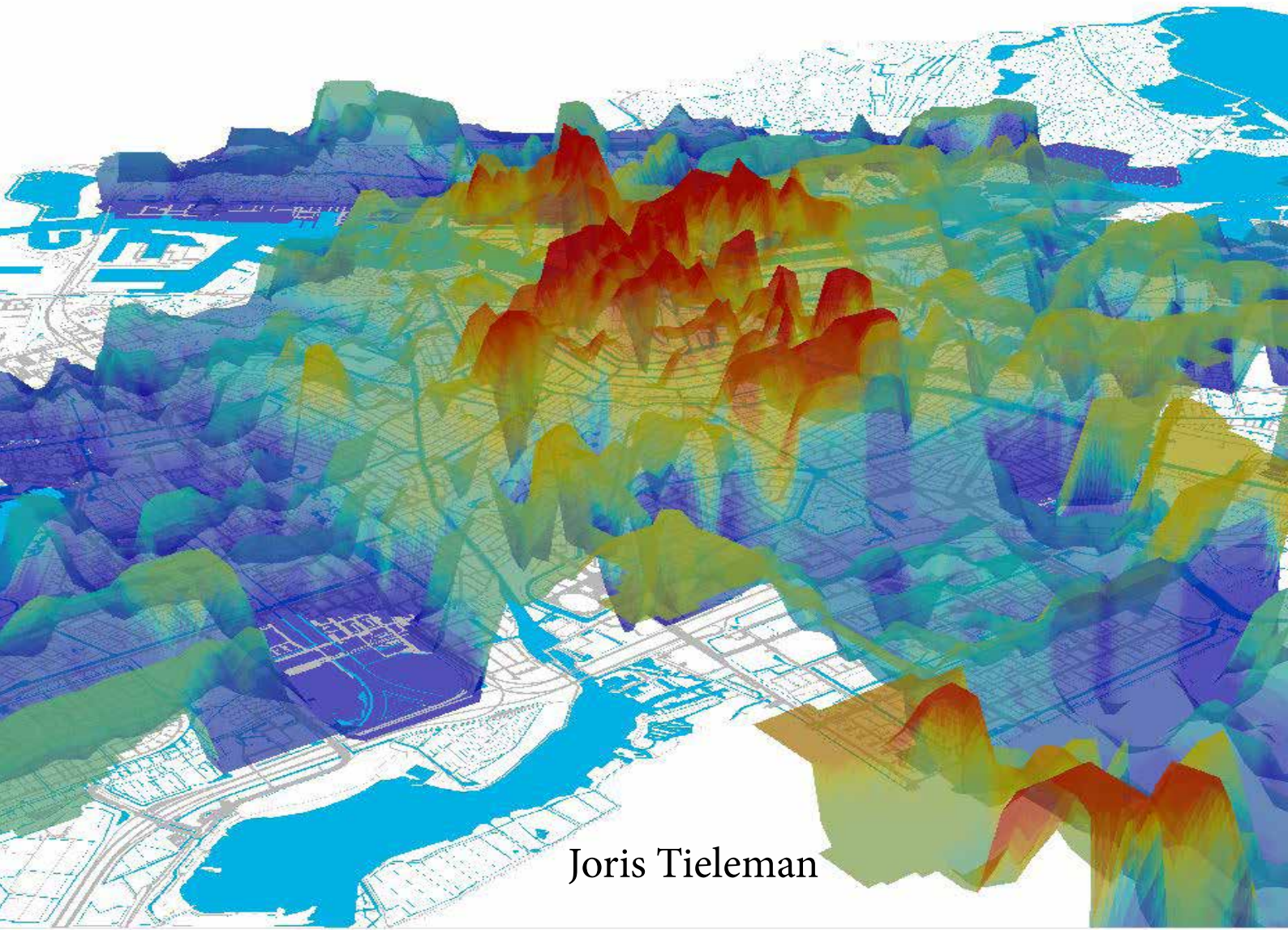
THE SHIFTING CITYSCAPE OF AMSTERDAM



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The shifting cityscape of Amsterdam

Using AGIS to analyze gentrification patterns through relative housing prices

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Abstract

Gentrification is transforming Amsterdam, but this transformation is highly spatially differentiated. In this thesis, I develop and test a methodology to spatially map the process of gentrification inside a city. I quantify and visualize gentrification as relative housing prices throughout the city, using a rich dataset of housing transaction prices over the period 1985-2010 which allows differentiation by area at a very fine-grained level. With these data, I create a number of animated GIS' (AGIS), which show several nuanced patterns in the spatial spreading of gentrification throughout the city over the period 1985-2010.

Among other things, the data show an axis of expensive housing cutting through the city from the Canal District to the Vondelpark, from which gentrification radiates outward, claiming neighborhood by neighborhood in a wave-like pattern over the decades as the (higher) middle classes returned to the city center. There are some factors stopping or slowing its spread. The strongest of these are large, connected blocks of socially rented housing. However, small bodies of water and official (yet non-physical) neighborhood boundaries also appear to be surprisingly effective at slowing the process.

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Contents

Foreword

If you intended to skip the foreword, please do read the following few lines, because they may save you time by directing you to the most interesting part of the thesis instantly.

Reading guide

First of all, the Appendices are an essential and integral part of the thesis. They do not contain dry formulas or methodological material, but maps which accompany the story. Appendix A and B are designed to be read alongside the chapter *Tracing gentrification in Amsterdam* and contain printouts of the video maps (AGIS') on which this thesis is based. Those videos themselves can be found in full at *https://vimeo.com/user18202860/videos*. Appendix C is designed to be read alongside the chapter *Attemps at understanding*. It contains several thematic maps: social housing in the city, concentrations of squatters in 1980 and buildings' ages.

Second, this thesis starts with an extensive theoretical framework and data and methodology description. While these are integral parts of the thesis, the time-constrained reader would do best to focus on the introduction, the last chapter, the conclusion and the Appendices. I really hope you enjoy reading this work, and any feedback or questions will be very much welcomed.

Acknowledgements

I would like to thank a number of people for their help in this writing process. First of all, I would like to thank Aslan Zorlu, for his pragmatic and cheerful guidance of the writing process and for encouraging me to write more freely than I had previously been taught. I would like to thank the Dutch Association of Real Estate Brokers (NVM) for graciously lending me their data and Jasper Dekkers for organizing this and guiding me on my way with GIS. As I am not an Amsterdam native, I have required the help of several local experts to get a good overview of the history of the housing market in this city; Jurgen Hoogendoorn, Fred Jansen and Cor de Jong of the OGA, Art Klandermans of the WZS, Henri de Groot, housing expert at the VU, Perry Hoetjes, strategist for the Stadsgenoot housing association, Klaas-Bindert de Haan, GIS expert of the DRO and Jeroen van der Veer of the Amsterdam Federation of Housing Associations (AFWC). Finally, I would like to thank Clara Welteke and Just Dengerink for providing a most stimulating working environment.

1. Introduction

Gentrification is transforming Amsterdam, but not evenly. The gentrification literature has so far seen very few attempts to spatially map the process inside a city. In this thesis, I develop and test a methodology to fill that gap in the literature. I build a test case for Amsterdam using a very rich dataset of housing transaction prices between 1985 and 2010, which enables me to look at the change in spatial patterns over time at a very detailed level. Using these data, I create a number of animated maps (AGIS´), which show several nuanced patterns in the spatial spreading of gentrification throughout the city over several decades. Finally, I use these AGIS´ to explore several variables that could explain part of the observed patterns.

As its inhabitants would argue, Amsterdam is a city with heart. However, it would be hard to say exactly where its heart lies; around the central station, in the tourist district? In the old canals, the Heren-, Keizers- and Prinsengracht? Perhaps in the centrally located Pijp neighborhood, with its bustling everyday market on the Albert Cuyp and its classical laborers housing? Maybe even outside the ring road, perhaps the economic powerhouse of the Zuidas is the true heart of the city? Ask ten inhabitants, and one will get ten different answers; Amsterdam is clearly a polycentric city.

What is more, the city is changing rapidly. Although the city has always exerted a strong pull on the young and adventurous, after the Second World War there was a period when urban populations strongly declined, housing prices sank and municipalities seemed at a loss to stem the tide. However, this population decline created room for change and new initiative in the city, and as city living became fashionable once more, Amsterdam swelled with new inhabitants. This was accompanied by a steep rise in housing prices. Thus, like many other cities around the world, Amsterdam has experienced a wave of gentrification over the past decades.

The topic of gentrification has been well addressed in the geographic literature, from many different angles. Large volumes of research have been written on the topic, with methodologies ranging from sociological analysis to computer modeling (Butler and Robson, 2001; O´Sullivan, 2002). Surprisingly, however, the *geography* of the phenomenon has been largely left unstudied so far (Lees, 2000). It is surprising because most of the gentrification research is in fact done by geographers, and because the local institutional setting matters greatly to a process like gentrification. This lack of research is both on the macro level, regarding how the gentrification process plays out differently in cities in different countries, and on the micro level, regarding the process inside a single neighborhood. Concerning the macro level, prominent attempts have been made by Clark (2005) and Lees (2000) and in the Netherlands among others by Uitermark et al. (2007) and Van Gent (2013).

As for the micro and the meso level, these have been studied surprisingly little. It is surprising because one of the most prominent gentrification theories, the *rent gap* theory, refers to the developments on a meso level (citywide, so above the neighborhood level but below the national and international) in a city and could only be proven or disproven at that level (Smith, 1979; Ley, 1987). Several attempts have been made, among others by Butler and Robson (2001) using qualitative methods and Clark (1987) using quantitative methods. In this thesis, I will address the issue using mostly quantitative methods. The main goal of this thesis is to visually map, categorize and analyze the spreading patterns of gentrification inside a city; the research question: *What spatial patterns did gentrification follow when spreading throughout Amsterdam over the past 25 years?* Because this thesis is aimed at testing the AGIS methodology for the

topic of gentrification as much as working out this specific case, it includes a chapter in which I tentatively explore several drivers of the pattern.

To get a good overview of the spread of gentrification throughout the city over the past decades, I display the developments in housing prices in animated maps showing the developments in housing prices over the period 1985-2010. I then analyze the spatial spreading patterns that appear over the 25-year study period, both at the citywide scale and at the neighborhood level and develop a categorization. Following this, I conduct a tentative investigation into the main drivers behind the observed spatial patterns, looking at the role of different actors, from municipality to grassroots movements. However, it should be noted that the main contribution of this thesis is the first analysis, of the spatial spreading patterns themselves, and not the analysis of several of its determinants.

So what is the benefit of this work? First, this type of study may be useful to predict the success of urban upgrading policies in different areas in a city. It may also be useful to predict the continuing spatial pattern of the process, especially in cities where the housing market is less controlled than in Amsterdam. The results of this research may be of interest, obviously to gentrification researchers, but also municipal authorities, urban planners, and strategists at housing associations. It would be interesting both to those preaching urban upgrading and those seeking to prevent displacement through gentrification, as the outcomes of this research may provide some predictive power over the spreading patterns of rising real estate prices. However, it is not planning evaluation, nor does my work contain recommendations for planners, if only for the reason that it is rather exploratory in nature.

1.1 Outline

The thesis is structured as follows. In this introduction chapter, a brief historical framework is sketched to properly place the investigation and results in their historical and geographic context. In the second chapter, the theoretical framework is set. This starts with defining *gentrification*, followed by a short overview of the main debates in the gentrification literature, zooming in on the literature strand concerning the geography of gentrification. After that I give an overview of the institutional setting of the Dutch housing market. I then zoom in further, describing the literature on gentrification processes in the Netherlands, and finally bring all strands together in an overview of the main practical circumstances and theoretical ideas that may be relevant to the spatial spreading patterns of gentrification in Amsterdam.

In the third chapter, I describe my data and methodology. I first discuss my choice of variable for the quantitative operationalization of the research question, discuss alternatives used in the literature and explain the benefits and limitations of my choices. I then give an overview of my data sources, the data cleaning process and the method of transforming the raw data to the variables required for the final GIS. The data section is somewhat larger than usual in geography, but as this kind of quantitative research is not very common in geographic circles it seemed useful to elaborate on the technical aspects. I then describe the main software and methods used to create the time-animated GIS (AGIS) of housing prices and the different mapping.

The fourth chapter forms the core of the thesis. I describe the spatial patterns found in the GIS showing the spreading of gentrification over time, both on a citywide level and in several small case studies of individual neighborhoods. First I use a large scale AGIS to show the patterns which appear citywide, such as the path taken by the edge of gentrification. Second, I describe several ideal types of local spreading patterns using detailed, small scale AGIS' of individual neighborhoods.

The fifth chapter explains several of the patterns found in the fourth chapter. As gentrification is an extremely complex and many-sided phenomenon, this explanation is naturally incomplete. However, I believe some interpretation is not only possible but also a necessary precondition for follow-up research and may be useful to set the stage for a deeper understanding of the observed patterns. Therefore I do pursue a number of possible explanatory factors, also to demonstrate the usefulness of an AGIS in researching this type of complex phenomena.

The concluding chapter contains the usual three parts. First, I summarize the findings. Second, I reflect on the use of this quantitative methodology to study a complex phenomenon like gentrification, on its success, its limitations and its future potential. Third, I make suggestions for further research. This is a common part of concluding chapters, but it is slightly larger than usual in this thesis, because the goal was twofold: to fill a specific gap in the existing literature and to explore the possibilities of this quasi-experimental methodology. Thus, I devote quite some attention to the possibilities for further research in this section.

1.2 A brief history of Amsterdam since World War II

At the time of writing, it has been 68 years since World War II ended, and it has been a turbulent 68 years. In 1945, the city was ravaged by war and the loss of about 65.000 Jewish citizens (Joods Historisch Museum, 2013), and since then there have been major shifts in the nature of the economy, the social composition of the city population, the housing situation and the international landscape. Therefore it may be useful to briefly sketch the main shifts shaping Amsterdam in these decades before plunging into the theoretical structure and the more technical analysis, so that the story is set against a clear historic background.

In the housing spectrum, a large expansion took place in in the 1950s and early 1960s which had been planned before the war. Large neighborhoods were added to the city in the west (Slotermeer, Geuzenveld, Slotervaart, Overtoomse Veld, Osdorp) and later in the south (Buitenveldert, Bijlmer). These were built and rented out by housing associations, subsidized civil society organizations closely connected to the government. Later, in the 1970s and 1980s urban renewal operations took down a large amount of dilapidated housing throughout the city and replaced it with more social housing. These developments gave the housing associations an overwhelming presence in the city.

Due to technological developments like the proliferation of cars many people and firms decided to move out of the city in the decades following World War II. Along with most other major cities in Western Europe, Amsterdam drained population during these decades. The tide of this suburbanization wave turned in 1985, when Amsterdam's population was 675.570 people, its lowest point since World War I (Dienst Wonen, 2008). Despite this population drop and the urban expansion there was a shortage of housing in the city. As young people increasingly wanted to move out of their parent's houses to live more independently, the average number of people per household dropped, especially in urban areas. Thus, when in the 1960s and 1970s the municipality started evicting people and demolishing houses to make way for urban renewal plans, a squatting movement emerged with large public support. This eventually forced the municipality into an ideological shift to the left, building for the neighborhood (social housing) instead of for the economy (flagship projects and infrastructure).

Another major shift was demographic. In 1964, the Dutch government signed an agreement with Turkey for the recruitment of 'guest workers', in 1969 Morocco followed suit. During the 1960s and early

1970s, about 200.000 men came to the Netherlands through this channel. Many of these 'guest workers' stayed and most found a place in the larger cities, often bringing their families later on (Heijke, 1979). Meanwhile, Amsterdam also gained a large number of skilled immigrants from all over the world. According to data from 2010, Amsterdam is the city with the largest number of nationalities in the world and has more people of foreign descent (first or second generation) than Dutch descent (O&S, 2010).

Meanwhile, the economy changed. Where before the war Amsterdam was a major processing port for a.o. goods from Indonesia, after the decolonization its function as a maritime hub largely shifted to Rotterdam. Other heavy industries declined as more and more economic functions were offshored to countries with cheaper labor, and services gradually came to replace goods as the heart of the Western European economies, Amsterdam in particular. This had a double effect: the loss of manufacturing jobs meant a marked increase in unemployment, particularly in the lower socio-economic groups, while the increase in demand for services meant that another group took a more and more prominent place in the city.

This economic shift from manufacturing to services was accompanied by an ever increasing opening of the European borders, which sharpened differences within and between countries. Western European cities like Amsterdam now had to compete with a much larger geographic area, which led to increasing specialization of cities and urban districts. This sharpened the peaks and deepened the valleys in the economic fabric of the region. The network function of cities gained importance and Amsterdam saw an influx of highly skilled labor immigrants, who also took a prominent place in the city. Today, the service economy of Amsterdam is characterized among others by a large creative sector and a large, albeit declining, financial services sector (Fernandez, 2011).

Considering all these changes, most of all the large (but shrinking) role of housing associations in the housing system, the major economic shift from manufacturing to services and the intensification of the city's network function, it is no wonder Amsterdam has seen large shifts in its housing market. Gentrification is one of these shifts, the socio-economic upgrading of neighborhoods, often involving direct and indirect displacement of the local population to make way for the more financially potent newcomers. The following chapter will guide the reader through the large international literature on this topic and set out the conceptual framework for the analysis that follows.

2. Theoretical framework

In this chapter, the theoretical framework is set. I start by defining gentrification, followed by a short overview of the main debates in the gentrification literature, zooming in on the literature strand concerning the geography of gentrification. After that I give an overview of the institutional setting of the Dutch housing market. I then zoom in further, describing the literature on gentrification processes in the Netherlands, and finally bring all strands together in an overview of the practical circumstances and theoretical ideas that may be relevant to the spatial spreading patterns of gentrification in Amsterdam.

