

Who are Amsterdam's gentrifiers?

An examination of the household-level
resources and restrictions related to
moving into Amsterdam's gentrifying
neighbourhoods

A Master thesis by

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Abstract

Currently, the social geography of urban landscapes is changing. One process driving these changes is gentrification, which recently has gained increasing academic, public and media attention. For one, concerns are voiced about the city of Amsterdam becoming an enclave for the rich. This thesis aims to determine how household-level resources and restrictions influence the likelihood of moving into a gentrifying Amsterdam neighbourhood. It elaborates on existing literature on residential mobility and gentrification, through which the importance of five characteristics comes forward, namely income, education, age, ethnic origin and household type. Using data from the Dutch national statistics office (CBS) and the Bureau of Research, Information and Statistics (OIS) Amsterdam, the city's gentrifying neighbourhoods are determined, after which the characteristics of households moving into Amsterdam's neighbourhood are analysed with a multinomial logistic regression, distinguishing between the in-movers of gentrifying neighbourhoods, those of lower-income nongentrifying neighbourhoods, and the in-movers of higher-income neighbourhoods that are not eligible to gentrify. The results show that the aforementioned five household characteristics are significantly associated with moving into a gentrifying neighbourhood, as opposed to a non-gentrifying one. The findings cohere with the presupposed notion that gentrifiers are more likely to be affluent, high educated, young, of native origin, and childless as opposed to in-movers of lower-income neighbourhoods that are not gentrifying. Additionally, this study finds that the place of residence prior to moving also affects a household's odds of moving into a gentrifying neighbourhood.

Key words: Gentrification – Residential Mobility – Households – Resources and Restrictions – Amsterdam

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List of Abbreviations

US	United States
BBGA	Basis Datafile Areas of Amsterdam
OIS	Bureau of Research, Information and Statistics
CBS	Dutch National Statistics Office
IIV	Integral Income and Assets Examination
MNAR	Missing Not At Random
EBB	Dutch National Workforce Survey

1. Background

1.1. Problem statement

Socioeconomic disparities and class inequalities are on the rise in various contexts all over the globe (Piketty, 2015). These trends are also visible in European cities, driving processes of socioeconomic segregation within the city's limits and in some cases, even beyond. Such residential segregation of various population groups based on their class, profession and income can eventually lead to class enclaves, thus changing the social geography of these cities (Tammamaru et al., 2015). A specific process within the larger theme of looming socioeconomic segregation has been gaining traction in public, policy and academic discourses since its introduction in 1964 by the sociologist Ruth Glass. She coined and used the term 'gentrification' to describe the processes of urban change in 20th century London. More specifically, the term referred to the influx of middle-class citizens into centrally located city quarters, predominantly inhabited by the working class (Glass, 1964). She argued that the latter were subsequently forced out of their neighbourhoods, thereby prompting structural displacement and reinforcing socio-spatial segregation in the urban landscape. With her pioneering work, Glass laid the groundwork for a myriad of scholars to explore the issues of gentrification, displacement and segregation in a host of contexts since the 1960s. Several discourses have risen and widespread debate and discord on its causes and consequences exist to this very day. According to Lees et al. (2010), it has been the issues of continuous urban transformation and displacement that has kept the interest for gentrification alive for so long. Whilst narratives on the causes and drivers of the process have shifted over time, the overall interest in the topic has only become larger (Lees & Phillips, 2018). Contemporary definitions are not so different from Glass' original definition.

Aside from finding its way into various academic fields, including demography, geography, sociology, urban studies etc., gentrification has also increasingly gained media attention over time. Anecdotal reports on displacements and claims of worrying demographic changes fuelled by gentrification have shaped the public discourse on this matter (Freeman, 2005; Modan & Wells, 2015). This has (re)produced public and political debate on the role of (local) government and policy on processes of gentrification, as well as its broader consequences for the social geography of the city. In the last decade, this trend of increased media attention and rising public concern has also reached the Netherlands. Even though gentrification in Amsterdam started in the 1970s and academic work on gentrification in the Dutch context dates back to the early 1990s, it was as late as 2009 that national media first used the term to label the demographic shifts in the neighbourhoods of various cities (Hochstenbach, 2017). Since then, the process has become ingrained in the dialogue of Dutch urban transformation as well, especially for the bigger cities such as Amsterdam, Rotterdam, and The Hague. However, the process of gentrification is not a uniform one; its presence and consequences are contingent on the environment in which they are embedded (Berry, 1985; Lees et al., 2010). Thus, to fathom the Dutch case of gentrification, analyses in this context are essential. Parenthetically, the Dutch context is an interesting one to examine. With its highly regulated housing market, rent control, property protection, etc., the Dutch context differs greatly from the finer examined Anglo-American contexts. Several scholars have studied gentrification in the Netherlands, but have mainly done so by focussing on the 'production of gentrification', through narratives of urban housing dynamics and policy (Hochstenbach et al., 2015; Sakızlıoğlu & Lees, 2020; Van Gent, 2013). Studies that do focus on the demographic dimension of gentrification in the Netherlands examine the changing composition of population stocks or development of gentrification related migration flows over time (Boterman et al., 2010; Hochstenbach & Musterd, 2018), or focus on the spatial distribution of class in the urban landscape (e.g. Boterman & Musterd, 2017). Studies that have thoroughly examined residential mobility regarding gentrifying neighbourhoods mainly focused on exit

decisions and measuring displacement (Ellen et al., 2013). However, little has been studied on the entrants of gentrifying neighbourhoods, especially in contemporary contexts (Ellen & O'Regan, 2011). This is rather concerning, given that understanding the influence of household factors on the ability to move into a neighbourhood or city is crucial in understanding changing urban population dynamics. Hence, this study focuses on households moving into gentrifying neighbourhoods and explores the characteristics of these households in the metropolitan landscape of the most populated city in the Netherlands: Amsterdam. Novel concerns over the city's social geography are sprouting and academics and media are fearing that Amsterdam is transforming into a city for the rich – where the possibility of living in or moving into the city is becoming increasingly inaccessible for lower-income households (Couzy, 2019; Hochstenbach & Musterd, 2018). This study scrutinises how certain resources and restrictions are linked to moving into gentrifying neighbourhoods, to assess whether there are indeed signs of Amsterdam becoming an enclave for the rich. It examines how these household-level factors affect residential mobility with regard to gentrification.

1.2. Objective and research questions

Studies on gentrification processes have for long used aggregate data on population stocks to describe the demographic changes of neighbourhoods, due to the lack of individual-level data on residential moves in these neighbourhoods (López-Gay et al., 2020). With aggregate data however, it is merely possible to identify gentrifying neighbourhoods and describe shifts in composition over time (McKinnish et al., 2010). This might be helpful to locate cases of gentrification in e.g. the context of a single city, but it lacks the possibility of grasping the household-level factors that are linked to gentrification; be it to predict what sociodemographic profile is migrating into which neighbourhoods or to capture the processes that lead to a changing demographic composition of the urban landscape. Evenly important is understanding that gentrification is influenced by mechanisms beyond residential mobility only, most notably by in situ social mobility and demographic trends on the neighbourhood level (Hochstenbach & van Gent, 2015). Analysing the process on an aggregate level is thus of little use if one is interested in residential mobility patterns of gentrification. Household-level data allow examining the factors associated with moving into gentrifying neighbourhoods, therewith allowing to come up with a better overview of changing demographics of the urban landscape.

