yes	Yes	Yes
Residence specific control variables	Yes	Yes	Yes
Location specific variables	Yes	Yes	Yes
Observations	178 066	56 438	121 628
R^2	0.475	0.448	0.488

Source: Own calculation based on data from Statistics Denmark.
Notes: standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01, **** p < 0.001

Appendix 12: Complementary log-log model for likelihood to move after partners simulated death 15 years prior to real event with control variables coefficients

	All	**Men**	**Women**
1 year after partners death	-0.8245	-0.1371	-0.9647
	(0.5636)	(1.4228)	(0.6171)
2 years after partners death	-0.8313*	-1.2331	-0.7312
	(0.4803)	(1.2526)	(0.5250)
3 years after partners death	-2.4217**	(.)	-2.4531**
	(0.9643)	(.)	(0.9635)
4 years after partners death	-1.2327**	(.)	-1.2655**
	(0.5459)	(.)	(0.5448)
5 years after partners death	-1.0310*	(.)	-1.0640*
	(0.5982)	(.)	(0.5991)
6 years after partners death	-3.0573****	-1.2323	0.0000
	(0.7441)	(1.1669)	(.)
7 years after partners death	-1.9350***	-0.1357	-3.2085***
	(0.6419)	(0.9518)	(0.9829)
8 yearss from partner death	-1.2803**	0.5602	-1.6581**
	(0.5591)	(1.2282)	(0.6894)
9 yearss from partner death	-2.0801****	-0.5472	-2.6820****
	(0.5868)	(0.9194)	(0.6811)
10+ yearss from partner death	0.4255****	0.0519	0.5487****
	(0.0224)	(0.0370)	(0.0256)
Common duration from time of matching	Yes	Yes	Yes
FE residential duration	Yes	Yes	Yes
Individual specific control variables	Yes	Yes	Yes
Residence specific control variables	Yes	Yes	Yes
Location specific variables	Yes	Yes	Yes
Observations	817 049	183 075	577 390

Source: Own calculation based on data from Statistics Denmark.
Notes: standard errors are in parentheses; * p < 0.1, ** p < 0.05, *** p < 0.01, **** p < 0.001

PhD Theis

Aske Egsgaard-Pedersen

Principal Academic Supervisors

Professor Lars Winther

Associated Professor Høgni Kalsø Hansen

The PhD thesis has been submitted to the PhD School of Science,

Faculty of Science, University of Copenhagen

Marts 2021