2.1 Defining gentrification

To define a complex phenomenon like gentrification is not easy. It brings to mind Aesop's story of the blind men who together tried to find out what an elephant looks like (Hamnett, 1991). Because each one of them was feeling a different part of the animal, they could not agree on what it must look like; a tree, a snake, a wall? Gentrification is as least as complex a phenomenon, with many different sides, which lends itself to endless struggles over which aspects are central to it and which are peripheral. Therefore it is vital to spend some attention on building a clear definition of the term.

Elements commonly mentioned in the literature as core elements of gentrification can be roughly divided into two groups: the physical and financial elements, which are most visible on street level, and the socio-economic level, which concerns the inhabitants of the neighborhood. In the first group, most often mentioned are reinvestment of capital, an economic change in the land and housing markets, the existence of a *rent gap*, landscape change and a physical change in the housing stock (Smith, 1987; Davidson and Lees, 2005; Lees, Slater and Wyly, 2009a). In the second group are social upgrading of the locale by incoming high income groups and direct or indirect displacement of low income groups (Smith, 1987; Davidson and Lees, 2005; Lees, Slater and Wyly, 2009a). Other factors sometimes found in definitions are specific characteristics of the area, such as that it should be in the inner city or that houses should be built in Victorian style (Zukin, 1987; Gregory et al., 2009).

To form a working definition of the phenomenon for this thesis, I start by borrowing Clark's (2005):

> *Gentrification is a process involving a change in the population of land-users such that the new users are of a higher socio-economic status than the previous users, together with an associated change in the built environment through a reinvestment in fixed capital.*

This is quite a broad definition. Many definitions of gentrification look somewhat more like this:

> *Middle class settlement in renovated or redeveloped propreties in older, inner-city districts formerly occupied by a lower income population. (Dictionary of Human Geography, 2009)*

I choose Clark's version, as do the authors of the widely used Gentrification Reader (Lees, Slater and Wyly, 2009), because it provides a very clear delineation of the core aspects of gentrification, without being distracted by its more common, or more often researched, physical forms of appearance. As he states, "it is easy to confuse narrowness with precision" (Clark, 2005). Thus, it allows for a precise narrow-

ing down of the concept to a defined research topic, without any clutter left over from previous research sticking to the definition.

For example, Clark's definition is less constraining not only by including gentrification outside the inner city, but also in less obvious ways, such as leaving open the form of reinvestment of fixed capital in the built environment instead of constraining to the physical renovation of the properties themselves. However, it is not too broad; the term 're-investment' clearly delineates the boundaries between greenfield development and gentrification and demonstrates the socio-economic 'upgrading' character of gentrification.

This research will be delineated within Clark's wide definition in two major ways. First, it will concern only urban gentrification, although not necessarily inner-city. Second, it will concern only residential gentrification, mostly for reasons of data availability, but also because residential and commercial uses mix to such a high degree in Amsterdam that a measurement of the one is bound to capture an important part of changes in the other.

This definition will help to keep the theoretical framework manageable, cutting through the clutter of a worldwide gentrification literature by describing the core of the phenomenon. It will also make it possible to convincingly visualize the many-sided phenomenon of gentrification using a single quantitative variable.

2.2 Main debates in the gentrification literature

The gentrification debate has produced an immense literature, in which six main strands can be distinguished. These are described below.

Criticism of displacement

The biggest strand in the literature, still to date, is the criticism of displacement. The term gentrification was coined by Ruth Glass (1964), who used it to critically describe the replacement of working class people by 'a new gentry' in many London neighborhoods. This critical tone has remained an important voice in the gentrification debate ever since, with a large range of authors describing gentrification as a 'threat to inner city working class areas' and a 'prelude to the wholesale conversion of parts of the inner city into a bougeois playground' (Hartman, 1979; Ley, 1981; Hamnett, 1991; Smith, 2005; Slater, 2006). Directly linked to this transformation in the urban fabric is the displacement of the current residents, who are typically of a lower socio-economic class (Sumka, 1979; Atkinson, 2000; Vigdor et al., 2002; Braconi and Freeman, 2004; Newman and Wyly, 2006). A clear typology of displacement mechanisms has been devised by Marcuse (1986), ranging from direct eviction to displacement by indirect economic pressure.

Urban redevelopment as a government strategy

Against this critical perspective is a large and rapidly growing volume of work on 'urban upgrading', 'regeneration, revitalization and renaissance' (Slater, 2006). The most famous and arguably most influential proponent of these ideas is Richard Florida (2002, 2005, 2008), who paints gentrification as the only way forward for cities. This type of writing mostly takes place outside scientific journals, but is a very important driver of urban policies worldwide (Sumka, 1979; Sternlieb & Hughes, 1983; Freeman & Braconi, 2004). Interestingly, the literature critical on gentrification often refers to this 'urban upgrading'

perspective (as a one-sided argument) but there is little reference in the urban upgrading literature to the critical perspectives (Slater, 2006), although it describes largely the same process.

Stage models and historic development

The third strand that stands out in the literature concerns the categorization and theorization of gentrification through models. Regarding historically different types of gentrification the main contribution is from Hackworth (2000), who described three waves of gentrification; sporadic in the early 1970s, as a more firmly established process in the 1980s and as a government-led strategy in the 1990s and beyond. Recently Lees, Slater and Wyly (2009a) have proposed adding a fourth wave to this list. To categorize the different parts of the gentrification process, Pattison (1977) set out a four-stage model of the gentrification process, starting with first movers, followed by first commercial interest, then interest from realtors and media coverage, and finally a large-scale influx of rich gentrifiers from the upper middle class. Of course, this model has often been revisited and criticized, but it is still intensively in use (Caulfield, 1989; Lees, Slater & Wyly, 2009b).

Production side vs. consumption side

The fourth main debate in the literature concerns the causal explanation for the global rise of the gentrification process. There are different approaches to the economic side of the argument, ranging from Marxist to neoclassical economics (Rose, 1984; Ley, 1986; Smith, 1996). An important part of this economic discussion is whether we should focus on supply side economics, producer driven, or demand side economics, consumer driven. On the producer side financial arguments and theories play a large role, such as expansion of a municipality's tax base and profit opportunities, a so-called *rent gap*, for real estate developers (Smith, 1979). Focusing on the consumer driven side cultural arguments come into play, such as a preference for inner-city living and a desire for certain types of housing, usually older building styles (Mills, 1988; Caulfield, 1989).

Typologies of gentrification

Another branch of the literature attempts to refine different typologies of gentrification and to dissect different groups of gentrifiers. Notable contributions include work on the gender aspects of gentrification (Lauria & Knopp, 1985; Bondi, 1999; Florida, 2002; Cahill, 2007) and issues of racial differentiation in the gentrifying population of certain American neighborhoods (Taylor, 1992; Ley, 1995; Smith, 1996). Other discussions within this strand concern the social composition of the category of 'marginal gentrifiers', the first movers into not yet gentrifying neighborhoods (Rose, 1984; Smith, 1987).

Geographies of gentrification

Finally, a fairly recent branch of the literature concerns the different geographies of gentrification. The term was coined by Ley (1996) and picked up again by Lees (2000) in an agenda-setting research article titled 'Towards a geography of gentrification', a surprising title, since geographers have been investigating the phenomenon since 1964. In this article Lees sums up the research to date and finds a surprisingly large gap in the literature: there is very little attention to geographical differentiation within the gentrification process. Lees argues that the ´geography of gentrification´ ´works on a number of different levels – international comparison, intranational, and citywide comparison´ (Lees, 2000: 405), also extending this into the temporality of the process, which has ´all but disappeared from analyses´ (Lees, 2000: 397).

Within this strand of the literature, attempts have been made to broaden the scope from the central

city to suburban (Smith & DeFilippis, 1999) and rural (Phillips, 2004) gentrification. Other authors did qualitative research in different inner-city neighborhoods, attempting to distinguish the different ideal types of gentrification that may be identified (Butler and Robson, 2001). Finally, some authors attempt to deepen the field in yet another direction by looking beyond tangible outcomes and build theories of emotional landscapes which are driving the process of gentrification in the city, geographies of feeling and association rather than financial rent gaps or other such material mechanisms (Soja, 1996; Phillips, 2004).

2.3 Geographies of gentrification

Of all of the above debates, in my opinion the geography of gentrification is the one most deserving fresh energy and contributions. I believe this is in fact quite vital, as more and more municipalities embrace policies of urban upgrading, which work out very differently in different localities (Van Gent, 2013). This gap in the literature has sometimes palpable effects on the communication within the scientific community, as the following quote demonstrates.

> *"Visiting Malmö, Neil Smith* (from the U.S.) *asked me to show him the battlefields of gentrification. At the time, I was at a loss to explain that there were processes of gentrification in Malmö, but no battlefields. Conflicting interests, displacement, personal tragedies, yes, but not the desperation behind battlefields. The cumulative outcome of political and legal battles in Sweden during the twentieth century set the stage for less violent ways of dealing with inherently conflictual processes of change." Clark (2005)*

I want to add the methodology of animated GIS (AGIS) to the arsenal of gentrification geographers, because I think it can contribute much to lessen this type of misunderstanding, building on recent work like Walks and Maaranen (2008), Musterd and Van der Oord (2008) and Teernstra and Van Gent (2012). If we are able to visualize gentrification in motion, this can help to demonstrate the specifics of gentrification as a localized process, specific to a certain institutional setting, and even to understanding of the differences on a micro level, between different neighborhoods. It can also lead to a better understanding of the specific local problems brought on by gentrification and make for a more effective mitigation of the inevitable harm done, especially as a part of the ever more prevalent urban upgrading policies.

Quantitative methods have been used to map the differences in pace and rhythm of the process *between cities* (Dolde & Tirtiroglu, 1997; Gupta & Miller, 2010), *qualitative* methods have been used to compare neighborhoods within cities (e.g. Butler and Robson, 2001) but detailed-level quantitative spatial methods are rarely being used for this purpose. This is a pity, because good maps, and certainly AGIS', could be used to operationalize and evaluate prominent theories like the rent gap (Smith, 1979). To fill that gap in the literature, I am developing this methodology and test it through a case study of Amsterdam.

2.4 The Dutch institutional setting

Contrary to Anglo-Saxon countries, in Western European cities the state and other non-market institutions play a large and often leading role in shaping the development of neighborhoods and housing markets (Le Galès, 2002; Kazepov, 2005; Van Kempen and Murie, 2009; Van Gent, 2010). In the Netherlands, this role is typically even greater than in the surrounding countries. This means the Dutch housing market is quite different from the typical Anglo-Saxon context in a number of important aspects, and

even within the Western-European context a very particular one (Van Gent, 2013). A description of the general Dutch institutional framework of the housing market is given below, followed by an overview of the most important developments that occurred during the period under study, 1985-2010.

Institutional framework of the Dutch housing market

In the Netherlands, there are relatively many institutions concerning themselves with the structure of cities. I will give a short overview here; for a fuller description of the institutional setting surrounding Dutch housing, see Hoetjes (2010).

First, there is the central government, which oversees the general institutional framework regarding housing and thus sets out the rules for the housing associations. The central government does not really differentiate its policies much by city or look at the process on a very detailed level, but it nevertheless has a large indirect impact on the actions taken by housing associations because it has the most power in setting the legal framework.

Second, there is the municipality. The municipality of Amsterdam has traditionally taken a very active role in shaping both the public and the private spaces in the city. Partly, this is made possible by the unique system of leasehold estate ("erfpacht") which essentially means that people never completely own land in the city, they rent it from the municipality, and this gives the municipality a large amount of control over the layout of the city. It should be noted that the municipality is not a single agent; it consists of a central level and several district councils ('deelraden') which compete among each other for resources.

The third main institution are the housing associations. These organizations constructed about 90% of all new housing in Amsterdam between 1954 and 1985 and owned large swaths of the already existing housing stock, which gave them a very powerful position as managers of the housing system (Van Gent, 2013).

As for policies, the most important one is the Dutch 'compact-city' policy, set out on the national level, which promotes inner-city gentrification to prevent suburbanization and sprawl (Terhorst and van de Ven, 1997). This framework envelops many of the relevant policies for the timeframe covered, as in the grander scheme of things the actions of governmental actors are often focused on containing suburbanization by making the city attractive to those who would be tempted to build and buy in the countryside.

Changes in the institutional setting 1985-2010

At the end of the '80s the government started heavily promoting home ownership, which should be taken into account in analyzing the NVM data used in this thesis as those are based solely on ownership prices, not at the rental market (Boelhouwer and Priemus, 1990).

In 1989, the government turned a corner in its housing policy with the wide-ranging Housing Memorandum 'Housing in the 90s', which shifted responsibility for housing one scale down, from the central government to local governments and the housing associations (Heerma, 1989). This started a change in behavior for the housing associations, shifting from a purely government-oriented role to more market-oriented behavior (Boelhouwer & Van der Heijden, 1992; Van Kempen and Van Weesep, 1994). In 2001, a new memorandum pushed the neoliberalization of the housing market further, stipulating that '20.000 private rental and 50.000 social rental dwellings should become owner-occupied each year [in the Netherlands] in order to reach a 65% owner-occupancy rate by 2010' (Van Gent, 2013; SER, 2001). Although the owner-occupancy rate was still only 31% in Amsterdam in 2010, the shift in policy objectives should be well noted (AFWC, 2012a).

At a lower spatial scale, municipalities have been losing financial freedom for years, as individuals and companies are becoming more footloose, making the municipal tax base less secure. This makes the municipalities more dependent on private means to achieve their public goals in urban planning (Hoetjes, 2010; Korthals Altes, 2002). This often creates tensions between the relatively socially oriented policy goals of the municipality and the financially motivated goals of private actors.

The housing associations face much the same problem as the municipality, increasingly required to have a balanced budget, which means transforming from a governmental attitude to an entrepreneurial one. Increasingly, housing associations are managing the housing stock, instead of controlling it. However, their new role is not the standard role of a market actor: the housing associations are legally obliged to invest specifically in market-weak areas (Boelhouwer, 2007).

2.5 Gentrification in the Netherlands

Most of the literature published on gentrification is focused on the Anglo-American urban setting. As the assumptions surrounding that setting cannot simply be transplanted to the Dutch setting, I want to highlight some of the main differences here. For a fuller account of how the institutional setting and the character of gentrification in the Netherlands differ from the Anglo-American situation, see Van Gent (2013).

First of all, user rights are more strongly asserted vis-à-vis owner rights in European continental law than in Anglo-Saxon law, which means that gentrification is generally less of a violent social struggle in continental Europe (Clark, 2005). Amsterdam is very much a rental city and rent protection is strongly embedded in the Dutch law; a renter cannot be expelled without very pressing reasons, even if the contract was temporary and has ended (Rijksoverheid, 2013). This means that neighborhoods cannot simply be overrun by sudden gentrification and that the entire process is usually gentler and includes more cooperation with the local population.

Second, the role of the government differs. The policy goals of the Dutch local and national authorities are somewhat different from their US counterparts (Uitermark et al., 2007). Where the goal in the US often is to create as large a tax base as possible, which means upgrading a neighborhood to 'its maximum potential', the Dutch policy is explicitly to create mixed neighborhoods (Terhorst and Van der Ven, 1997). That means gentrification is often seen in a positive light by the inhabitants of an area, such as Uitermark et al. (2007) found in Rotterdam, where the municipality was attempting to upgrade the socio-economic composition of a neighborhood and most inhabitants felt the changes were not going far enough, rather than protesting against them.

Third, the power of the government and related institutions to control the process is much greater here and the role of the market much smaller. In Amsterdam specifically, most of the land is owned by the municipality and semi-governmental institutions; more than 50% of the total housing stock is in the hands of the semi-public housing associations (AFWC, 2012a). In practice, that means most of the city is not traded in a free marketplace as generally understood by economists and thus much less viable to sudden sweeping property changes.

It should be noted that the role and view of the government are changing. Slowly but surely, the Dutch municipalities are being cut off from their central government lifeline and being forced to become more market-oriented (Uitermark, 2003; Boelhouwer, 2007; Engelen & Musterd, 2010). This is visible in

the municipal government, which privatized its own housing association (Gemeentelijk Woningbedrijf) in 1993 and which no longer carries out the type of large-scale urban restructuring operations common in the 1980s, leaving this to private entrepreneurs instead. However, this is more than just a pragmatic shift in practice; it is also an ideological shift. The current 'Structural Vision Amsterdam 2040' envisions a gradual reduction of low-income housing throughout Amsterdam (Municipality of Amsterdam, 2011). In other words, the municipality is shifting from actively providing low-income housing to encouraging and promoting gentrification.

Summarizing, the gentrification processes in the Netherlands are generally more gradual, more controlled by a more social government and include less class conflict than those in Anglo-American settings. However, that has been changing over the past 30 years and is likely to change even further in the coming decades, shifting closer to the Anglo-American situation.

2.6 Drivers of spatial spreading patterns of gentrification in Amsterdam

It is time to build the bridge from the theory to empiric analysis. To give a somewhat inclusive overview of the literature, I had to describe a bewildering amount of factors surrounding gentrification. Now which of these could be core to understanding the changes in Amsterdam? This heading ties the strings together into a coherent conceptual framework. It should be noted that this is not a full overview of all relevant factors; it is merely an exploration. Below, I set out my baseline hypothesis and then add four potentially influential variables which merit further exploration. These are three actors: the municipality, the housing associations and the residents, as well as a selection of structural factors.

What makes a neighborhood a likely candidate for gentrification? To build my baseline theoretical model, I will follow Hackworth and Smith (2001), who find that gentrification radiates out from the places where it started, spreading throughout the city like ripples in a pond (cf. Aalbers, 2003; Porter, 2011). This raises the next question: where in the city will the starting point(s) be? Here, theory offers an interesting choice. Urban economists generally assume the monocentric city model as a baseline (Alonso, 1964; Muth, 1969; Mills, 1972; De Groot, 2011). In Amsterdam, the exact center would be the Central Station. Urban geographers often assume gentrification starts in the most prestigious areas; that is those with the most architecturally desirable housing and the most prestigious urban amenities (Jager, 1986; Hamnett, 2003). This would be the Canal District and to its southwest the Museum District area, near the Vondelpark. I will take the monocentric city model as my baseline hypothesis, as this is the economists' model which is generally used to build land rent models (De Groot, 2011).