The possibility of working with household-level data allows for a better understanding of the impact that gentrification has on households, neighbourhoods, and the city as a whole. Focussing on the resources and restrictions of these households, it can be uncovered how moving into a gentrifying neighbourhood is dependent on household-level factors. The following research question and sub-questions are constructed to attain a better understanding of this issue:

To what extent do household-level resources and restrictions influence moving into a gentrifying neighbourhood in the city of Amsterdam?

- Which resources and restrictions are associated with moving into a gentrifying neighbourhood as opposed to a nongentrifying neighbourhood?
- How are these resources and restrictions associated with moving into a gentrifying neighbourhood as opposed to a nongentrifying neighbourhood?

2. Theoretical framework

2.1. Residential mobility and the life course

Residential mobility can be regarded as the link between social and physical spaces; a household's characteristics and attributes affect the probability of making a residential move and influences the destination of the move (López-Gay et al., 2020). Additionally, residential mobility is perceived to be a key determinant of the creation and recreation of the sociodemographic composition of the urban landscape. Studying its differences among social groups allows for a better understanding of a city's social geography (Sharkey, 2012). Hence, in the case of examining gentrification – *“the movement of middle-income households into low-income neighbourhoods”* (Beauregard, 1985, p. 51) – residential mobility cannot be disregarded. Gentrification is induced by a combination of three elements, namely demographic processes, in situ social mobility and residential mobility (Millard-Ball, 2002). Where the former two are slow and minor of influence, it is residential mobility that has the biggest role in the gentrification of neighbourhoods (Hochstenbach & van Gent, 2015; Millard-Ball, 2002).

In order to understand the process of gentrification, it is crucial to understand the residential mobility behaviour of movers in the context of gentrifying neighbourhoods. One approach that entails elucidating residential mobility behaviour is the life course approach. This perspective deems households' residential preferences, needs, choices and moves to hinge on their resources and restrictions, as well as by opportunities and constraints of the broader context (Mulder & Hooimeijer, 1999; Rerat, 2012). In other words, it considers the importance of both the household characteristics as well as the environment in which they have to make choices. Given that this study focuses on household-level characteristics, it homes in on the resources for and restrictions of residential mobility. The most important factors in this aspect are income and education: these (in)directly provide the household with the capital to move and to sustain the payment of rent or mortgage (Mulder & Hooimeijer, 1999). Residential mobility is influenced by various sociodemographic characteristics of the household as well. Factors such as the household's lifecycle stage, type, size, ethnic origin and presence of children similarly determine residential needs and preferences (Finney, 2011; Hochstenbach & Boterman, 2018; Olaru & Smith, 2013). Following the life course approach, changes in household resources, restrictions and demographic circumstances generally trigger the desire or ability to relocate to housing or a location that better fits the novel needs and preferences (Coulton et al., 2012). Applying these insights to gentrification studies, the life course approach thus suggests that the entirety of these elements make up the household-level characteristics that influence residential mobility. It supposes that the presence – or rather absence – of resources inhibits lower-income groups from moving into a neighbourhood that has undergone gentrification (Lees et al., 2013). Their lack of capital would not be able to facilitate a move into a gentrifying neighbourhood and/or sustain the increasing costs of living there, thereby excluding them from (parts of) the city (Marcuse, 1985). On the other side, households with the proper resources are able to move into neighbourhoods undergoing gentrification. In-moving households might additionally possess specific demographic characteristics that convert into specific needs and preferences. The extent to which households are restrained in moving into inner-city neighbourhoods similarly depends on their overall resources and restrictions: those with greater resources and fewer restrictions would be more likely to be in-movers of gentrifying neighbourhoods. The life course approach thus suggests that residential mobility regarding gentrification is dependent on the household's resources and restrictions, which stem from their socioeconomic and sociodemographic characteristics. Appropriately, it can be argued that examining these elements is necessary to shed light on a household's (in)ability to move into a gentrifying neighbourhood (Clapham, 2002; Rerat, 2012).

2.2. Residential mobility and lifestyle

The concept of lifestyle has a substantial role in residential mobility behaviour and location choice. A household might hold specific attitudes towards different types of locational and residential outcomes, which are based on deep-rooted preferences, norms and values (Walker & Li, 2007). These elements are commonly reflected in a household's lifestyle: the collective pattern in the behaviour of the various household members that expresses its orientation in the facet of family, employment and consumption, within the available resources and established restrictions (Salomon & Ben-Akiva, 1983). Considering mobility within this broader sense of lifestyle aids in understanding the influential factors on residential behaviour. A household's deep-rooted preferences and its pursuit of a particular lifestyle are of influence on its residential mobility behaviour. Aeroe (2001, 2006) considers lifestyle as the reflection of a household's values and preferences and argues that it ultimately influences the household's attitudes towards various residential outcomes. Ben-Akiva et al. (1996) and Waddell (2001) theorise that residential mobility behaviour of households can be better understood in a framework where households are grouped according to their lifestyle, e.g. clustering career-oriented households and family-oriented households. Still, lifestyle itself arguably is determined to a great extent by socioeconomic and sociodemographic characteristics; it greatly hinges on available resources and existing restrictions through which a household can realise their attitudes and desired lifestyle (Wang & Lau, 2009). Reflecting the concept of lifestyle on the life course approach, residential mobility is thus arguably directly and indirectly determined by socioeconomic capital as well as other household attributes e.g. the lifecycle stage and type and ethnicity of a household (Ben-Akiva et al., 1996; Blasius et al., 2016; Wang & Lau, 2009).

Given the importance of lifestyle, examining a household's lifestyle and its foundational socioeconomic and sociodemographic factors are thus fundamental to comprehend its residential mobility behaviour. This is especially the case for gentrification studies, as lifestyle is implied to be a crucial determinant of the potential gentrifiers' inner-city housing demand. Ley (1996) was one of the first to argue that lifestyle is a key factor within the realm of gentrification. He labels the gentrifiers – those households moving into lower-income neighbourhoods – as part of the 'new middle-class'. Members of this group possess high levels of human, economic and cultural capital; they are attracted to the urban identity, with its appreciation of culture and diversity and with amenities that are tailored for an urban lifestyle (Haase et al., 2010). In the search for this lifestyle, new middle-class households recognise that their desires such as close proximity to their work, presence of inner-city amenities and cultural diversity can be achieved simultaneously with affordable housing (Ley, 1996). Lower-income neighbourhoods possess these perks, thereby making them attractive for this new middle-class. As a result, their pursuit of this lifestyle results in an inflow of socioeconomic affluent households into lower-income neighbourhoods.

2.3. Residential mobility and locational attainment

A similar approach towards the determinants of residential mobility is exhibited in the locational attainment model. Although the model is conventionally used to understand differences in residential patterns between households of various ethnic backgrounds, it can be employed to grasp residential outcomes for households of different socioeconomic classes as well. The locational attainment model assumes that residential neighbourhoods are commodities, structured in a hierarchical arrangement: some are more desirable to live in than others – the reasons for which can be numerous (Woldoff, 2008). For any household, the locational and residential outcomes and the ability to obtain residence in a higher-order neighbourhood are consequently affected by household characteristics (Woldoff, 2008). More specifically, it hypothesises that economic resources (e.g. income, education), demographic characteristics (e.g.

household type, lifecycle stage) and ethnicity are key factors associated with locational and residential outcomes (Freeman, 2008). Therefore, it shares this notion with both the life course approach as well as the theory of lifestyle, considering that all concepts perceive these three elements to be the drive of residential mobility behaviour.

The locational attainment model traditionally focuses on the importance of racial factors in residential outcomes, but it can also be employed to concentrate on the effect of economic and demographic resources and restrictions. In gentrification studies, the entrants of gentrifying neighbourhoods are understood to have a set of economic, social, cultural reasons to relocate to particular neighbourhoods of the city (elaborated upon in section 2.5). Their needs, preferences and pursuit of a certain lifestyle make these neighbourhoods more attractive to live in than alternatives – axiomatically implying that they are of higher-order according to the locational attainment model (Lees et al., 2013). As discussed, the ability of a household to move into a gentrifying neighbourhood depends on its resources and characteristics. Hence, the resources and restrictions of relatively affluent households enable them to attain housing in what is to become a gentrifying neighbourhood – at the cost of the option for low-income households to do so as well. Both Olaru & Smith (2013) and McKinnish et al. (2010) further affirm the locational attainment model in the context of gentrification implicitly, proclaiming that households choose their neighbourhood location by comparing potential destination neighbourhoods on the basis of the amenities available and utilities they might receive in relation with the costs of residing there. Hence, they support the presumption that a household's residential behaviour reflects their ability to attain certain outcomes through their resources and restrictions. Even though these neighbourhoods are desirable for many households, only those with the proper resources and the least restrictions can generate this outcome for themselves.

2.4. Stage theory of gentrification

In the academic work that has focused on gentrification specifically, rather than residential mobility in general, attempts have been made to hypothesise generalisations in the changing socioeconomic and sociodemographic composition of gentrifying neighbourhoods. The most notable and prominent of these are 'stage theories'. It is widely agreed that gentrification is a chaotic concept, with its prevalence and impact to be conditional on the maturity of the process and the context in which it forms (Lees et al., 2010). Models of stage theory define and classify successive stages of gentrification, focussing on the profile and attributes of their respective in- and out-movers (Kerstein, 1990). Even though the number of stages differs for the various models as presented by several authors (e.g. Clay, 1979; Gale, 1979; Kerstein, 1990; Pattison, 1977), they follow a similar pattern over the successive stages. The three hypothetical stages that can be derived from the works of the aforementioned authors are as follows.

Typically, the first stage of such models is distinguished by its in-movers, who are willing to take a considerable degree of risk with their move, both with regards to their financial security and personal safety. Their oblivious attitude towards risk is defined by their socioeconomic and demographic profile; the majority of these 'pioneers', e.g. artists and students, are regarded to have a specific set of characteristics, allowing them to take greater risks than other types of households (Blasius et al., 2016; Gale, 1979; Kerstein, 1990). In-movers of this phase are motivated by low rents/house prices, historical properties and the demographic and cultural diversity of typically lower-class central city neighbourhoods.

After this initial phase, a transitional stage can be identified in which the profile of in-movers gradually shifts from risk-oblivious pioneers towards more risk-prone, middle-class households (Kerstein, 1990). These early gentrifiers are attracted to the gentrifying neighbourhood due to its mix of diversity and low rents/house prices, this time combined with its increasing popularity, the image of a new urban lifestyle and close-to-the-city-centre amenities (Kerstein, 1990). Additionally, speculative investors and realtors recognize the neighbourhood's potential for future development and begin promoting investments in the area (Clay, 1979). In this phase, demand for more middle-class housing rises and various properties are fixed up and their values reassessed, increasing rents and housing prices of neighbourhood properties. Landlords looking to capitalise on the rent gap (for more information see Smith, 1987) prefer the more affluent middle-class renters to the current lower-class residents and raise rents (Pattison, 1977). At the same time, the higher property values prompt tax increases for homeowners. As a direct result, lower-class (and potentially minority) incumbent residents, be it renters or homeowners, cannot cope financially and are forced to relocate, leading to their displacement (Shaw, 2008).

In the final stage of these gentrification models, the process has matured. An increasing sociodemographic homogenous group of middle-to-upper-middle-class households move into the gentrifying neighbourhood, as it is now a popular middle-class enclave. As these established gentrifiers move into the neighbourhood, the displacement of the incumbent residents continues to increase. Landlords and developers take advantage of this situation, by increasing the prices of existing properties and rents, leading to even more displacement (Clay, 1979). Eventually, a large part of the neighbourhood is gentrified by sociodemographic similar households, decreasing its diversity. Here, gentrification has reached its end state. According to these stage models, successive stages of gentrification can be categorized by the socioeconomic and sociodemographic profiles, or resources and restrictions, of in- and out-movers.

2.5. Gentrifiers and exclusionary displacement

Theories of stage models and successive works (Berry, 1985; Clay, 1979; Kerstein, 1990; Ley, 1996) implicitly converge in various assumptions on the resources and restrictions of households moving into (and out of) gentrifying neighbourhoods – also at different stages. Overall, stage models acknowledge that households with different (levels of) resources and restrictions (e.g. human and economic capital) can be predicted to move into or out of a gentrifying neighbourhood, given the changing constraints and opportunities within the housing market (e.g. availability of residents in a neighbourhood, rent and house prices). There is widespread theoretical backing that in-movers belong to Ley's (1996) new middle-class. A myriad of literature goes on to theorise how this new middle-class was created by the shift from an industrial society to a service-based economy (Lees et al., 2013). Important for this thesis however, is its outcome: new middle-class households moving into previously lower-income neighbourhoods to pursue a certain urban lifestyle and consumption pattern. Linking this with theories on residential mobility and locational outcomes, these households would thus require sufficient resources to complement the move and prospect of living in these neighbourhoods, without being encumbered by any particular restrictions. Hence, the socioeconomic profile of in-moving households should be distinguished by higher levels of income and educational attainment (Clay, 1979; Lees et al., 2013; McKinnish et al., 2010). Sociodemographically, they are not restrained by residential needs and preferences of their lifecycle stage or household composition. Gentrification theory reflects on these notions and hypothesises that gentrifiers are predominantly young singles or childless couples, also called 'dinkies' – households with a double income and no kids (Farwick, 2010). Especially the dinkies are supposed to have the socioeconomic resources to move into a gentrifying neighbourhood. Gentrifiers are also presupposed to be predominantly white and native to the country in question, as opposed to