After investigating the spatial routes taken by gentrification in Amsterdam, I will first explore the role of the municipality in the pattern. Government, both central and local, plays a large and active role in urban changes in the Netherlands (Teernstra & Van Gent, 2012). The municipality plays a large and interventionist role in the housing market, through renovation and demolition of public housing and the promotion of owner-occupied housing, generally in cooperation with the housing associations (Van Kempen & Van Weesep, 1994; Musterd and Ostendorf, 2008). It could be that the municipality is actively promoting the development of gentrification; it could also be that this happens place-specific, either in those areas left behind or in areas that could be even more exclusive, although the latter is not very likely in a city as left-leaning as Amsterdam. My hypothesis is that municipal policy will generally have stimulated the first part of gentrification processes throughout the city, but slowed them down as neighborhoods threatened to become very exclusive.

The housing associations are the next factor I will explore. Their influence is twofold: passive and active. First the passive part, which is in my view the most important side. The housing associations are omnipresent in the city, in some cases owning entire neighborhoods, in other areas their property is scattered, but it is in every district ('stadsdeel') at least 33% of all housing (AFWC, 2012a). The fact that such amounts of housing are by definition kept off the free real estate market and distributed through a parallel system must have a large influence on the process of gentrification. Their active part of their role is that they intervene in the neighborhoods where they have a large amount of property, continuously trying to improve living conditions there. However, housing associations are controlled by the municipality in this respect almost as much as private owners, so they cannot be expected to have played a very directive role through that channel. My hypothesis is that areas with more social housing will gentrify more slowly, because this housing is not traded on the free real estate market and therefore less likely to see displacement of its current socio-economic occupant group through financial pressures. That means the gentrification process will be slowed, as fewer richer occupants have a chance to move in. Also, there is less room for private developers to move in, leaving the supply side of the gentrification process stymied.

Moving down the power chain from government to civil society, the third factor are grassroots networks. All stage models of gentrification start with the arrival of pioneering first movers (Pattison, 1977; Lees, Slater & Wyly, 2009b). Ley paints this cohort as builders, people who start to transform the neighborhood through sweat equity, who make contacts, build a network in their new neighborhood and generally put their backs into it (Ley, 1986). Although hard to operationalize, this is a group that must be part of the analysis. My hypothesis is that strong networks in a neighborhood will cause it to be among the initially gentrifying areas and to gentrify faster up to a certain point, as a strong sense of community generally improves the quality of life in a neighborhood.

Fourth and finally, there are several structural characteristics of areas to be considered. According to Beauregard (1986), the process is so complex that "no one or even two factors are determinant", but I will still choose two variables which seem likely to be of central importance. The first is the type of housing. Generally, the oldest areas of the city, which have the most desirable architecture, gentrify first (Clay, 1979; Beauregard, 1986). In Amsterdam this would be the Canal District and following that, anything built before World War II, as the housing built after that is often thought to be somewhat uninspired. The second is the reputation of a neighborhood. However, this only works under the assumption that neighborhood boundaries and area names have an influence on gentrification patterns. My hypothesis is that the age of housing will be an important driver for the gentrification spreading pattern and that the influence of a neighborhoods' reputation will an important factor in explaining the remaining variance in the pattern.

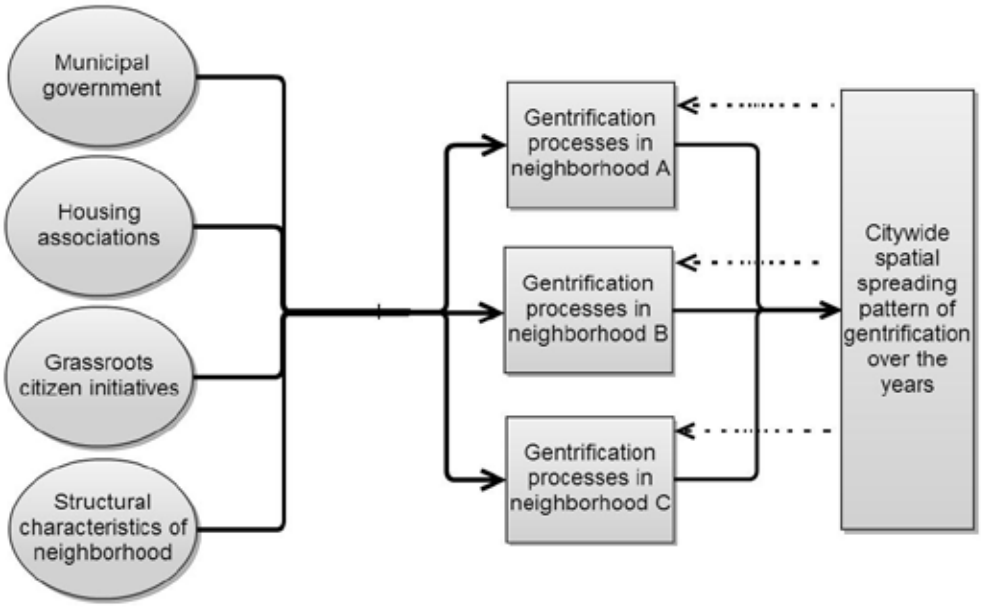

Figure 1. Conceptual Framework

This conceptual framework is further operationalized in the final two chapters of this thesis: *Tracing gentrification in Amsterdam* and A*ttempts at understanding*. In the former chapter I simply describe the observed patterns, in the process evaluating my baseline hypothesis. For the latter chapter I ground my theory by interviewing seven professionals and officials in municipal and housing association circles on the basis of the AGIS'. I then use their answers to operationalize the four explanatory variables described above.

3. Data and methodology

This chapter describes the research methodology, from operationalization of the research question to data and mapping methodology. First, I discuss the quantitative operationalization of the research question, explain my choice of variables and discuss their advantages and limitations. Second, I describe the data used. Third, I describe the methodology used to map the data in an AGIS. Fourth and finally, I discuss the limitations inherent in my choices of variable and methodology.

3.1 Quantifying gentrification using relative housing price

To operationalize gentrification, my variable of choice is the price of housing in an area relative to the citywide price. That choice leads to two main questions. The first question regards the choice of indicator. Is the price of housing the best possible quantitative indicator to represent the gentrification process; what alternatives are found in the literature? The second question regards the consequences of this choice. What information does this variable omit that should be taken into account when studying gentrification, and what information does the variable contain that does not belong to the gentrification process, which should therefore be filtered out before mapping the variable? This will be answered under the heading ´Limitations´ below.

Gentrification is a multidimensional phenomenon and extremely hard to pin down. When a neighborhood gentrifies, many different aspects of the area change, often simultaneously, sometimes subsequently. The built environment is upgraded, prices rise, the population changes, sometimes the demographics change too, the range of commercial facilities changes, and so on and so forth. These indicators sometimes lead and sometimes lag each other; there is no fixed order (Ley, 1996; Lees et al., 2009b; Teernstra and Van Gent, 2012). That may be the reason that relatively little quantitative research has been conducted on the topic so far, as it is difficult to select dependable indicators which will show where gentrification is going on, and how much of it.

The practical problem is that to visually map this phenomenon and its changes over time in an AGIS, a single indicator is required. Although literature quantitatively approaching gentrification is sparse, there is some guidance there. Indicators can be divided over two groups: demographic indicators and economic indicators. Demographic indicators are usually created from clusters of socio-economic census variables (Lipton, 1977; Nelson, 1988; Ley, 1996) or single variables: inhabitant turnover rate (Freeman & Braconi, 2004) and income (Boterman et al., 2010). The main economic indicators is land rent, a variation on housing prices, with the main contribution from Clark (1987) and other prominent work by Badcock (1989) and Hammel (1999). A final, extremely labor-intensive mapping method consists of block-by-block surveys to 'seek out visible evidence of housing reinvestment and class turnover' (Whyte, 1988).

I believe the housing price is the best available indicator to map gentrification. It is relatively straightforward to calculate, using a good dataset of real estate transactions, much easier than the land rent (see Clark, 1987; Hammel, 1999; De Groot, 2011). Furthermore, it incorporates both of the core elements of the gentrification definition, the upgrading of the built environment and the demographic shift towards higher socio-economic status groups. The upgrading of the built environment is expressed through the value of the house itself and the valuation of the neighborhood, two big factors in forming

the housing price according to standard hedonic pricing theory (Visser & Van Dam, 2006; De Groot, 2011). The demographic shift is expressed through the fact that higher socio-economic groups are clearly outbidding the less wealthy for the houses, which makes the prices rise. However, it should be noted that the relationship between housing price and social composition of a neighborhood is not entirely straightforward. For some further research on this, see Teernstra and Van Gent (2012).

3.2 Limitations and partial solutions

Since this part of the thesis is intended as a case study for the application of the AGIS methodology in gentrification research, it is important to take some time here to recognize the limitations inherent in using the housing price per m^2 as the variable of choice.

The first issue is that the housing price is influenced by factors which are not part of the gentrification process. Housing prices rise and fall with inflation, with the state of the mortgage market, the availability of sufficient homes in the area and the general price trend in the Dutch housing market. To filter out these factors I have normalized the housing price against the average housing price in the urban agglomeration of Amsterdam (Amsterdam, Amstelveen, Diemen and Duivendrecht) so that only the price rises above average are shown, which indicate a change in the socio-economic status of a neighborhood within the urban system.

Another issue important to gentrification researchers is that the degree of displacement is not shown on this GIS. This can be solved with another AGIS, which could show the relative amounts of housing transactions, if the exact amount of addresses per area were known. Such a GIS could also be used to distinguish between marginal gentrification, which means gentrifiers moving in before the neighborhood gentrifies, and later stages of gentrification. However, taking onboard this extra topic would rather exceed the scope of a single thesis.

The fact that this database contains only the price of houses that are sold on the market presents another problem, because a part of the housing stock was sold off by the housing associations during this period, representing a shift from rent-controlled rented social housing to owner-occupied housing. Unless the previous renters can afford to buy the house (buy-in) this also represents gentrification, especially since the houses are often remodeled before being sold on the market for the first time. The database does not show this. However, it should be noted that the percentage of the social housing stock being sold off every year is relatively small. As shown in Table 1 below, the housing associations only started selling their socially rented property in 1998 and have sold, between 1998 and 2010, in total almost 16.000 dwellings, which is a mere 4% of the total municipal housing stock (Verkoopconvenant, 2011; CSB, 2013). A map showing the locations of social housing in the city in 2009 (latest available year in the required data format) is included in Appendix C1.

Table 1. Sales of socially rented dwellings per city district per year, 1998-2010. *Source:* WoOn Amsterdam, 2012.

Year	Centrum	West	Nieuw West	Zuid	Oost	Noord	Zuid-Oost	Total
1998	32	29	8	0	0	4	206	279
1999	51	4	96	0	22	15	188	376
2000	14	9	67	8	38	102	85	323
2001	2	66	78	52	52	164	88	502
2002	6	35	44	55	52	105	137	434
2003	47	140	65	70	141	322	283	1068
2004	114	320	231	180	211	448	398	1902
2005	119	405	417	171	375	558	357	2402
2006	68	596	257	146	437	490	302	2296
2007	95	531	205	203	342	470	326	2171
2008	55	362	141	148	264	428	306	1704
2009	53	232	145	116	208	277	183	1214
2010	84	256	142	99	199	189	175	1144
Total	**740**	**2985**	**1896**	**1248**	**2341**	**3572**	**3034**	**15815**

As mentioned, the process of gentrification is a complex one, and it should be noted that not all of its stages are equally well presented through this GIS. Pattison (1977) defines four stages of gentrification: first movers, first commercial interest, interest from realtors and media coverage, and finally large-scale influx of rich gentrifiers from the upper middle class. Before the third stage sets in, property is still relative inexpensive and gentrification processes are thus not reflected in the housing price yet.

3.3 Data

The housing transaction price data used for this research were generously supplied by the Dutch Association of Real Estate Brokers, the NVM. The members of this association currently conduct around 70% of all housing transactions in the Netherlands, the details of which have been stored in a central database since 1985. The data used for this research is that on transactions of housing units within the municipality of Amsterdam in the period between 1985 and 2010. The starting year of 1985 is thus forced by necessity, but also quite a fortunate choice, as the national housing policies of the Netherlands changed drastically in 1989, with the Housing Memorandum of the ´90s. This memorandum started a large-scale shift from home renting to home ownership, which is why it is very fortunate to have data starting a few years before this policy change. Also, 1985 was the year when Amsterdam's population finally started rising again, after declining ever since World War II to a low point of 675.000 (CBS, 2013).

Before starting, I applied a number of filters to the data to clean it up before the analysis. The details are given in Table 2 below. After applying this set of filters, 83% of the observations were still remaining, amounting to 95.251 real estate transactions. This is a very rich dataset which reflects the public valuation for real estate as well as possible. However, there are three categories of real estate excluded from this database which deserve to be mentioned.

First, the database does not contain the values of rental housing units owned by the housing associations, because those units are not traded, which means their potential market value is never turned into an observable price through a market transaction. Second, the database contains few transactions of housing units sold by the housing associations, as those sales are often not conducted through a real estate agent but directly by the housing association itself (AFWC, 2012a). These sales concerned some 5-10% of the total housing stock in the late 1990s and 2000s. Third, the database contains no commercial real estate. Although this is an omission in the data, it would have been difficult to analyze within the same framework the dynamics of the housing real estate market and the commercial real estate market.

Table 2. Filters applied to the dataset to eliminate extreme outliers and faulty observations

Variable	**Filter applied**	**% of records**
Floor surface	Observations with floor surface below 1 m2 or above 1.000 m2	8%
Type of real estate	Observations of garages or empty land	0%
Selling price	Observations with selling price below €50.000 or above €2.000.000	7%
Amount of rooms	Observations with amount of rooms below 1 or above 20	1%
Type of housing	Observations of caravans and housing boats	1%
Partly rented out	Observations of houses partly rented out at the time	1%
Price difference	Observations where the difference between asking and final price was greater than 50% in either direction	2%
Postal code	Observations where the postal code was unknown	0%
	Total amount of observations deleted through these filters	**17%**

A final issue is that these data do not supply information on the rental market, which is quite substantial in Amsterdam. Since 1998, housing corporations have been selling off some of their social housing, but Amsterdam still is mostly a rental city. As can be seen in Figure 2 below, the composition of the housing stock has undergone a strong shift from rental to owner-occupied during the past two decades. For a large part of the research period, the owner-occupied sector comprised a relatively small part of the total housing stock. However, that does not have to be a problem as long as the data contain sufficient observations in each area to form a clear indication of price developments. To observe the effect created by a larger or smaller percentage of social housing in an area I compare my data with maps from the AFWC, the Union of Amsterdam's Housing Associations, showing exactly where in the city the social housing is (AFWC, 1992; 2012b).

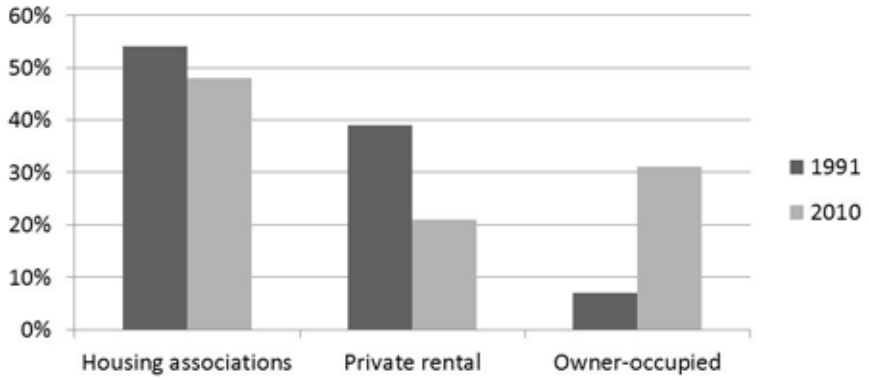

Figure 2. Changes in the structure of the housing stock, 1991-2010. *Source:* AFWC 1992, 2012a.

To get a single housing price indicator from the raw data I first calculated the average price of a square meter of living space per area per year, correcting for the size of the individual observations by using $\sqrt{size}$ as weight. To smooth out the observations somewhat and get rid of any random spikes in the data I then created a moving average according to the formula below.

$$Price_{i,t} = \frac{(1 * p_{i,t-2} + 2 * p_{i,t-1} + 3 * p_{i,t} + 2 * p_{i,t+1} + 1 * p_{i,t+2})}{(1 + 2 + 3 + 2 + 1)}$$

$\boldsymbol{Price_{i,t}}$ is the final smoothed value used for the price per square meter of living space in area $\boldsymbol{i}$ in year $\boldsymbol{t}$; $\boldsymbol{p_{i,t}}$ is the unsmoothed average price in area $\boldsymbol{i}$ in year $\boldsymbol{t}$. To make sure that the data would be as representative as possible for the areas described, I deleted from this final dataset all observations composed of less than 5 transactions in the raw data. Table 3 shows the range of housing prices for each year in the dataset and the developments in the housing market in general. Please note that this methodology only averages out the price over time, not over space; the calculated average price of an area is not influenced by transactions in the adjacent areas.

Table 3. Developments in the average price of a square meter of housing space in different areas of Amsterdam. All prices are corrected for inflation and expressed in euros at the 2010 value. *Source:* own calculation from NVM data.