having a migration background (Gale, 1979; Lees et al., 2013). Regarding the household composition, gentrification theories perceives the absence of children as a key aspect of being a gentrifier. Childless households do not have elaborate residential or locational requirements associated with having children, e.g. schools (Ellen et al., 2013), instead focusing more on the locational benefits of their new neighbourhood (Lees et al., 2013; Rerat, 2012). They aspire to utilize its location and its close-to-the-city benefits as an 'escalator' to increase their chances of pursuing an urban lifestyle and of upward social mobility later in their life (Blasius et al., 2016; Freeman, 2005; Hochstenbach et al., 2015; Ley, 1996; Rerat, 2012). The households that want to make use of the neighbourhood's escalator functions are in general relatively early in their professional career – and therefore in an earlier lifecycle stage. All in all, the new middle-class households have the opportune set of characteristics to move into low-income urban neighbourhoods. They have the resources to take the risk of moving and living in these areas, yet are not as restricted by, for example, the presence of children. To conclude, these gentrifiers are characterised by a specific socioeconomic and sociodemographic profile that allows for the urban lifestyle of the new middle-class as posed by Ley (1996).

Evenly interesting is the influence of gentrification on the inflow itself. Whereas early stage theories focus solely on the displacement of incumbent residents through their move out of a gentrifying neighbourhood, Marcuse (1985) theorises that stage theory overlooks an important but critical consideration, namely that displacement is not always direct. He classifies a fourfold typology of residential displacement, which is still applicable in contemporary gentrification contexts (Zhang & He, 2018). Direct displacement, he argues, is the outflow of lower-class incumbent residents of gentrifying neighbourhoods as their resources can no longer sustain the neighbourhood's rising rents or taxes; this type is widely discussed in stage theories. Yet displacement can also be of a more indirect and subtle nature, which Marcuse coins as exclusionary displacement. This entails that households which previously had access to housing in a certain neighbourhood are now unable to move into this neighbourhood, as the result of changing housing-market conditions (Lees & Phillips, 2018). Whenever a household voluntarily moves out of a gentrifying neighbourhood and the rent or house price is increased to a level unfeasible for less affluent households, the property becomes inaccessible for this group. On a larger scale, this process reduces the housing stock available for low-income households in gentrifying neighbourhoods, essentially excluding them from these areas (Hochstenbach et al., 2015). Considering that the household's resources are no longer adequate in meeting new neighbourhood constraints, they are unable to make a residential move into the gentrifying area. On the contrary, households with a greater level of resources and fewer restrictions are still able to move into the area, which establishes an inflow of such households into neighbourhoods that are undergoing gentrification (McKinnish et al., 2010; Rayle, 2015). Walks et al. (2021) further explain that exclusion is not only on the base of increases in rent and house prices. It is also reinforced more broadly by changes in the type of housing stock available as well as changing proportions of tenure types and of private versus social housing. The housing stock becomes more suitable for the affluent and less so for the poor, creating and reinforcing the process of exclusionary displacement (Millard-Ball, 2002). The changing composition of the inflow of gentrifying neighbourhoods is thus not solely determined by the increase in the number of gentrifier households; it is elicited by the simultaneous decrease in in-moving lower-income households as well.

2.6. Hypotheses and conceptual model

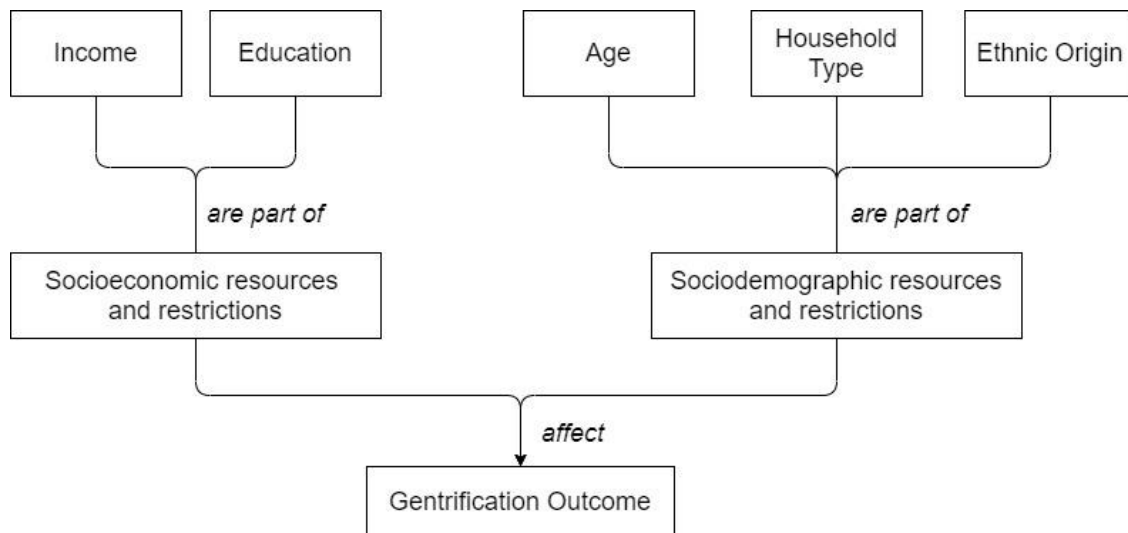
To answer the research question “*To what extent do household-level resources and restrictions influence moving into a gentrifying neighbourhood in the city of Amsterdam?*” and the related sub-questions, several hypotheses are tested. We are interested in the overall influence of resources and restrictions on the probability of moving into a gentrifying neighbourhood. To examine this association, the influence of socioeconomic and sociodemographic characteristics, as well as additional variables is investigated according to the following two hypotheses derived from theory and previous research:

A household’s probability of moving into a gentrifying neighbourhood as opposed to a nongentrifying neighbourhood is higher:

1. with higher values of income;
2. with higher levels of education;
3. with lower householder age;
4. with the absence of children in the household;
5. for Dutch natives than non-natives;

In Figure 1, the relationships between household-level resources and restrictions and the gentrification outcome are shown. It shows how five hypothesised household characteristics affect the ‘gentrification outcome’: the gentrification status of the neighbourhood the household moves into. This is elaborated more on in Section 3.1.

Figure 1. Conceptual model



In the next section, previous academic work on gentrification is discussed. The data and methodology that are used to test the hypotheses and answer the research question are discussed in section 4.