Year	Price trend Amsterdam	Price trend Netherlands	Observations (% of all areas)	Mean price/m2	Standard deviation of price/m2	Min. price/m2	Max. price/m2
1985	-	-	9%	€ 1.192	€ 241	€ 833	€ 1.804
1986	3,90%	4,30%	14%	€ 1.231	€ 250	€ 736	€ 1.880
1987	7,40%	4,20%	19%	€ 1.288	€ 273	€ 648	€ 2.066
1988	4,70%	3,70%	23%	€ 1.357	€ 294	€ 807	€ 2.140
1989	3,40%	5,10%	27%	€ 1.401	€ 307	€ 859	€ 2.515
1990	0,10%	-0,40%	32%	€ 1.430	€ 326	€ 859	€ 2.511
1991	-0,90%	-1,30%	36%	€ 1.427	€ 334	€ 711	€ 3.340
1992	1,10%	4,70%	40%	€ 1.431	€ 310	€ 786	€ 2.608
1993	4,00%	8,40%	45%	€ 1.471	€ 305	€ 758	€ 2.785
1994	3,50%	5,70%	51%	€ 1.505	€ 301	€ 699	€ 2.864
1995	5,60%	2,10%	56%	€ 1.589	€ 310	€ 781	€ 2.722
1996	10,40%	8,00%	61%	€ 1.713	€ 347	€ 857	€ 3.589
1997	14,70%	6,60%	65%	€ 1.908	€ 417	€ 918	€ 5.087
1998	15,60%	6,40%	69%	€ 2.194	€ 519	€ 1.076	€ 6.515
1999	15,90%	15,90%	73%	€ 2.519	€ 648	€ 1.251	€ 7.426
2000	11,00%	12,50%	75%	€ 2.837	€ 739	€ 1.365	€ 7.596
2001	2,10%	2,90%	77%	€ 2.959	€ 741	€ 1.438	€ 6.126
2002	-1,00%	1,80%	80%	€ 2.952	€ 702	€ 1.298	€ 5.401
2003	-1,30%	-0,40%	84%	€ 2.905	€ 665	€ 1.346	€ 5.442
2004	0,80%	2,40%	87%	€ 2.899	€ 656	€ 1.452	€ 5.457
2005	3,00%	2,50%	90%	€ 2.948	€ 704	€ 1.461	€ 5.657
2006	5,80%	3,90%	93%	€ 3.089	€ 800	€ 1.526	€ 6.098
2007	4,40%	2,00%	95%	€ 3.228	€ 917	€ 1.586	€ 9.804
2008	1,80%	-2,60%	96%	€ 3.279	€ 952	€ 1.402	€ 8.558
2009	-0,30%	-8,60%	94%	€ 3.284	€ 949	€ 1.285	€ 7.601
2010	-1,00%	1,90%	89%	€ 3.243	€ 939	€ 1.370	€ 8.270

3.4 GIS methodology

As medium of analysis, I use animated GIS (AGIS). I build a digital map of Amsterdam showing the data described above. Because I want to explicitly show the *changes* in these data over a certain period, I turn this into a video, showing a single frame for every year between 1985 and 2010. This video is what I will refer to in the rest of this thesis as 'the AGIS'. I also make several detail videos, showing only the changes in a single neighborhood, but by 'the AGIS' I mean the video showing in an overview of Amsterdam the relative price per area, that is the price of a square meter of housing in a certain area divided by the average price throughout the city. As videos are hard to print, this AGIS is available online at *https://vimeo.com/user18202860/videos* and partly in Appendix A1.

To show the spread of gentrification in a single animated GIS, a single variable is required. To deal with the fact that housing units have different sizes, I have used the average price of one square meter of housing. To deal with the fact that different areas had very different starting price levels, I have created both a citywide GIS and several detailed zoom-ins, in addition to several maps of the price changes over time within the areas themselves. To deal with the fact that prices all over the city rise in a general trend which is influenced by inflation, the mortgage interest rate, the popularity of city living in general and of Amsterdam in particular, I have normalized all prices. This means that in the final visualization, prices per square meter are set to 100 on average throughout the municipality, for every year. Table 3 below details the relevant time trends.

As this is a new methodology for the field of gentrification research, it may be useful to other researchers reading this to shortly discuss the software used. To convert the raw data of individual transactions to running averages per postal code area, a number of scripts in Stata, Excel and SPSS were used; these are available on request. The spatial structure used to map the data consists of 5-digit postal code area Thiessen polygons adapted from a 6-digit postal code polygon map generously supplied by BridGIS BV. The underlying map of Amsterdam is the Grootschalige Basiskaart, developed by Dienst Basisinformatie Amsterdam.

To map the data into this spatial structure and create a time-animated GIS, I first attempted to use the *time* application included in the ArcGIS software package 10.1. However, that process is not yet far enough developed to handle this amount of polygons and create a flowing, or even functioning, animation. Experiments with the process showed that in principle, this type of data can be mapped using the time function, but whenever the amount of polygons went over a certain threshold, the application crashed. Thus, the GIS animations were finally created using a series of static maps and a video-editing application.

4. Tracing gentrification in Amsterdam

Having described the theoretical framework, methodology and data, now comes the core of this thesis: the visual analysis of the spreading patterns of gentrification in the city. This chapter describes and visually demonstrates the way gentrification spread throughout Amsterdam over the past 25 years and is the first of its kind in the gentrification literature. It investigates the sometimes complex rhythm of its flow throughout the city, including its main anchor points in the urban fabric, its breaking points and a highly differentiated temporality. Although every city is different, the results found below for Amsterdam may well correspond strongly with the patterns appearing in other Dutch and Western European cities.

The appendices are added to this thesis in a separate document, as they were designed to be read alongside this chapter and the next one. The chapter is written so it can in theory be read without looking at the maps, but it would be much less interesting to read that way. It is set up as follows. I first describe the most important patterns found in the citywide spreading history of gentrification, including its range, the relationship between the municipality and surroundings, and its main anchor points in the city. I then describe some observations regarding the pace and rhythm of the gentrification process moving through the city. Finally I zoom in and look in detail at the patterns in a number of neighborhoods, from which I derive several ideal types of spreading patterns inside neighborhoods.

4.1 General gentrification trends and background

Between 1985 and 2010, while Amsterdam´s population grew again from 675.000 to 767.000, its socio-economic composition also shifted strongly (CBS, 2013). The share of households in the municipality classified as low income went down from 47% in 1995 to 31% in 2010 while high incomes went up from 14% to 28% of the population (AFWC, 2012a). This influx of more affluent households was accompanied by a strong rise in housing prices throughout the entire municipality, even more so than in the rest of the Netherlands (see Table 3 above).

As this change was accompanied by large-scale changes in the built environment, it is clear we can speak of gentrification in Amsterdam over the research period. However, Amsterdam never experienced the stratospheric price peaks or the extremely sudden gentrification that appears to occur in cities like New York and London; the process is much more gradual here. This is visible in Table 3 above, which shows the range of housing prices for the entire municipality for every year in the research period and demonstrates that the price difference between the cheapest and the most expensive area was never greater than a factor 6. The first thing that should be noted, thus, is the relative equality with which the prices rise throughout the city. The next question then is of course: where in the urban fabric are the variations?

The AGIS starts in 1985 and runs until 2010. For the first years, relatively little data is available, partly because the digital data gathering techniques were not as common then and partly because Amsterdam was to such a large degree a rental city (see Figure 2 above). The full AGIS can be found at *https://vimeo.com/user18202860/videos*; for the purposes of discussion the 6 stills in Appendix A1 of the situation in 1985/1990/1995/2000/2005/2010 will suffice. This chapter starts with a discussion of the citywide pattern, of which maps are given below. Further down in the chapter a number of neighborhoods is discussed in more detail. The AGIS's for these neighborhoods are available online at the same page, and stills of every five years are given in Appendix series B.

4.2 Citywide patterns

Citywide, the gentrification follows a fairly clear general trajectory. There are two centers from which the change originates: the Canal District and the Vondelpark. Over the entire 25-year period, prices rise in those two areas, and like ripples in a pond the phenomenon spreads out. Interestingly, if we look closely at the center, the rise does not originate in the exact city center but really comes out of the surrounding Canal District, spreading inward to the Red Light District and Central Station area and outward, at first mostly to the west. Thus, we can observe an axis of gentrification running clearly from the Central Station through the Museum Quarter to the south end of the Vondelpark. This is the first thing to notice: that even in a city with a housing market as tightly controlled and managed as that of Amsterdam, the gentrification seems to follow its own, very distinct, pattern.

The physical structure of the city is quite diverse with regard to building style, and cut through with water, roads and parks everywhere. However, there appear to be sets of two natural borders delineating a strong trend break in the urban fabric.

The first of these is formed by water. As can be seen in map A1-2000, in the west the pattern of gentrification is broken by the Kostverlorenvaart. Apparently, although this body of water is only 20 meters wide and bridged at regular intervals of less than 1 km each time, it presents some kind of barrier for the gentrifying population. In the east the pattern stops at the Amstel, after which the Eastern District starts. This is a slightly more real physical barrier, although the area to its east is just as accessible as the area to its west. However, we clearly see gentrification making a halt at the water's edge. In the north, the IJ has always formed a strong barrier, separating Amsterdam Noord from the rest of the city; it still does, although in the last years some movements are becoming visible in Noord.

The second barrier is well known throughout the city: the ring road. Many locals do not consider the area beyond the ring road to be a part of the city proper, and there is a local saying that 'beyond the Ring, the vegetation starts'. However, it has not always been like that. The role of the ring has changed over the past years, from having little meaning in the urban fabric in 1995 to clearly cutting out the inner city as a desirable living location vis-à-vis the outlying areas in 2010. Another way to look at this is shown in maps A2:'95-'00 and A2:'05-'10 which depict the rise and fall of prices over the periods 1995-2000 and 2005-2010, clearly showing a general rise inside the ring road and a fall outside it.

From the Canal District-Vondelpark axis outwards, gentrification spread in a rhythm of neighborhood by neighborhood. It appears that there is much more coherence between the prices of areas which lie within the same neighborhood than between adjacent areas with a neighborhood border between them. This may be due to structural differences between the neighborhoods, such as the type and quality of housing or the available greenspace, but this is often not the case, as after the first wave of gentrification has passed, prices in adjacent neighborhoods often end up around the same level. Good examples of this are the Rivierenbuurt, which gentrified roughly between 1990 and 2000, and the adjacent Pijp, which went through the process about five years later. Price levels are currently comparable between those two, sometimes even higher in the Pijp.

This neighborhood-hopping pattern is documented in Appendix A1 using numbers for the examples mentioned here in the text in [brackets]. The first neighborhoods to gentrify, between 1985 and 1995, are the Canal District [1] and the Museum Quarter [2]. In the first half of the 1990s, we see that the Jordaan[3] gentrifying definitively, while the first round of gentrification is occurring in the Rivieren-

buurt [4] and the Watergraafsmeer [5]. In the ten years after that, between 1995 and 2005, the Pijp[6] and Oud West[7] join the fold of fashionable areas. In the last five years of the research period, 2005-2010, the western area of the city is relatively stable. Expansion continues into the east, in the Indische Buurt [8], the Oosterparkbuurt[9] and Transvaalbuurt[10], with the first indications appearing in Noord [11].

Concluding, one pattern that stands out in the main AGIS (Appendix A1) is that this is certainly not the simple monocentric spreading of gentrification suggested by the monocentric city model (Alonso, 1964; Muth, 1969; Mills, 1972). First of all, there are clearly two, not one, anchors of the gentrification process, the Canal District and the Vondelpark. The prediction of gentrification spreading outward like ripples in a pond appears to be accurate. This means that areas outside this axis are gentrifying much slower than those adjacent to it, even if they are quite close to the city center. This can be seen in the entire eastern part of the city, where housing remains until today much cheaper than is to be expected in such a central area, and even to a stronger degree in the north, although the lagging there is also caused by the natural barrier of the IJ water and the high percentage of social housing.

Second, there are a number of areas which go against the general pattern. These gentrify before others which would on the face of it appear to be first in line. We see for example the Rivierenbuurt rising before the Pijp, although the latter is more centrally located and catches up later on, reaching the same price level. In the east, the Watergraafsmeer experiences a strong degree of gentrification although it is quite peripheral in the city, before the much more centrally located Dapperbuurt. Summarizing, although the gentrification is nowhere as extreme as that described in the Anglo-Saxon literature, there are a number of clear patterns to be distinguished, some of which do not match the hypotheses formed on the basis of the existing literature.

4.3 Pace and rhythm

There is another dimension crucial to understanding the spreading pattern of gentrification: its temporality (Bondi, 1999). Gentrification is a gradual process, and although I often categorize neighborhoods in this thesis as 'gentrified' and 'not yet gentrified' for the sake of clarity of argument, the reality is that gentrifying neighborhoods go through a number of phases as they go further down the gentrification path, sometimes speeding up, sometimes slowing down or even stopping.

To map this rhythm, I have created another AGIS showing the change in relative price of an area over a period of 5 years, to see how a neighborhood shifted in the hierarchy of the urban fabric, whether it became cheaper or more expensive. It should be noted that there are hardly any instances of a neighborhood becoming cheaper in absolute terms, but this GIS shows some interesting patterns in the relative shifts. To accompany the following text, please turn to Appendix A2. It contains four maps, covering the period between 1990 and 2010.

For the first half of the 1990s the pattern is still quite diffused. Only the Jordaan, the Rivierenbuurt and the Watergraafsmeer clearly show gentrification over these five years. During the second half of the 1990s the ring road clearly defines the pattern: growing prices inside, sinking prices outside. The first half of the 2000s is clearly marked by a large-scale expansion phase, with price growth concentrated in the areas outside the initial gentrification axis Canal District-Vondelpark, expanding to the west, the north and the east. Curiously, in the second half of the 2000s this pattern is almost completely inversed, with growth once again concentrating inside the ring road.

The pattern described above clearly shows a wave pattern, consisting of alternating expansion waves in ungentrified territory and intensifying gentrification in the already gentrified areas. To distinguish these two areas during the last 15 years until 2010, the clearest dichotomy could be drawn along the ring road, with one exception. Amsterdam North, the area above the IJ water, moves in tandem with the area outside the ring. This could mean that as a living area, North is mentally grouped in with areas outside the ring. The fact that North is physically only a three minute ferry ride removed from the Central Station is apparently overruled by the mental barrier of the IJ water, which makes people less eager to bid for housing in North, as apparent from the price patterns.

4.4 Local patterns

Having explored the citywide pattern, it is now time to turn to the details. I study these at the level of neighborhoods, using the government definition of 'generally socially and physically homogeneous territories that are often clearly set off by streets, railroad lines, or waterways' (CBS, 2013). Within the neighborhoods, there are a number of distinct patterns to be observed, some of which return over and over again in different parts of the city, at different points in time. From these patterns, I have deduced a number of ideal types of neighborhood-level spreading patterns. These are described using examples of certain neighborhoods, but it is important to understand that the descriptions given concern *ideal types* and that the neighborhood case studies are examples, each of them only approximating the ideal types to a certain degree. Appendices B1 to B4 contain the maps supporting this section, of the Jordaan, Oud West, the Watergraafsmeer and the Indische Buurt.

1. Spreading evenly from a certain direction

This ideal type is the most common, found in the Jordaan, Rivierenbuurt, Pijp and many other neighborhoods. The best example of this pattern is visible in Oud West (Appendix B2), where gentrification spread northwards from the Vondelpark and westwards from the Jordaan continuously. In this area, housing went from costing 70-80% of the city average in 1990 to costing 110-130% of the city average in 2010 (on top of the steep general price rise in the city in that period). Another interesting example is the Jordaan (Appendix B1), which gentrified very quickly and completely between 1985 and 1995. Whether the spreading pattern was outward from the Canal District is hard to say because all of the postal code areas run east-west, but a clear pattern is visible spreading outwards to the north and south from the area between the Rozengracht and the Westerstraat.

2. Spotty and unequal

In some neighborhoods, the pattern is not as smooth as described above. The best example of this ideal type is the Indische Buurt (Appendix B3), which started gentrifying in the early 2000s. There is no pattern to be discerned in the price rises, they appear to be quite randomly distributed over the area. When after some years a pattern does appear, the northwestern quarter of the neighborhood clearly stands out above the rest, cut off by the Molukkenstraat and the Insulindeweg. Another example of this unequal developing pattern can be found in the Watergraafsmeer (Appendix B4), of which the northeastern quarter, not the most centrally located one, experiences a much stronger price rise during the 2000s than the rest of the neighborhood.

3. Without a clear anchoring point

Finally, there are some neighborhoods which gentrify without a clear anchoring point such as the city center or gentrifying adjacent neighborhoods. For those arguing that gentrification is normally a monocentric process, this happens surprisingly often, counter to the monocentric hypothesis. The best example of this pattern is found in the Watergraafsmeer (Appendix B4), which is relatively far from the other gentrifying areas in the city. It seemed unclear for a while which areas would be most expensive and in the end, the area *furthest* from the center turned out to be the most coveted one.

5. Attempts at understanding

Having studied the patterns that gentrification formed in the city, the sequence of the neighborhood transformations, it would be gravely unsatisfying not to at least make an attempt to understand them. In this chapter I will experiment with a number of potential explanations. However, it should be noted that the previous chapter forms the analytical and methodological core of this work. Any attempt at fully explaining the observed patterns would far exceed the mandate of a master's thesis, considering that the topic would span all urban developments over a period of 25 years. Rather, I want to investigate several factors which are quite specific to the Amsterdam housing market and use the AGIS to test hypotheses about them, with as secondary objective to demonstrate the use of the AGIS methodology in gentrification research.

To determine broadly which factors to investigate in this chapter, I drew on the literature and built a theoretic framework. To further specify and operationalize this (to 'ground' the theory), I interviewed seven professionals and officials in municipal and housing association circles and asked them which factors they would most like to investigate and which factors they felt would be the strongest drivers of the observed patterns. From those interviews I distilled a list of four topics which might deliver interesting results and for which sources were readily available.

Starting at the top of the urban food chain, municipal government, I investigate the influence of municipal legislation regulating transactions in the housing market, neighborhood improvement programs and flagship projects. Moving one step down the hierarchy to civil society, I look at how the dominant presence of housing associations (which own over 50% of all housing in Amsterdam) has affected the pattern. Third, I investigate the effects of grassroots organizations, operationalized for a case study here as the squatting movement in the early 1980s. Finally, my fourth factor does not consist of human agency; I experiment with investigating several structural characteristics of neighborhoods such as building style and reputation.