3. Previous work on gentrification

3.1. Identifying gentrification

For studies to examine neighbourhood gentrification, it is essential to have a sound set of specifications and criteria to identify the process. Yet, Williams (2015) claims that gentrification studies suffer from the absence of consistency in precisely the empirical specification and measurement of gentrification. He argues a wide array of measures is used haphazardly throughout the literature – hindering a clear-cut and well-conceptualised understanding of gentrification dynamics. However, this might as well be a by-product of the overall broad scope of gentrification studies. When concentrating studies of gentrification that use quantitative methods to identify areas that are undergoing this process, it emerges that these studies commonly follow a two-step approach (Martin, 2017). First, a neighbourhood's potential for gentrification to occur is established. Not all neighbourhoods have the eligibility to undergo the process of gentrification. As previously mentioned, gentrification is conventionally discussed as the influx of middle-to-upper-middle-class households into traditionally lower-income neighbourhoods. Thus by definition, in order for a neighbourhood to undergo gentrification, it needs to have experienced a period of disinvestment (Freeman, 2005; Galster & Peacock, 1986; Hammel & Wyly, 1996). Previous studies illustrate this difference and make an explicit distinction between gentrifiable and nongentrifiable neighbourhoods (Bostic & Martin, 2003; Ding et al., 2016; Gibbons, 2019). They argue that neighbourhoods with a past of disinvestment will typically possess levels below-average in indicators such as income, education, or occupational sector (Lin & Chung, 2017). Therefore, it is possible for gentrification to occur and the neighbourhood can be classified as gentrifiable. Conversely, with no signs of a below-average social status and disinvestment, the neighbourhood is deemed nongentrifiable (Williams, 2015).

The second step is to identify gentrifiable neighbourhoods that have actually experienced gentrification. Overall, this is done in a retrospective manner, in which data on indicators of social status are compared in two points in time (Martin, 2017). Both income and education levels are able to reflect the process of gentrification in a neighbourhood and are therefore frequently found as the best proxies when quantifying gentrification (Easton et al., 2020). Based on the degree of change, it is possible to determine if gentrification has taken place in this period. One rather straightforward approach is employed by Bostic & Martin (2003) in their study on gentrification in the United States. It entails that neighbourhoods are classified as gentrifying if they are gentrifiable at the beginning of the observed period, but nongentrifiable at the end. Whilst this is a practical approach, it is inordinately simplistic to accurately reflect through processes of neighbourhood gentrification. A more complex method is used in recent studies (Barton & Brault, 2018; Ding et al., 2016; Gibbons, 2019) and measures neighbourhood increases in social status indicators whilst taking into account any citywide change. If the increase is above a certain threshold (which depends on any author's specification), it can be classified as a gentrifying neighbourhood. If it fails to meet this criterion, it is labelled as nongentrifying. Even though this exact approach has not yet been practised in the context of the Netherlands, Dutch quantitative gentrification studies incorporate approaches that are fairly similar. For example, Hochstenbach et al. (2015) define a neighbourhood as gentrifying if neighbourhood income growth is more than half a standard deviation above the citywide income growth; Teernstra (2014) develops a gentrification index through which gentrifying neighbourhoods are defined if the index's value is above a set threshold. However, both methods assume that higher-income neighbourhoods

are also able to undergo the process of gentrification. Whilst such 'super-gentrification' is the subject of some gentrification studies, the focus of this study remains on the archetypal definition of gentrification, which supposes that solely low-income neighbourhoods are eligible to undergo the process of gentrification (Aalbers, 2019; Lees, 2000; Lees et al., 2013). Therefore, following Ding et al., (2016), this study distinguishes between nongentrifying and gentrifying neighbourhoods, yet also classifies neighbourhoods above a certain threshold as being nongentrifiable.

3.2. Gentrifiers' characteristics and geographies of gentrification

As mentioned earlier, a surprisingly small number of studies focus on the characteristics of in-moving households of gentrifying neighbourhoods. The studies that do exist in this field are predominantly focused on the North-American context. Early works on gentrification studies, mainly in the school of stage theory, coincide on five demographic characteristics of in-moving households of gentrifying neighbourhoods in the United States in the 1970s and 1980s (Clay, 1979; Gale, 1979; Kerstein, 1990; Lees et al., 2010, 2013; Pattison, 1977; Ragas & Miestchovich, 1977). Firstly, the household size was found to be very small for these gentrifying neighbourhoods: the majority of households were composed of one or two persons. Secondly, the annual income of these in-movers was relatively high. Whilst the various studies draw on multiple matrices of income, it is overall clearly stated that the gentrifiers are generally middle-to-higher-income households – a contrast with the predominant lower-income incumbent residents. Thirdly, the age of the householder seems to be an important determinant. Previous studies found that in-moving households were quite a bit younger when compared to citywide and national figures. Gale (1979) discovered that households aged twenty-five to thirty-five comprised a minimum of forty percent of the inflow of gentrifying areas in his study on neighbourhood figures of seven US cities; considerably higher than the national average of twenty percent. Fourthly, education, for which in-moving households exhibited the most impressive differences with the city- and nationwide figures. Overall, between sixty and eighty percent of the gentrifiers across various cities had finished their college education; a stark contrast with the generally observed twenty-five to fifty percent citywide share of college-educated households. Fifth and lastly, the racial composition of in-movers of gentrifying neighbourhoods differed evidently from the incumbent residents. Whereas the latter showed great differences and variety in the racial background, the inflow was in any case at the least eighty percent white, some cities even exhibiting figures above ninety percent (Lees et al., 2010; Ragas & Miestchovich, 1977). Additionally, Gale (1979) examined the geographic origin of gentrifiers and found that gentrifiers mainly originated from other inner-city neighbourhoods – contrarily to earlier assumptions that these gentrifiers were former suburbanites. He argues that gentrifiers were specifically rejecting the suburban lifestyle and instead pursued an inner-city, urban lifestyle. Collectively, these early gentrification studies observed that gentrifiers – albeit in the North-American context – exhibited a distinct socioeconomic and sociodemographic profile, and are fairly homogenous in their geographic origin.

However, these early studies merely compared aggregate data of neighbourhood composition and inflow to citywide figures. They give a basic idea of the differences between incumbent residents and gentrifiers, but more comprehensive analyses of household-level demographic figures of gentrification remained largely out of reach, mainly due to the lack of appropriate micro-level data (Lees et al., 2013; McKinnish et al., 2010). This caveat still plagues contemporary gentrification research, considering that the majority of studies derive their results and conclusions based on aggregate-level analysis (e.g. Bostic & Martin, 2003; Ellen & O'Regan, 2011; Somashekhar, 2020). The smaller share of studies that do draw upon detailed datasets and registers still have one hiatus: they are almost all concerned with displacement due to

gentrification – and thus on the characteristics of out-moving households (Lees et al., 2010). Hence, whereas the early aggregate-level studies of the 1970s and 1980s were fixated on the entrants' characteristics, contemporary micro-level studies predominantly examine the outflow and displacement. As a result, a small share of recent demographic gentrification studies actually focuses on the resources and restrictions of entrants. Still, various studies on gentrification in European countries exist. Blasius et al. (2016) find that the entrants of gentrifying neighbourhoods in German cities do have a similar sociodemographic profile of households as formulated in earlier gentrification studies: smaller of size, young, and high educated. Rerat (2012) focuses on age and education only and finds strong evidence that gentrifiers in Swiss cities are younger and higher educated as well. Chelcea et al. (2015) examine the characteristics of gentrifiers in various Eastern European countries and conclude that gentrifiers in the majority of cities are most likely to be affluent one-person households or childless couples that originate from within the city. Studies on gentrifying areas in the US find that in-movers were more likely to be high-educated, higher-income, smaller in size, childless and – in addition – white when compared to households moving into nongentrifying neighbourhoods (Ellen & O'Regan, 2011; Freeman, 2005; Freeman & Braconi, 2004). In US contexts, gentrification is oftentimes considered synonymous with a neighbourhood's racial transformation. As the process matures, the share of ethnic minorities decreases due to an increasing amount of whites moving into the gentrifying neighbourhood (Kirkland, 2008). Lees (2016) argues that this race-centric narrative of gentrification studies in the North-American context cannot be disregarded for European contexts. She explains that there are structural differences in the residential mobility and locational outcomes of different ethnicities in Europe as well, where the native population does not face the same restrictions as those with a migration background do. Following locational attainment models, this implies that natives have an advantageous position and therewith a higher chance of moving into a gentrifying area. Acknowledging ethnic dynamics is therefore a vital component of a demographic study on gentrification. Following the findings of prior research, the five characteristics as erected by early stage theorists are still applicable in contemporary contexts. Still, the household's geographic origin should not be overlooked. Whereas the majority of (recent) gentrification studies do not explicitly address the importance of geographic origin, Gale's (1979) early work established that gentrifiers are more likely to originate from within the city rather than outside. Additionally, recent discourse sheds light on the upcoming trend of transnational gentrification (Hayes & Zaban, 2020). Cocola-Gant & López-Gay (2020) and López-Gay et al. (2021) have found that lifestyle opportunities attract affluent transnational migrants to various neighbourhoods in Barcelona. For an internationally oriented city as Amsterdam, the share transnational gentrifiers might be overly represented in in-moving flows as well.

Despite the well-defined focus of gentrification literature on the aforementioned household-level characteristics, one major issue persists within the operationalisation of demographic gentrification studies. Many studies suffer from the absence of a well-defined control population. They all compare residential mobility in gentrifying neighbourhoods with that in all the remaining neighbourhoods. In the previous section, it was discussed that the quintessential notion of gentrification is that it may only occur in low-income neighbourhoods. Hence, a more relevant control group would be lower-income neighbourhoods that did not gentrify – or nongentrifying neighbourhoods (Ding et al., 2016). This approach is used by McKinnish et al. (2010), who show that white and higher-income households have indeed a higher likelihood of moving into lower-income neighbourhoods that experienced considerable income gains as opposed to their non-gaining counterparts. Wang & Lau (2009) however, find that in-movers of gentrifying neighbourhoods in Shanghai do not necessarily share such characteristics. They argue that gentrifiers do not belong to a homogenous sociodemographic group – instead being stratified

in terms of affluence and lifestyle orientation. Considering these contrasting findings, an important notion made by Lees (2000) becomes apparent. Even though it were geographers that long were the dominant academic voice in gentrification studies, it was the geography of gentrification that was long overlooked (Lees et al., 2010). Various perspectives and discrepancies on a wide array of topics related to gentrification were conventionally attributed to theoretical, methodological or analytical differences; yet geographical context emerged to be evenly important. Despite the call for a coherent approach towards an understanding of household-level resources and restrictions of gentrifiers, the outcomes will ultimately always be influenced by geography-specific attributes – which may differ internationally but also between and within cities (Lees, 2000). This does not say that comparison of previous studies is nonsensical; it definitely is germane to gentrification studies as it aids towards a robust framework of understanding. Butler & Robson (2001) support this idea and explain that understanding gentrification is not a unitary practice. Instead, they advocate for an examination of each case according to its own content, context, and outcomes. All in all, earlier studies on household attributes – from early stage theorists all the way until the latest household-level studies – support a sociodemographic approach. In other words, an approach that focuses on the attributes of household income, type and size, as well as householder education, age and ethnic origin – features that are consistently used in demographic gentrification studies. Therewith, it is possible to better understand the household-level characteristics that influence residential mobility in the gentrification context.

3.3. Gentrification in the context of Amsterdam

Following on from the notion of geographies of gentrification, the context of the Netherlands and in particular Amsterdam cannot be neglected for this study. Overall, grand theory of gentrification has been proven to be virtually equally valid in a myriad of contexts (Clark, 1991; Hochstenbach et al., 2015; Van Weesep & Musterd, 1991). Tieleman (2014) argues that in essence, gentrification in Amsterdam is no different from practices in London or New York: it concerns a 'battle of the classes' where lower-income households are displaced by middle-and-higher-income households through direct and indirect forces. Still, contextual differences exist, which may alter the outcomes. Gentrification studies have mainly described the process in Anglo-American contexts, characterised by liberal attitudes towards the housing market. The Dutch market, however, is renowned for greater government intervention. Having stronger government intervention, rent control and tenant protection cannot prevent gentrification from occurring, but it can influence the pace and magnitude of the process (Van Weesep, 1994). Blasius et al. (2016) find this to be the case in Cologne, Germany; a similar role of the government as found in Amsterdam's housing market. Incumbent residents with fewer resources are protected from large rental increases and direct displacement by various legal arrangements. However, displacement might still be prevalent through the occurrence of indirect, exclusionary displacement. Such displacement cannot be regulated as easily as its direct counterpart: tenant protection and rent control are not applicable to potential in-movers (Davidson & Lees, 2005). Rising house prices and lower availability create a situation of housing inaccessibility and unaffordability for the less affluent, aggravating processes of exclusionary displacement. Bosch (2015) indeed found these processes to be the most evident form visible in Amsterdam, as the availability of cheap rental dwellings had shrunk considerably. Similarly, Hochstenbach & Musterd (2018) observed that lower-income residents became less likely to move into central city locations over time, thereby being forced to settle for suburban locations. Hence, in the context of the Amsterdam housing market, gentrification might not lead to the direct displacement of the less affluent as much, instead making prospects of living in the city unfeasible for potential in-movers.

Additionally, the Amsterdam context is shaped by its demographics and housing market dynamics. The city has a long history of social welfare and public housing (Tieleman, 2014). In 2015, lower-income households were overrepresented in the city of Amsterdam, as fifty-three percent of the households have an income in the national four lowest income deciles (Bosch, 2015). These figures are reflected in the city's housing stock as circa forty-five percent of its housing stock was part of the public housing sector, which exists to provide the lower-income population with affordable housing in the city and therewith promote social integration (Bosch, 2015; Musterd, 2014; Van Weesep, 1994). However, the increasing demand for residence in Amsterdam has proven to be a lucrative opportunity for housing associations. By selling public housing dwellings to investors in the private rental sector, the overall supply of affordable housing in the city decreases (Fransham, 2020). The pressure on the Amsterdam housing market is increasing, as middle-class families are prolonging their stay in the city, whilst students and graduates are moving to the city in increasing numbers (Boterman et al., 2013; Hochstenbach et al., 2015). In-moving households might not have the resources to buy a home, but they might also deliberately choose to rent in the private sector to make use of the city's escalator region before suburbanising to settle down (Boterman, 2012). Musterd & Arnoldus (2002) explain that the inflow of these younger households is not just related to the economic and locational merits of living there, but also with the city's role in facilitating the urban lifestyle and social lifestyle of these young entrants.