5.1 The influence of municipal government

The first driver of gentrification I investigate here is municipal policy. Institutionalists have argued that municipal policy is central to understanding gentrification, and in Amsterdam that is certainly a plausible argument since the municipality owns about 80% of the land in the city (Pahl, 1970; Robson, 1975; Bassett and Short, 1980; Municipality of Amsterdam, 2011). Even the land on which the famous Canal houses stand is generally owned by the city and leased to its owners through leases that are usually renewed every 50 years. This large degree of control over real estate throughout the city means the municipality could have a large hand in directing the gentrification process.

I will discuss two types of government influence. First, the indirect influence the municipality exerts through its real estate legislation, second, the direct interventions it has done through acting as project developer and building in the city. This second category could be divided in social housing projects, be they small or large, and eye-catching flagship projects.

The legislation surrounding selling has been quite restrictive for the last four decades (A. Klandermans, interview, 25-04-2013). It is not allowed to change houses in the social housing sector to owner-oc-

cupancy, except for a limited quota, and that includes privately owned houses. Nor is it allowed to split houses into apartments, generally a core component of gentrification processes, again except for a limited quota and except for a legendary week in the 1980s when municipal legislators were not paying attention and let slip the legislation for a single week, in which thousands of houses were brought out from under this protection. Houses with a rent above the social limit, which currently (in 2013) stands at €681, may be both sold and split. This is about half of the total city housing stock.

In the area of physical interventions the municipality has a strongly mixed track record. Until 1978 there were large-scale modernization plans for the city heart. Neighborhoods were sometimes flattened wholesale to make room for a metro, a four lane freeway to the central station and for other prestigious flagship projects. After large protests from the citizens a more socially oriented council came to power in 1978, which decided to build solely for the neighborhoods ('Bouw voor de Buurt'). That meant the only thing that was built in the city was social housing. This was quite necessary to replace large amounts of dilapidated housing and ensure a more adequate supply of housing to meet the large demand. Currently, the municipality has mostly withdrawn itself from social housing projects and is focused again on flagship projects like the IJ waterfront, a North-South metro line and several new museums, although the general pace of building is much slower.

The influence of all this on the spatial spreading patterns of gentrification does not appear to be very large. The urban renewal operations in the 1980s were set in almost every neighborhood in and directly surrounding the Canal District (F. Jansen, interview, 25-04-2013). Currently, it is visible in the NVM data that the quite basic houses built then are generally cheaper than the surrounding 'historic' houses (NVM, 2013). However, they do not seem to have a negative effect on the value of the surrounding houses unless entire blocks were replaced, such as in the area directly to the east of the central station, where it is still much cheaper to live than in the surrounding areas, despite its central location. As for the influence of municipal legislation, that seems to have slowed down the gentrification process and protected the availability of affordable housing stock, quite like the housing associations have done (see next heading). It is not likely to have had a decisive effect on the spatial patterns of gentrification in the city, because it was not spatially differentiated.

5.2 Housing associations

The housing associations loom large over the Amsterdam housing market, as they own about 50% of the total housing in the municipality (AFWC 1992, 2012a). Their influence is twofold. On the one hand, they are always looking to improve 'their' neighborhoods, working with local area development plans in tandem with the neighborhood, which may have played a role in turning the suburbanization movement (see e.g. Barth et al., 2009; AFWC, 2012a). On the other hand, they are socially oriented and want to keep housing affordable, also in the popular central areas. Over the last 20 years, they have become financially independent by selling off part of their property, but this is a very slow process; sales are less than 1% of their possessions each year (AFWC, 2012a, 2012b).

As most of my interviewees indicated that housing associations follow rather than lead in the process of actively upgrading neighborhoods, I will not focus on the agency of the housing associations, but rather on their passive role in the process. To determine the influence of the presence of social housing on the gentrification pattern I use the Atlas of Social Housing of Amsterdam (AFWC, 1992, 2012b), which contains address-level details of all social housing in the city. Appendix C1 contains the map of 2012,

including numbers indicating the neighborhoods referred to in the text below.

The neighborhoods inside the ring road differ strongly in terms of social housing, and the amount and position of the social housing inside each area is highly constant, as the housing associations sell off relatively little of their property each year. This high degree of difference between the areas and high degree of continuity within the areas make it relatively easy to estimate the impact of this factor on the gentrification process. I will discuss the neighborhoods in the order in which they gentrified, first west of the gentrification axis, then east of the axis. For the sake of consistency, the numbers here correspond to the numbers in the previous chapter, so that Appendices A1 and C1 can be read alongside each other.

To the west of the gentrification axis, the Jordaan [3] contains roughly 1/3 social housing, as do Oud West [7] and the Staatsliedenbuurt [12]. However, in all three neighborhoods the social housing is quite spread out, so that no area is completely dominated by it. Going further west, from south to north, the Hoofddorppleinbuurt [13] contains little social housing, the Baarsjes [14] some more and Bos en Lommer [15], in the northwest corner inside the ring, contains the highest amount. That means little information is to be gathered here about the impact of the presence of social housing, as the percentage of social housing increases equally to the distance from the gentrification axis.

To the south and east, we can find out more. The Pijp [6], just south of the Canal District, gentrified after the less central Rivierenbuurt [4]. This could be due to the distribution of social housing, as the Pijp contains much more social housing than the Rivierenbuurt. However, as noted above, the housing prices in the Pijp catch up with and surpass those in the Rivierenbuurt in the 2000s despite the fact that hardly any social housing has been sold off in the Pijp.

In the east, the east side of the Watergraafsmeer [5] gentrified first and is still the most expensive area. This is remarkable, as this area is far from the center and indeed the entire gentrification axis. Here, the location of social housing may have played a large role, as this is the neighborhood with the least social housing of the entire east flank of the city. Another exception to the citywide pattern, the uneven gentrification of the Indische Buurt [8] during the 2000s, can also be explained by the presence of social housing.

Currently, only a few peripheral neighborhoods inside the ring are still cheaper than the municipal average. These are Bos en Lommer [15] and the Baarsjes [14], in the northwest corner, the Indische Buurt [8] in the northeast corner and some spots in the southeast corner such as Betondorp [16]. All of these neighborhoods have a heavy concentration of social housing. Thus, there appears to be a correlation between the degree of social housing and the speed of gentrification. However, there are also neighborhoods with similarly high degrees of social housing which gentrified early, such as Oud West [7] and the Staatsliedenbuurt [12], which are located more centrally. Thus, social housing can only be part of the explanation for the low housing prices in these peripheral areas, and their peripheral location seems to be of higher importance.

Concluding, it appears that the positioning of social housing throughout the city certainly has its influence on the pattern of gentrification. It appears to be an issue of temporality rather than a structural determinant, since the general pattern is determined by the location of the gentrification axis, but the order in which neighborhoods initially gentrify differs partly based on the amount of social housing they contain. However, it does not seem to be a strong deterrent to gentrification in Amsterdam; both Oud West and the Jordaan, two of the earliest neighborhoods to gentrify, contain large amounts of social housing. One municipal official suggested that in small doses, the social housing built during the urban

renewal projects in the 1980s actually stimulated gentrification, as long as it is spread throughout a neighborhood and does not occupy entire blocks and streets (F. Jansen, interview, 25-04-2013).

5.3 Grass-roots citizen initiatives

The third factor I want to discuss is grass-roots initiative. In the gentrification cycle as commonly described in the literature, the first steps in the gentrification cycle are set by marginal gentrifiers (Rose, 1984; Ley, 1986). That is, people go into a dilapidated neighborhood, buy a house or apartment, and try to improve it and its surroundings. Generally, gentrification is then described as roughly moving up the economic food chain from 'students and artists' to 'adventurous yuppies' and ending with 'high-profile managers and bankers'. It was suggested to me by a municipal official who has been working for decades in municipal outreach to grassroots groups that this pattern may have been slightly different in Amsterdam; here, the all-important first steps may have been set by the squatters.

Amsterdam historically has (and attracts) a fairly assertive population. In answer to the ancient question *Wem gehört die Stadt?*, the answer is fairly unequivocal: the inhabitants. However, this 'right to the city' does not always come easily. One generation before the time of writing, a serious struggle was fought over the right to the city. In the 1970s and 1980s, the municipality had conceived plans to 'modernize' the city by turning canals into parking lots, tracing a four lane freeway up directly through the historic city center to the central station, and building an American-style Central Business District (Duivenvoorden, 2000).

Blocks of housing were emptied to make space for the freeway and a new metro and office buildings in the center were bought by speculators in expectation of windfall profits when the CBD would be realized. However, the mills of government ground slowly, while public resistance to the plans built up. There was a serious shortage of housing, and the emptied buildings filled up with squatters, often simply young couples wanting to move out of their parents houses (Duivenvoorden, 2000). The squatting movement quickly grew and reached its peak in the early 1980s, when an estimated 10.000 active squatters were living throughout the city. The theory I want to test here is that the spatial spreading pattern of the squatters is a predictor for the later patterns taken by gentrification. More specifically, I test whether the fact that gentrification moved first to the west of the center, later to the south and only after that to the east could have been caused by the spatial distribution of the squatters throughout the city.

To determine the spatial distribution of the squatter population with any degree of certainty is not an easy task, as it is not a group generally inclined to comply with official registration. Added to that there is the problem that not all squatters were active in their neighborhood; many were simply living in a house without wanting anybody to notice it; this group could hardly be expected to function as marginal gentrifiers. The solution to both of these problems is found in several records supplied by Duivenvoorden (2000), who has written a fascinating history of the movement. Appendix C2 shows the locations of squatting cafes and the circulation of the main squatter newspaper in 1980. This information gives a good proxy for the citywide distribution of the *active* squatter population, which is very useful for testing this hypothesis.

The map in Appendix C2 shows that both the circulation of the newspaper and the locations of the squatting cafés were spread evenly throughout the city, that is, throughout the historic 19th century ring around the center, and the center itself. The two neighborhoods which played the largest role in the squatting resistance to urban change, the Nieuwmarkt [1] and the Staatsliedenbuurt [2] were certainly

not among the first to gentrify, and the early gentrified western part of the city did not have a much larger squatting population than the east. The hypothesis can thus be rejected.

Stepping back into the present, a different and less threatening form of grassroots neighborhood organization could have a more directly gentrifying effect. Butler and Robson (2001) have investigated the function of social capital in gentrification and found that neighborhoods with or without active neighborhood associations have very different characters. Currently, a number of local initiatives are gaining prominence in neighborhoods which are all on the list of 'potential next gentrifying area'. In Noord, there is ILoveNoord, in the west there is BoloBoost (Bos en Lommer) and NiceNieuwWest, in the east MikInOost. It would be interesting to evaluate the function of this kind of neighborhood initiatives with an AGIS like the one presented in this thesis, but that cannot be done yet, as these initiatives are all quite recent.

5.4 Structural neighborhood characteristics

Having considered several levels of intervention by conscious agents, one more set of explanations remains unexplored. These are what I call structural characteristics of neighborhoods; those characteristics which are hard to quantify but extremely durable. Here I investigate two of them; on the one hand the most important physical characteristic, age and building style, on the other hand an intangible characteristic: a neighborhoods' reputation, which seems to be surprisingly permanent. As goes for the above explanatory variables, this section too is necessarily incomplete as an analysis, and rather meant as a first exploration of potential drivers of the observed pattern than as a full and thorough investigation.

Building year

Physical characteristics of a neighborhood such as building age, style, neighborhood structure, type of available housing (garden, size) and open space, water and greenspace could all be important for its gentrification potential (Lees et al., 2009a). As this chapter is intended as a tentative exploration of some factors to test the potential of the AGIS mapping methodology, rather than a full-fledged analysis, I will choose one factor to take a closer look at: the style of the housing stock, which is the physical neighborhood characteristic most often cited in the literature. Since it is common practice to use building era as a proxy for style (Lees et al., 2009a) I will do the same; Appendix C3 contains a map of the building periods of the Amsterdam housing stock.

In general, Amsterdam was built, like most cities, from the center outwards, which means that the age of the housing stock is negatively correlated with the distance to the center. Generally, a line is drawn at World War II and the housing stock is referred to as pre-war and post-war. As the separation line between those two types of housing roughly corresponds to the position of the ring road, most researchers choose to equate the two, but this AGIS make a more detailed comparison possible. I look at the difference between pre-war and post-war building zones inside the ring road to determine whether the ring road or the building era is the most relevant factor to determine gentrification potential.

There are three patterns to be observed. First, both in the eastern Canal District and in the northern half of the Jordaan there are concentrations of post-1980 buildings. These clusters appear to gentrify before their purely old-housing stock counterparts in the same areas, although they actually end up being cheaper later in the process. The best example of this is in the Indische Buurt, where the north-west quarter ends up having the highest price level in the neighborhood. This is clearly because of the pre-war

building style, which distinctly separates this area from the rest of the Indische Buurt (see Appendices B3 and C3).

Second, there are a number of areas in Oud West, the Pijp and the western part of the Watergraafsmeer which contain concentrations of post-1980 buildings. In these areas no sales are observed, as corporations currently hardly sell any of their properties inside the ring, and thus it is not likely that gentrification occurs, as the occupation of these housing units is not determined by the market.

Third, there are the last areas inside the ring where the housing price is below the municipal average in 2010: these are parts of the Indische Buurt, the Watergraafsmeer and Bos en Lommer. All of these areas were built post-war, and although they are also all relatively peripheral the directly adjacent areas containing pre-war housing stock clearly gentrified before them, showing the importance of building style to the process.

Reputation

Another factor in the gentrification pattern can be the reputation of a neighborhood, 'people's perception of place matters a lot' (Butler, 1997). This was mentioned as very important by all municipal officials I spoke with: As this factor is abstract enough on its own and would certainly require a full research project to properly investigate, I will only give two examples. First, the Canal District, which is a prime example of a neighborhood with an unbreakable reputation. This led that area to be gentrified before all others, no matter what the state of the canal houses was at the time of upgrading.

The second example concerns a negative reputation. Neighborhoods in Amsterdam Noord like the Van der Pekbuurt are minutes away from the central station by (free) ferry, yet only in the most recent years are signs of gentrification even beginning to show there. This can only partly be explained by the high percentage of social housing in that part of the city (80%), as there are several neighborhoods close to the IJ water which contain higher percentages of owner-occupied or privately rented dwellings and the housing associations are trying very hard to sell parts of their property in Noord (Verkoopconvenant, 2011).

Despite this central location, this part of the city has been colloquially known for the past decades as the 'Siberia of Amsterdam'. That reputation seems to be so fixed in the public and governmental eye that the municipal urban planners expect the current generation of marginal gentrifiers to cross the ring road in the west of the city rather than move to Noord (P. Hoetjes, 06-02-2013). The municipality currently attempts to break through this fixed reputation by allocating large public resources to Noord in the form of large-scale waterfront development plan including the flagship new film museum EYE, and a metro tunnel connecting Noord to the rest of the city, with costs currently estimated at €3.1 billion (Commissie Veerman, 2009). Whether this type of negative reputation is most effectively broken by such large-scale governmental action or by grassroots initiatives is an interesting question for further research. The municipal officials interviewed for this research had strongly divergent opinions on that point.

6. Conclusion

6.1 Summary

In this thesis, I have attempted to map, explore and understand the way gentrification moves through a city. To do this, I used data on housing transaction prices to construct a number of AGIS' (Animated GIS, video maps) which show for 25 subsequent years the developments of the relative prices of housing throughout Amsterdam, from 1985 to 2010. During this period, the Amsterdam housing market liberalized and became much more expensive throughout, compared to the rest of the Netherlands. From these AGIS´, a number of clear trends in the geographical spreading pattern of gentrification throughout the city could be distinguished.

My initial hypothesis was that gentrification would spread in concentric circles outward from the city center, the Central Station. This hypothesis was only partly confirmed, as the spread neither originated from the exact center nor in simple concentric circles. Instead, the areas to gentrify first were the most prestigious zones of Canal District and Vondelpark area, confirming the alternative hypothesis formed on the basis of urban geographic literature. Another part of the hypothesis was confirmed, as from these areas the gentrification did spread through adjacency, not simply randomly throughout the city. Thus, areas far removed from the initial gentrification areas gentrified much more slowly than comparable areas near it.

From this initial axis of gentrification, running from the Canal District through the Museum District and along the south border of the Vondelpark, gentrification spread mostly westward, then south, and only recently east. The AGIS shows clear patterns of neighborhood-hopping, where generally entire neighborhoods gentrify roughly equally before the gentrification jumps over the neighborhood border to the next one. Generally, the gentrification spreads rather gradually, but there appear to be two types of natural borders delineating a trend break in the urban fabric. The first of these is water; it is clear that in the west the Kostverlorenvaart and in the east the Amstel slowed the spread of gentrification, and a clear price differential persists around them. The second is the ring road: the area inside the ring road is much more popular than the area outside it. This ring road pattern develops over time, from hardly showing a differential in 1995 to forming a clear delineation in 2010.

The fact that AGIS' visualizations show the dimension of time very clearly made it possible to distinguish a rhythm in the spreading pattern. This was especially helped by an AGIS I made of the *changes* in relative housing prices over a period of 5 years, shown in Appendix A2. This AGIS shows a wave pattern in the movements of gentrification, where in cycles of roughly ten years the area inside the ring road gentrifies more strongly, then the areas outside it catch up, and then the areas inside it grow much stronger again, and so on. It is especially striking to observe that Amsterdam Noord, which lies entirely within the ring road, moves in tandem with the area *outside* the ring road, probably because it is separated from the rest of the city by the IJ water, which seems to create a large perceived distance, a mental barrier.

To zoom in even further and better observe the detailed spreading patterns appearing inside neighborhoods I created a number of AGIS´ of several neighborhoods, shown in Appendices B. From these, three ideal types of spreading patterns within neighborhoods appeared. The most common of these is spreading equally from a certain direction. The best examples of these are Oud West (Appendix B2) and

the Jordaan (Appendix B1), where the gentrification started in the east, from the direction of the general citywide gentrification axis. The second ideal type is gentrification spreading spotty and unequal, for which the Indische Buurt (Appendix B3) is the best example. Prices rose throughout the neighborhood in the 2000s, but it was not clear which part was going to be the most popular one until late in the 2000s, when the northwest corner, with the oldest housing, came out clearly as the most expensive. The third ideal type is gentrification without a clear anchoring point, which occurs in areas which are not connected to the citywide gentrification axis, like the Watergraafsmeer (Appendix B4).

Apart from observing and noting these patterns I also investigated a number of possible explanatory factors, to better understand the observed patterns. To determine which factors would be most relevant to the pattern in Amsterdam specifically, I conducted a series of interviews with municipal officials and professionals in the semi-public housing sector. From those interviews I distilled a list of four topics which might deliver interesting results and for which sources were readily available: municipal government, the housing associations, grassroots citizen initiatives and structural neighborhood characteristics.

The role of the municipality in determining this pattern appears to be rather limited, as municipal policies either affected the entire city equally or attempted to level the field, not exacerbate differences. Several shifts in municipal policy have clearly had a strong effect on the urban fabric, most notably the era of social building in the 1970s and 1980s, and the neoliberalization drift starting in the early 1990s. However, it does not seem likely that municipal policy has had a strongly locally differentiated effect on the gentrification pattern, rather speeding it up or slowing it down for the entire city at the same time.

Instead, it appears that the main driver of the pattern was the dominance of social housing. Areas with a large share of social housing gentrify much slower, especially if the social housing is concentrated in blocks covering entire streets. This largely explains the citywide pattern, although a number of exceptions still stand out. For example, the Watergraafsmeer falls completely outside the citywide pattern, gentrifying early although it is located far from the main gentrification axis, and Oud West gentrifies quickly and completely despite the presence of large amounts of social housing.

The effect of grassroots groups on the pattern is either small or cannot be easily measured. What is clear is that the locational choices of the large squatting movement in Amsterdam were not strongly connected to the subsequent spreading pattern of gentrification. It remains to be seen whether current, more accessible forms of grassroots neighborhood organization will grow to take a more central place in the gentrification process.

Fundamental factors do play a large role in explaining the remaining variance in the pattern. Water turns out to be a strong natural barrier to gentrification, with the IJ as best example, but also the Amstel river and even the narrow Kostverlorenvaart creating a sometimes sharp dividing line in the urban fabric. The barrier formed by the water appears to be largely mental, not physical, as the areas on either side of the water are generally equally well accessible and the waters in Amsterdam are bridged at short intervals. The only exception to this is the IJ, but even that is crossed 24/7 free of charge by a ferry, by a tunnel and by a bridge. Finally, the age of buildings does appear to play a role, but not a very big one. Only areas which were completely built after World War II lag behind in the gentrification process.

6.2 Discussion

The first purpose of any research should be to find out more about the way the world works. But this thesis had an important secondary purpose: to look at the phenomenon of gentrification in a more quantitative light and experiment with the AGIS methodology, to see whether it was at all possible to visually map the spreading of gentrification throughout a city. It turns out that this is certainly possible and that such mapping can provide valuable insights which are hard to obtain through other means. However, the information gathered from such an AGIS can never stand alone, it must be supplemented with qualitative historical and institutional information and grounded in visual observations.

As this research explores an existing gap in the fundamental literature, there are few direct applications and policy recommendations. However, the knowledge gathered in this case study could be very useful to municipal planners and strategists as well as neighborhood gentrification activists. For these audiences, both the descriptive and analytical analysis and the AGIS itself could be useful. To facilitate this type of use, I have made the AGIS available online at *https://vimeo.com/user18202860/videos* and will gladly supply the high-resolution version through other means if requested. Furthermore, in a comparative study with some other cities it could be investigated how the harm done by gentrification through displacement and destruction of the neighborhood fabric could be better handled by municipal policy, as this kind of city-wide overview makes comparative case studies easier.

Municipalities seeking to better understand the process of neighborhood upgrading could also use the results of the descriptive analysis to determine the position of a particular neighborhood in the general urban fabric. For example, the position of Noord as a separate part of the city, mentally far removed from the center, becomes very clear through a visual analysis of the AGIS'. This information could be used in planning: perhaps it is not so much the character of the neighborhood that is seen as negative but rather its geographic position in the city, so that a stronger focus on connecting Noord to the rest of the city would make more difference than building flagship cultural projects there.

6.3 Possible directions for further research

As this thesis provides an exploration of an experimental methodology, the possibilities for further research are numerous. I will describe four possible directions here.

The most important next step is to apply this research model to several other cities. It would be good to include in the sample an American city like Washington DC, where gentrification explicitly progresses street by street through the grid-like street pattern. An Eastern European city with a recently liberalized housing market like Prague would be another interesting case. The sample could be completed by an Indian city, to explore the patterns traced by the explosive growth of newly industrializing countries. By comparing the speed and shape of the patterns appearing in a small group of cities like that, a tremendous amount of information on the geographic differences in gentrification could be gathered.

Thinking in a different direction, it would be interesting to focus more on the temporality, the speed and rhythm of gentrification. A first approach is described in Chapter 3, but the topic deserves more attention than that. The question is so inextricably connected with the temporality of public policy that I found it impossible to investigate it further in a necessarily short section of this thesis without trespassing over the boundaries of scientific rigor. Some basis is given in the literature already; for example

Berry (1985) finds gentrification is pro-cyclical. However, this remains largely uncharted territory, as the earlier stage models of gentrification remain yet to be solidly connected to the economic cycle in a city-scale empirical approach (Pattison, 1977). Another application of these data here would be an AGIS of the relative amount of transactions per area, instead of the price, to be able to differentiate between marginal gentrification and buy-ins later in the process.

A third promising field is the involvement of grassroots citizen organizations. Butler and Robson (2001) describe the different social character and different types of gentrification found in three neighborhoods in London on the basis of social capital. It would be quite interesting to see how these neighborhoods develop further down the line. Combining that type of analysis with the kind of quantitative temporal data provided in this thesis, for example differentiating between those neighborhoods with an active local citizen organization, could provide some answers in the grassroots versus planning debates.

A final area of promising research is to compare GIS data of demographic gentrification indicators such as education and age levels to the AGIS of housing price data, to explore where and by how much the demographic indicators lead or lag the economic indicators. This type of research is currently slowly starting up, see i.e. Teernstra and Van Gent (2012), but as yet a field of low-hanging academic fruit. It may also provide an avenue to differentiate between different types of gentrification. To take an example in Amsterdam, there is a large difference between buzzing 'yuppie' neighborhoods like the Jordaan and the Pijp, which contain relatively small houses, too small for modern family living space demands, and relatively quiet upper middle-class family neighborhoods like the Watergraafsmeer and the Rivierenbuurt. It would be interesting to further explore whether their different demographic character is also connected to the economic type, speed and shape of gentrification occurring there.

All in all, this thesis shows that AGIS is a promising methodology which can provide insights into the functioning of a city that text or even static maps can hardly provide. And although the technical issues connected to this type of work can at times form a large threshold, the rewards for climbing across that barrier are very much worth it.

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APPENDICES

Appendices A: General patterns
A1: Amsterdam, relative housing prices for the period 1985-2010
A2: Amsterdam, 5-year changes in the relative housing price, 1990-2010

Appendices B: Local patterns
B1: Jordaan, relative housing prices for the period 1985-2010
B2: Oud West, relative housing prices for the period 1990-2010
B3: Indische Buurt, relative housing prices for the period 1995-2010
B4: Watergraafsmeer, relative housing prices for the period 1990-2010

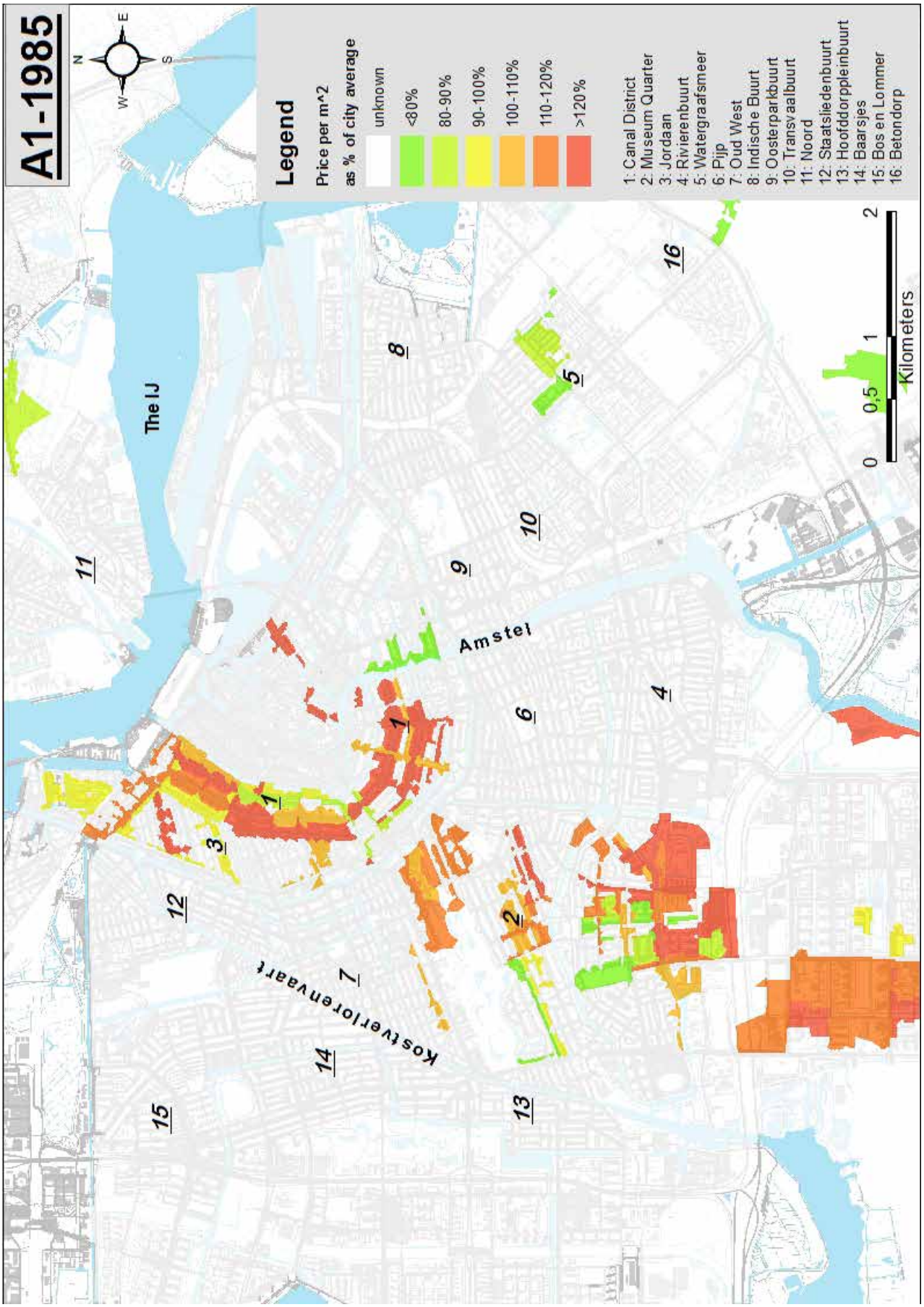
Appendices C: Attempts at understanding
C1: Amsterdam, the distribution of social housing within the ring road
C2: Amsterdam, the locations of squatter activity around 1980 within the ring road
C3: Amsterdam, the construction year of buildings within the ring road

The maps contained in these Appendices form the backbone of this thesis. As print media is by nature restrictive, they are compressed versions of the material. Should you be interested in seeing the more detailed version of any particular map, please contact me at *joris.tieleman@gmail.com*.

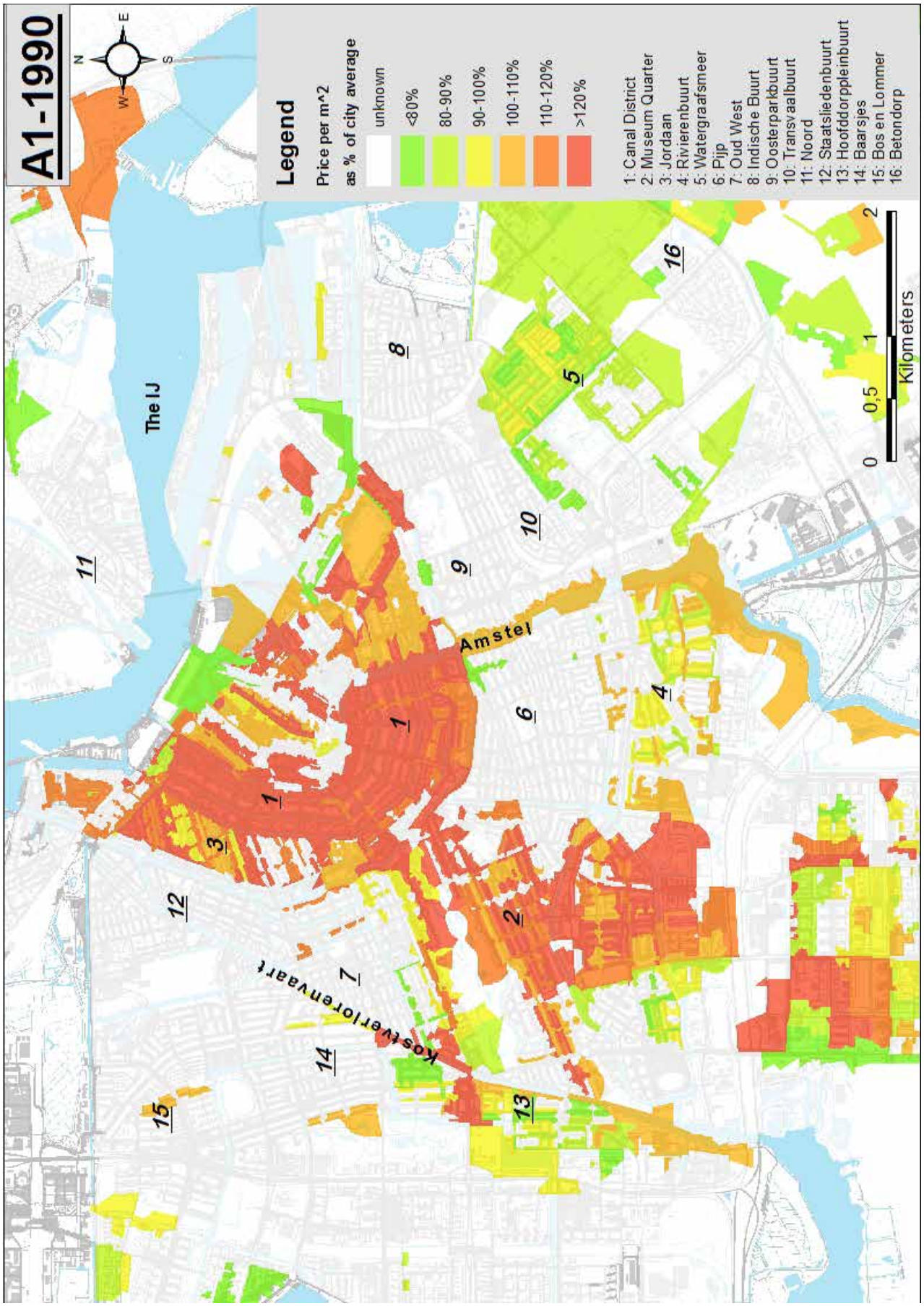
Appendices A and B are designed to be read alongside the chapter *Tracing gentrification in Amsterdam* and contain printouts of the video maps (AGIS') on which this thesis is based. Those videos themselves can be found in full at:
https://vimeo.com/user18202860/videos.

Appendix C is designed to be read alongside the chapter *Attemps at understanding*. It contains several thematic maps: social housing in the city, concentrations of squatters in 1980 and buildings' ages.