With a shrinking social-rental sector and increased housing demand, the city's housing market has been increasingly facilitating gentrification (Boterman & Van Gent, 2014). Still, most of the gentrification literature focusing on Amsterdam mainly homed in on socioeconomic determinants of in-moving households, especially on income. As theory and research on residential mobility and gentrification have made apparent, these are not the only attributes that play a role. Including socioeconomic and sociodemographic characteristics is therefore important to carefully scrutinise how household-level resources and restrictions are associated with moving into Amsterdam's gentrifying neighbourhoods.

4. Data & Methods

For the analysis of this study, data are extracted from two datasets. The first is the publicly available dataset *Basisbestand Gebieden Amsterdam* ('Basis Datafile Areas of Amsterdam'; abbreviated BBGA), published by the municipality of Amsterdam (Municipality of Amsterdam, 2021). Neighbourhood-level income data from the years 2011 and 2018 are used to identify various neighbourhood types in the municipality of Amsterdam, i.e. (non)gentrifiable and (non)gentrifying neighbourhoods. Subsequently, the dataset *Verhuisstromen Amsterdam* ('Flows of Residential Moves Amsterdam') is used to find associations between household characteristics and the type of neighbourhood the household moves into. This dataset contains household-level information on moves into and out of Amsterdam neighbourhoods in 2017 and 2018. These data are used to create household-level variables in order to analyse differences in resources and restrictions between in-moving households of various types of neighbourhoods.

4.1. Dataset Basisbestand Gebieden Amsterdam

To identify gentrifying neighbourhoods in Amsterdam, this study utilises income data from the *Basisbestand Gebieden Amsterdam*. This dataset is compiled and made available by the Bureau of Research, Information and Statistics (OIS) of the municipality Amsterdam (OIS, 2021). It contains key figures of various spatial entities for the period 2001-2020 on multiple scalar scales. This information is dispersed across ca. five hundred variables on the themes of population, work, education, income and more. For this study, the average income within a spatial entity is collected (section 4.3 further elaborates on this). The BBGA exclusively features income statistics for entities with more than two hundred inhabitants. In cases where this threshold is not met, income data are redacted. The BBGA's smallest scale of spatial entities regularly have populations below two hundred inhabitants. Consequently, the absence of income data for these areas makes it impossible to categorize them as either gentrifying or nongentrifying. To overcome this problem, this study utilises the second-smallest scale level of Dutch *Wijken* – which are referred to as neighbourhoods in the remainder of this thesis. Since 2015, the municipality of Amsterdam has employed a classification of spatial entities containing ninety-nine different neighbourhoods. Of these neighbourhoods, nine are excluded from categorisation due to the absence of income data. They are either business parks or new residential areas with too few inhabitants at the beginning of the observed period. Considering that these neighbourhoods account for just over one percent of the Amsterdam population, it is not probable that this influences the results considerably. The BBGA harmonised income data for the spatial entities to compare datasets before and after the spatial reclassification of 2015. It is however undesirable to make comparisons between the income data before and after 2011. Income data before 2011 are based on an alternative survey, making them virtually incompatible with later income data. Hence, the largest possible interval is used for the identification of gentrifying neighbourhoods: the seven-year period between 2011-2018. A seven-year period is arguably both long enough to reflect processes of gentrification (Hochstenbach & van Gent, 2015) and sufficiently short for demographic processes and in situ social mobility to only be of minor influence on neighbourhood upgrading (Millard-Ball, 2002). A full overview of all neighbourhoods and their average income levels is shown in Appendix A.

4.2. Dataset Verhuisstromen

The analysis of this study relies on the dataset *Verhuisstromen*, which is constructed through data extracted from various population registers and surveys as collected by Statistics Netherlands (CBS), the Dutch national statistics office. It contains data on the residency of all households in the metropolitan area of Amsterdam as of December 31st, 2018 as well as information on the previous residence if the household has made a residential move into or out of Amsterdam neighbourhoods in either 2017 or 2018 (including moves between Amsterdam neighbourhoods). Additionally, the dataset contains variables on various socioeconomic and sociodemographic characteristics, as well as other attributes for each household. These data allow for an assessment of the resources, restrictions and other characteristics of in-moving households (López-Gay et al., 2020), which makes it possible to analyse the profile of the in-movers of a gentrifying neighbourhood, as opposed to in-movers of nongentrifying neighbourhoods and nongentrifiable neighbourhoods in the municipality of Amsterdam. Conveniently, the dataset *Verhuisstromen* utilises the same classification of spatial entities as the BBGA, which facilitates compatibility between the two datasets. A handful of selections are made for the analysis. Households are excluded if they have moved into one of the nine neighbourhoods without BBGA income data (4,419 cases), if their geographic origin is unknown (1,791 cases) or if more than ten households are registered on the household's new address (3,053 cases). The latter is done to exclude new immigrants and ex-pats that register on some form of collective address before they move to a place of their own. Their locational outcome is not yet identifiable and is therefore not of interest to this study. These selections result in a total of 123,840 cases.

4.3. Measuring gentrification

Income data from the BBGA are used to identify various types of neighbourhoods in Amsterdam. The analysis is carried out with both multinomial and binomial logistic regression models with the destination neighbourhood status of either gentrifying or nongentrifying (and specifically for the multinomial model also nongentrifiable) as the dependent variable. The approach is similar to Freeman's (2005) study on gentrifiers and is additionally a common method employed by models of locational attainment. Such studies opt for a particular neighbourhood characteristic (e.g. poverty rate or distance to city centre) to serve as the dependent variable. For this analysis, the neighbourhood characteristic of choice is the neighbourhood's gentrification status. A gentrification index is created to coherently distinguish between different gentrification statuses. In previous academic research, gentrification has been identified through matrices of house prices, housing stock, income level, educational attainment, displacement rates, etc. (Atkinson, 2000; Ding et al., 2016; Lees et al., 2013). Nevertheless, the focus of this study lies on household-level resources and characteristics that are linked to moving into a gentrifying neighbourhood – not on identifying neighbourhood gentrification itself. Although there might be many indicators of gentrification, there is an overall consensus that gentrification is a process of higher-income households moving into predominantly lower-income neighbourhoods (Lees et al., 2013). Hence, this study follows this rationale and measures the process of gentrification through neighbourhood-level income development. As illustrated earlier, it is first essential to differentiate between various gentrification statuses of neighbourhoods, for which the BBGA's neighbourhood-level average disposable income per household is used. McKinnish et al. (2010) argue that average neighbourhood household income is preferred over the median, as the influx of higher-income households might have little effect on the median, but does affect the neighbourhood average. The values for average household income are obtained through the *Integrale Inkomens- en Vermogenonderzoek* (Integral Income and Assets Examination; abbreviated IIV) as carried out by the CBS. The IIV seeks to provide accurate statistics on the composition and distribution of wealth and income of households in the Netherlands on a yearly