A1: Amsterdam, relative housing prices for the period 1985-2010, map of 1985. Data: *NVM, 2013.*



A1: Amsterdam, relative housing prices for the period 1985-2010, map of 1990. Data: *NVM, 2013.*



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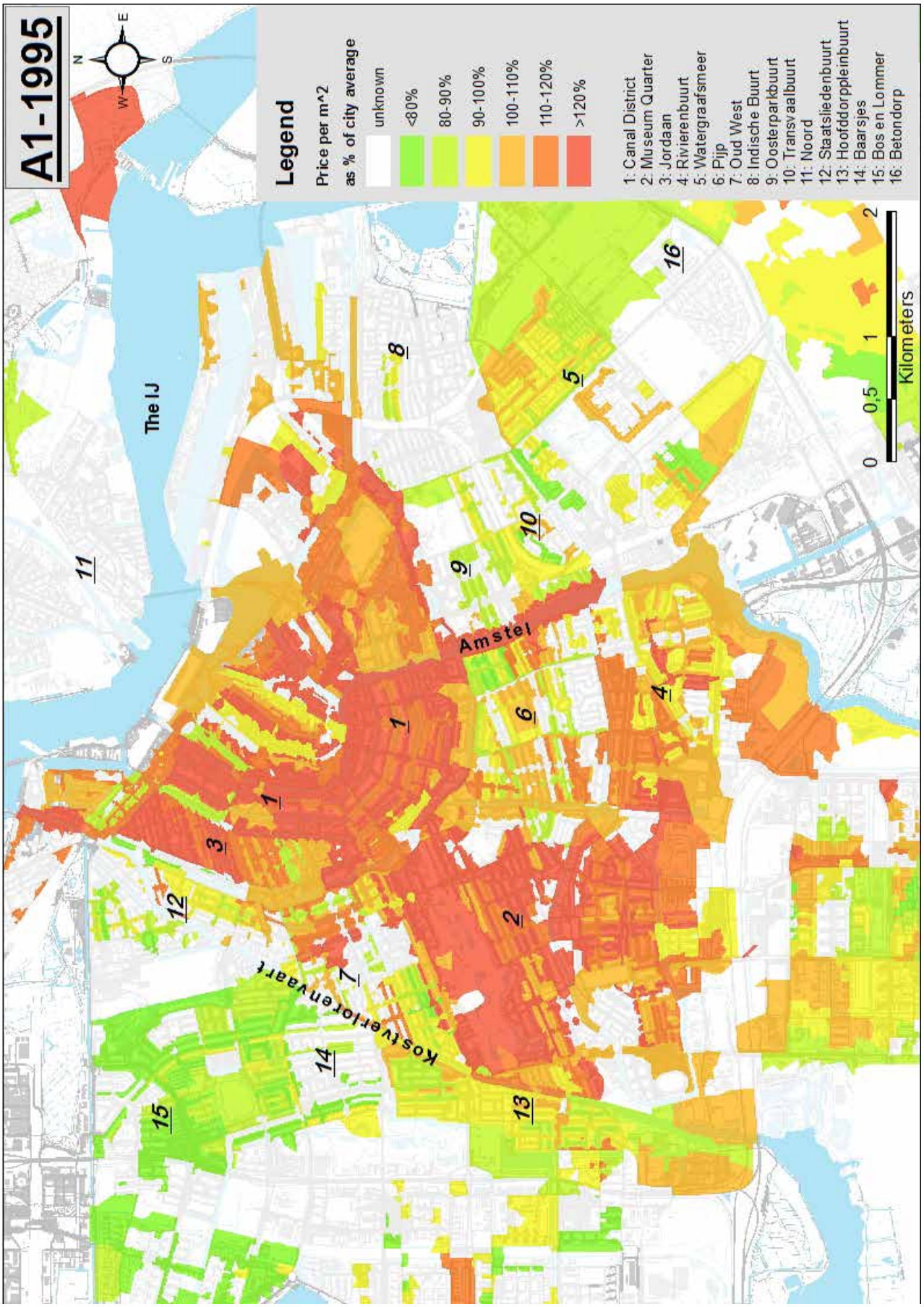

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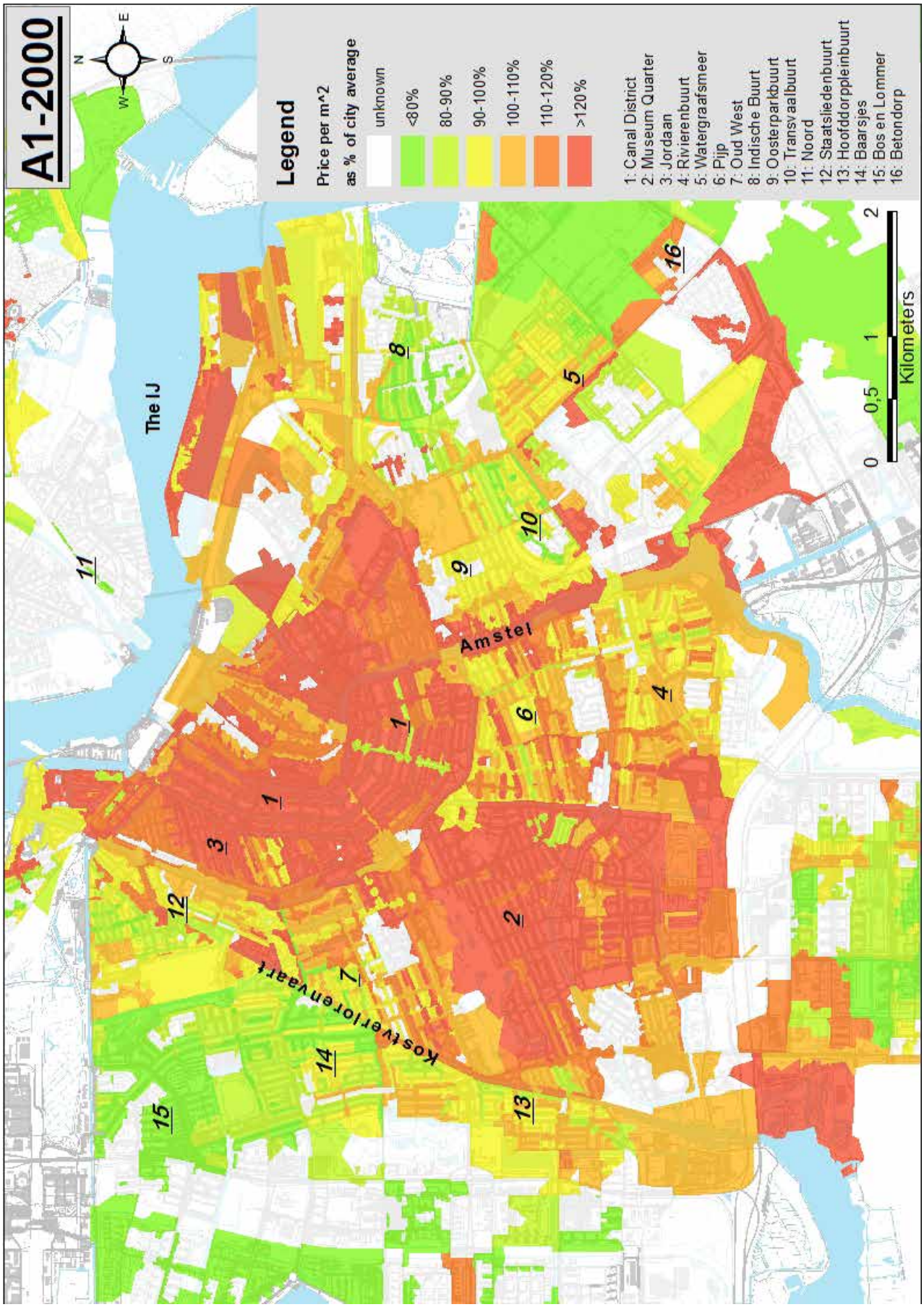

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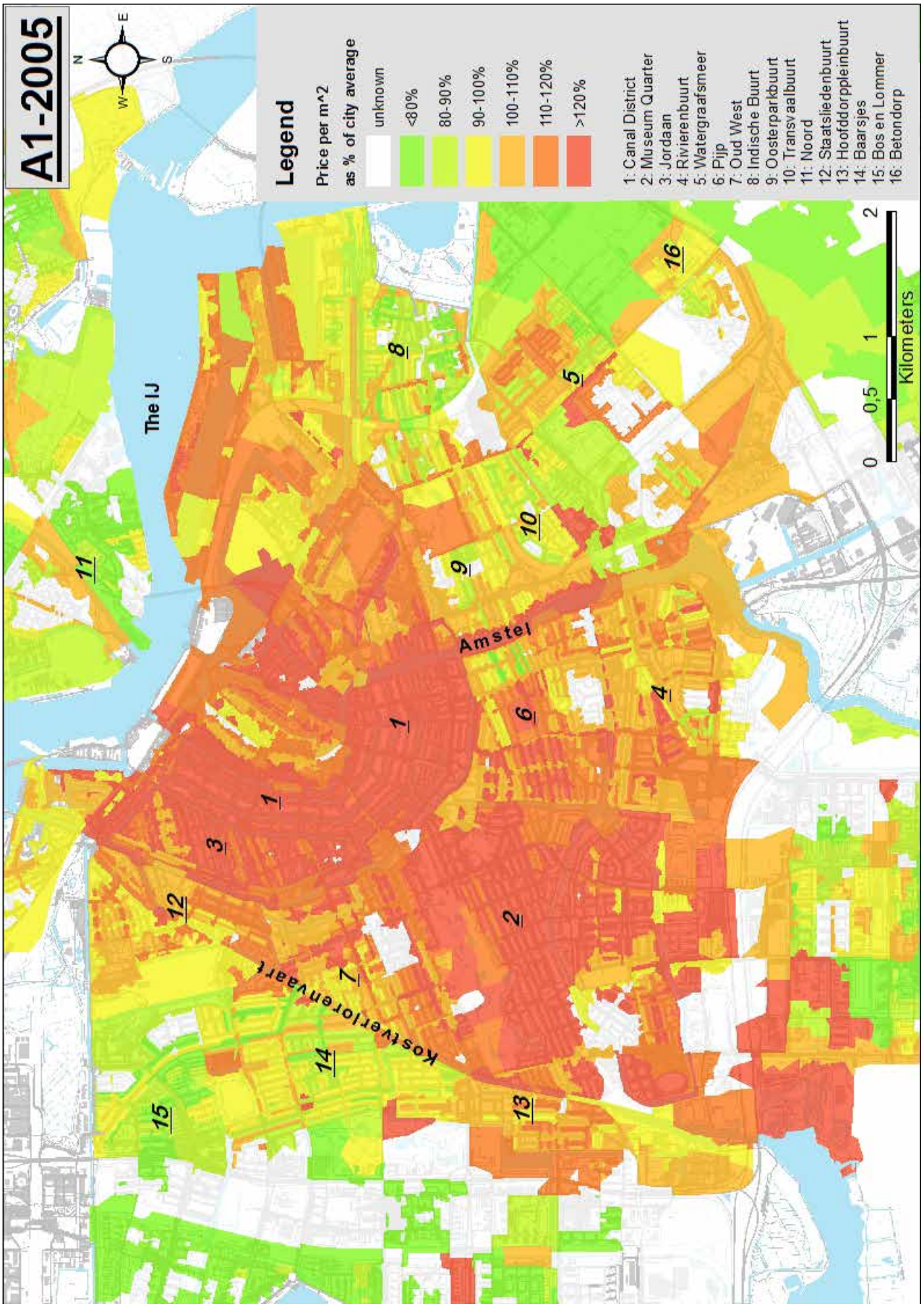

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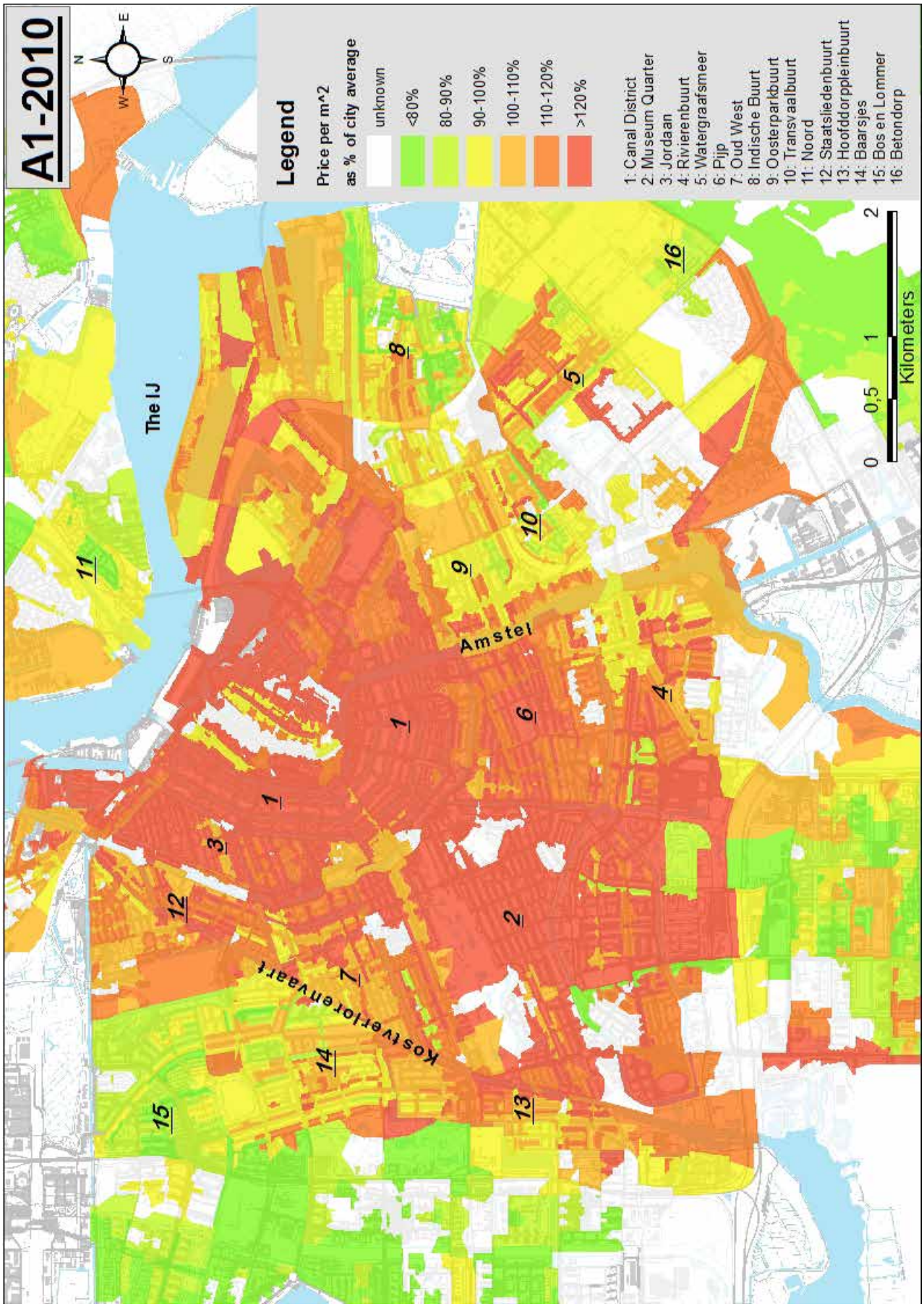
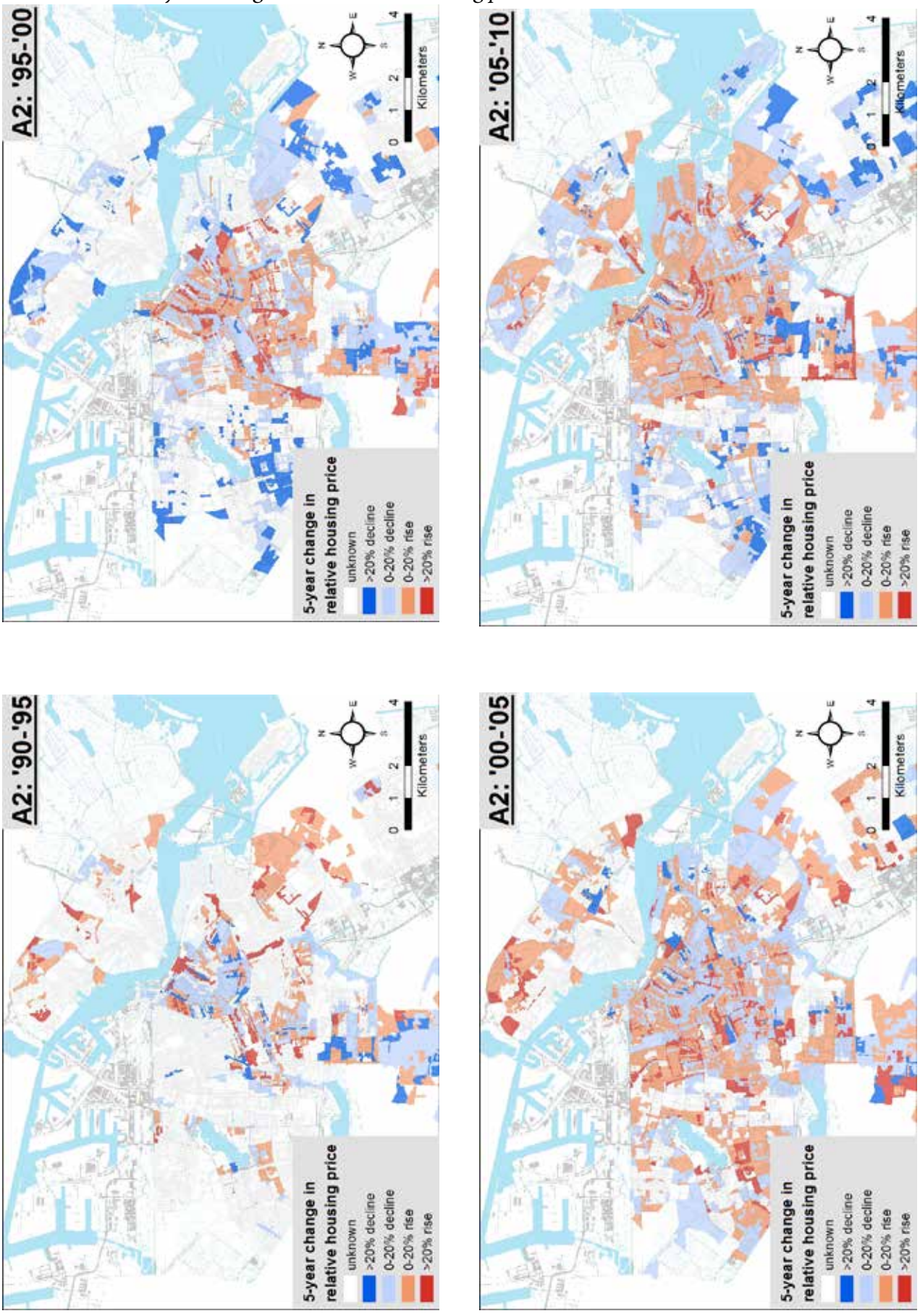
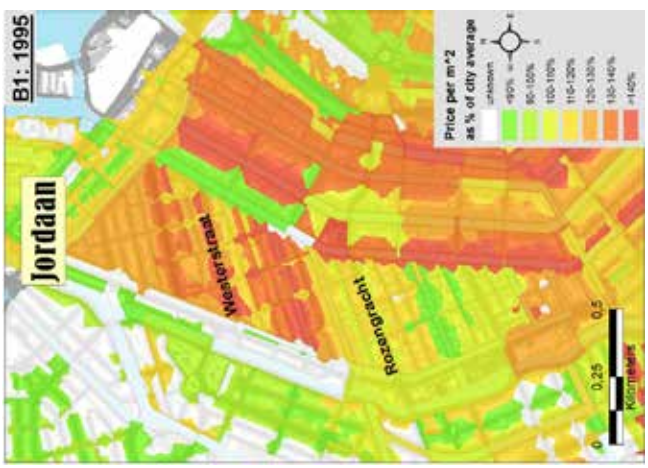
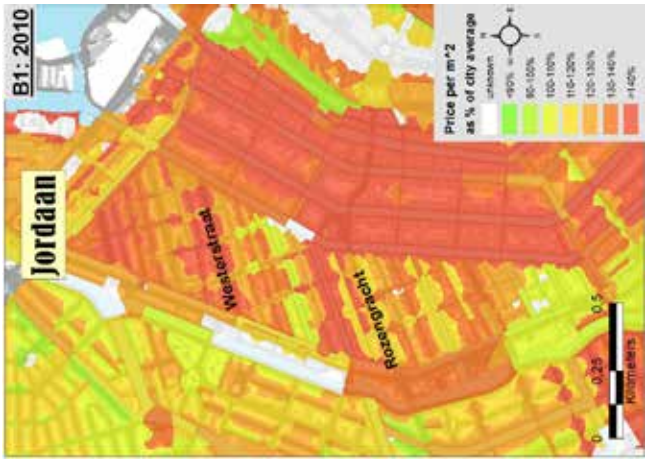


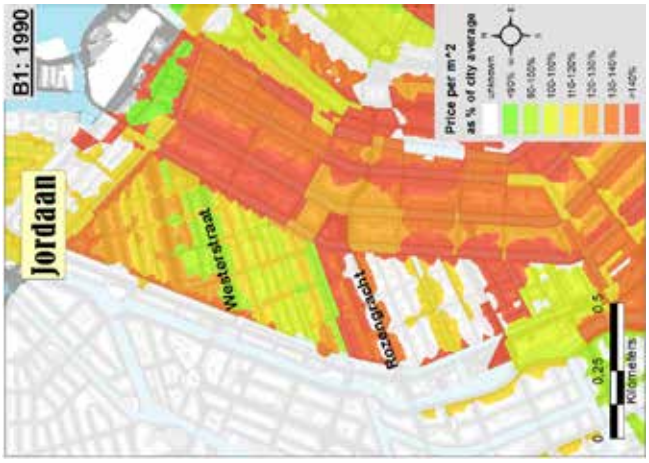
A2: Amsterdam, 5-year changes in the relative housing price, 1990-2010. Data: *NVM, 2013.*

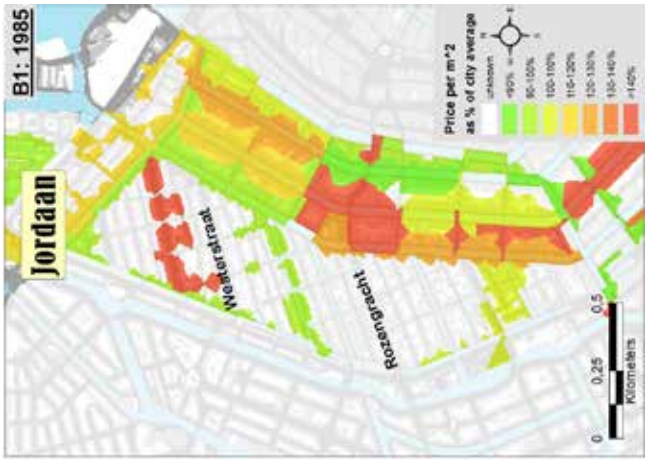


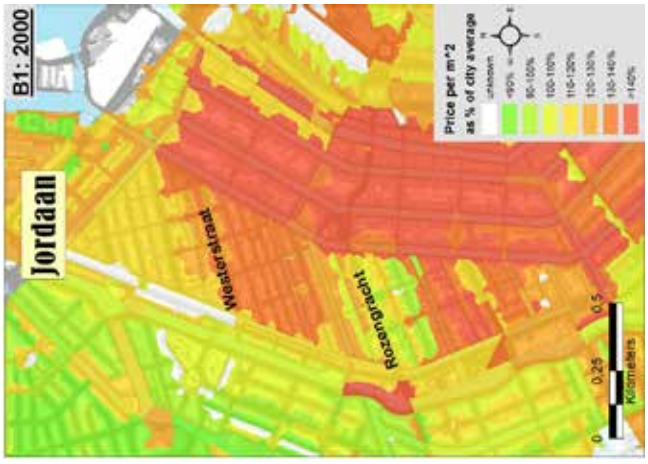
B1: Jordaan, relative housing prices for the period 1985-2010. Data: *NVM, 2013.*



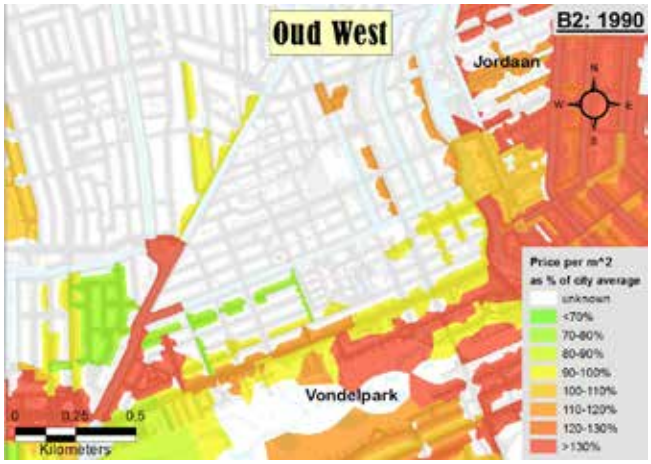






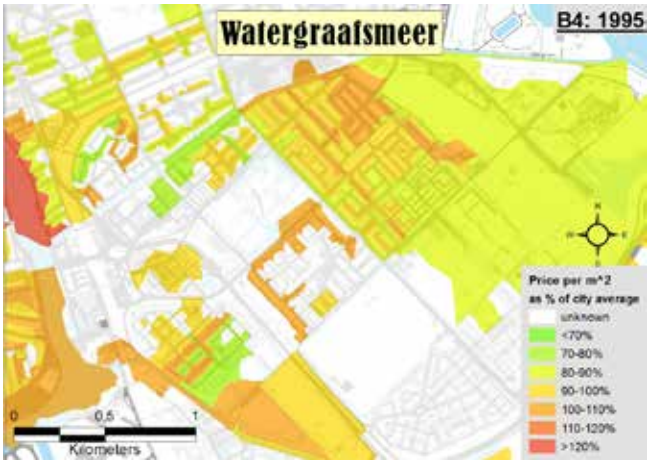


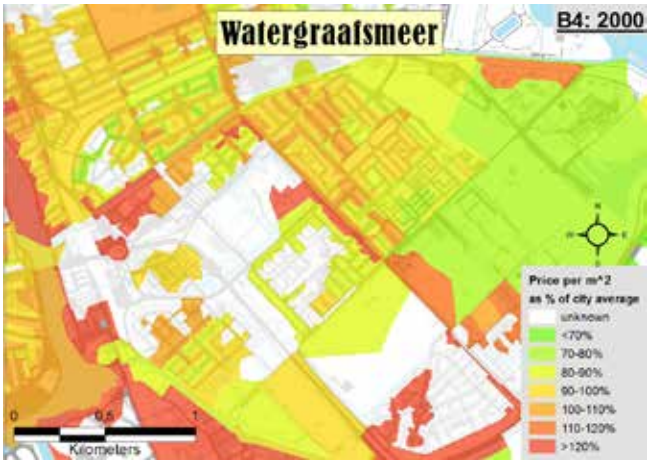
B2: Oud West, relative housing prices for the period 1990-2010. Data: *NVM, 2013.*

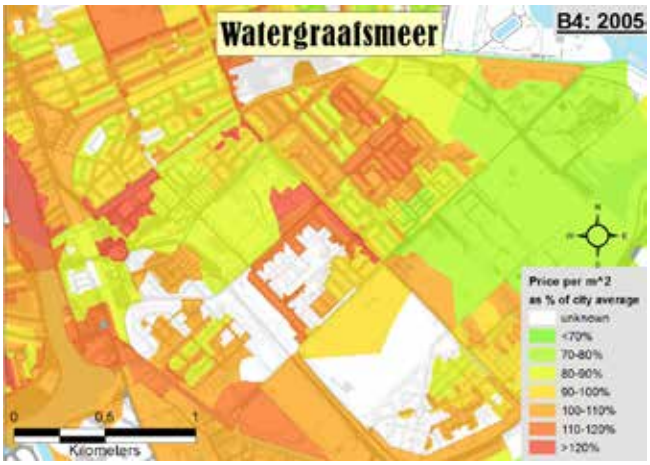


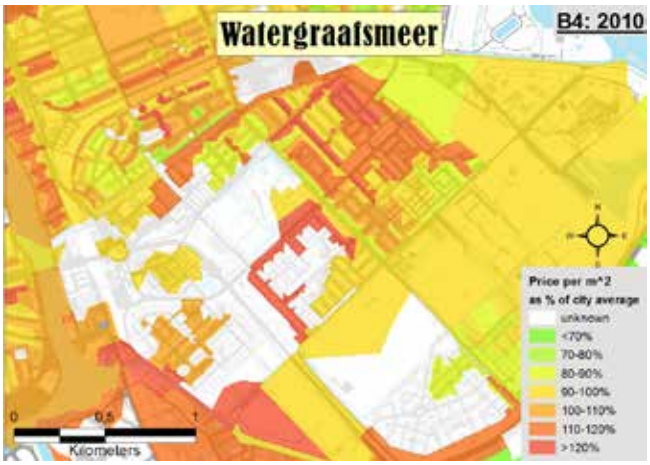
B3: Indische Buurt, relative housing prices for the period 1995-2010. Data: *NVM, 2013.*

B4: Watergraafsmeer, relative housing prices for the period 1990-2010. Data: *NVM, 2013*

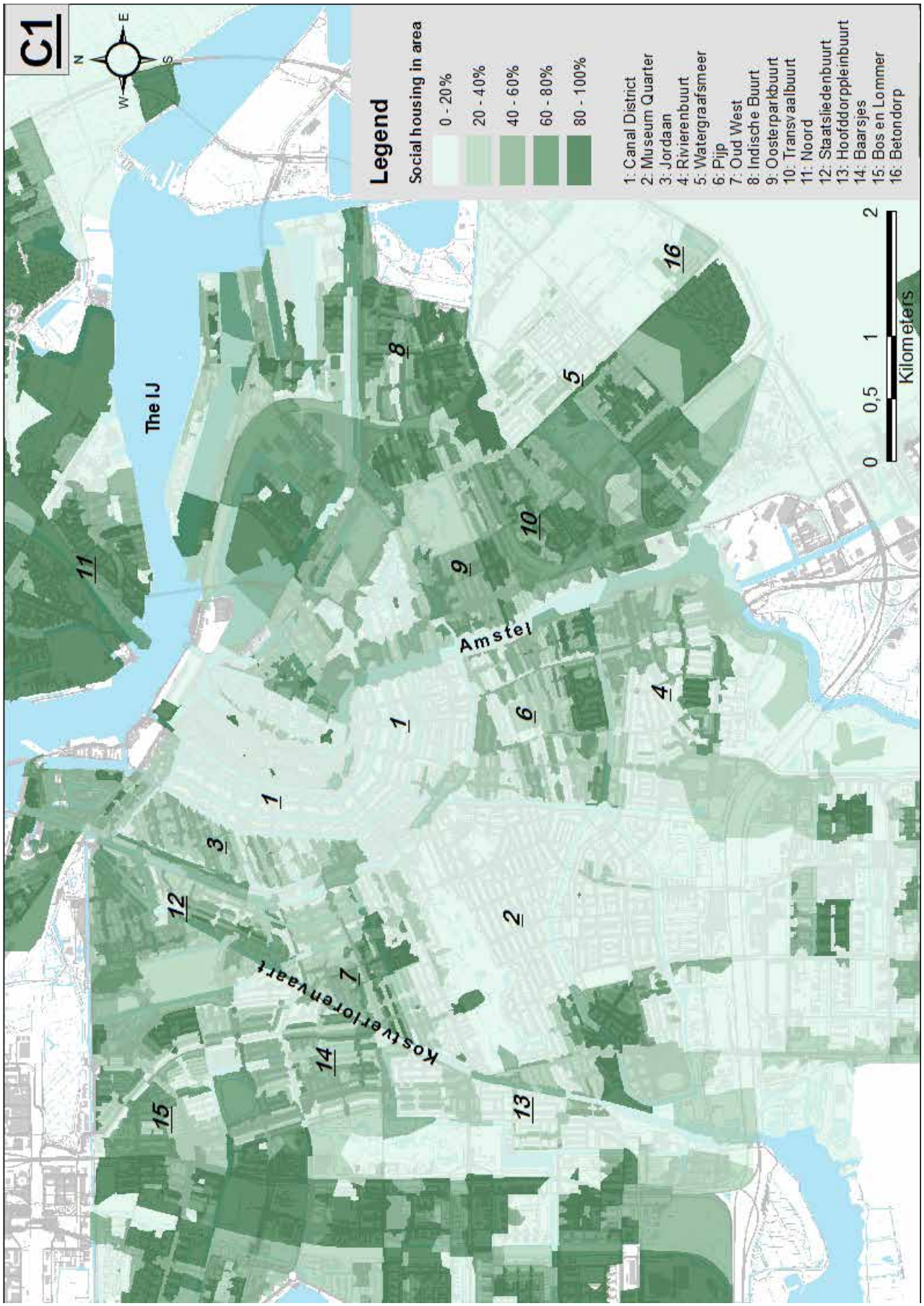




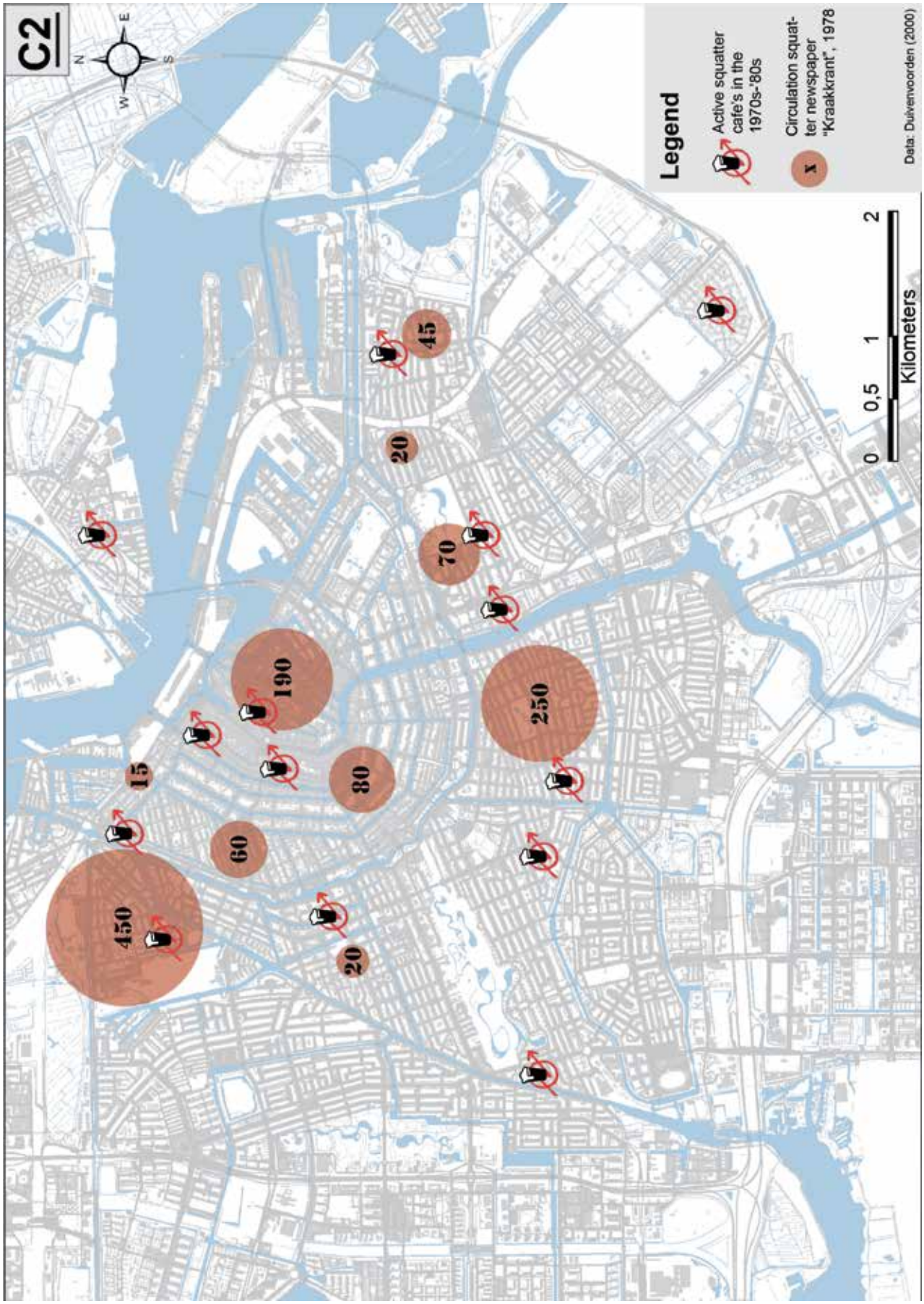




C1: Amsterdam, the distribution of social housing in 2010. Data: *Dienst O&S, 2010.*



C2: Amsterdam, the locations of squatter activity around 1980. Data: *Duivenvoorden, 2000.*



C3: Amsterdam, the construction year of buildings within the ring road. Data: *DBI, 2013.*