basis. It collects these data via various governmental institutions and the National Basic Registration of Persons (CBS, 2011). These data are used to classify Amsterdam neighbourhoods as either gentrifiable or nongentrifiable at first. Considering that gentrification can only occur in lower-income areas by definition, a neighbourhood is gentrifiable if its mean household income is below the citywide mean at the start of 2011, similar to Ding et al. (2016). The Amsterdam average of 30.200 euro in 2011 therefore implies that all neighbourhoods below this threshold are gentrifiable. Out of the ninety neighbourhoods that have income data, fifty-eight are eligible to be identified as a gentrifiable neighbourhood. The remaining thirty-two are consequently classified as nongentrifiable. In a second step, the gentrifiable neighbourhoods are categorised as either gentrifying or nongentrifying. For this purpose, the gentrification index *GENTR* is computed. It calculates the relative growth of mean disposable household income for all neighbourhoods (excluding those that lack income data) and compares it with the citywide growth in income. It uses relative growth in order to standardise for absolute differences in mean neighbourhood income. The calculation of *GENTR* is inspired by the methods employed by Teernstra (2014) and Hochstenbach et al. (2015). Its calculation is as follows:

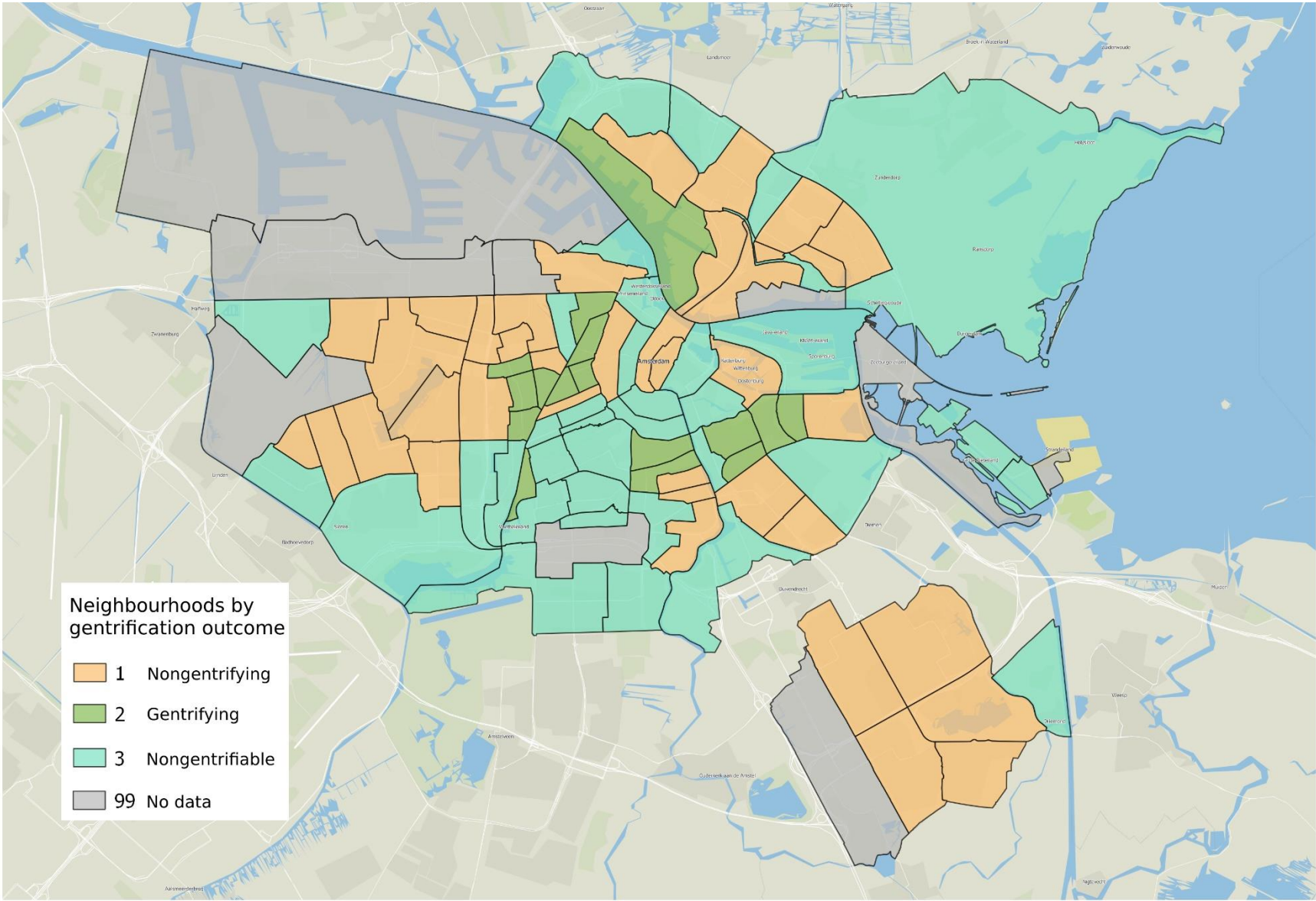
$$GENTR = \frac{NNDI_{j,2018} / NNDI_{j,2011}}{NNDI_{Amsterdam,2018} / NNDI_{Amsterdam,2011}}$$

In this formula, *NNDI* reflects the neighbourhood average household disposable income per household. *NNDI_{j,2018}* is the value for neighbourhood *j* in 2018; *NNDI_{j,2011}* is its value in 2011. The denominator is the outcome of dividing the citywide value of *NNDI* in 2018 (40.300 euro) with its value in 2011 (33.200 euro). Given that the denominator is identical in the computation of *GENTR* for any Amsterdam neighbourhood, the formula can be rewritten as:

$$GENTR = \frac{NNDI_{j,2018} / NNDI_{j,2011}}{40.300 / 33.200} = \frac{NNDI_{j,2018} / NNDI_{j,2011}}{1.21385542169}$$

Subsequently, values of *GENTR* are computed for every neighbourhood and the mean and standard deviation for disposable income per household across all neighbourhoods are calculated. In a similar fashion as performed by Teernstra (2014), a neighbourhood is considered to be gentrifying if its relative income growth between 2011 and 2018 is at the least half a standard deviation larger than the citywide mean growth. In this case, the minimum value of *GENTR* for a neighbourhood to be classified as gentrifying is 1.0390401 (1.003952 + 0.0701762*0.5). If it does not meet this criterium, it has not experienced this income growth and is accordingly labelled as nongentrifying. In total, sixteen neighbourhoods are classified as gentrifying, thirty-eight as nongentrifying and the remaining thirty-six are identified as nongentrifiable neighbourhoods. The remaining nine neighbourhoods without income data are labelled accordingly. Figure 2 depicts the spatial distribution of Amsterdam's neighbourhoods according to the gentrification index. For a full overview of the classification of all the ninety-nine neighbourhoods and their values for both gentrification indexes, see Appendix A.

Figure 2. Amsterdam neighbourhoods according to their gentrification outcome



4.4. Operationalisation of resources and restrictions

For the explanatory variables of the logistic regression models, various household-level characteristics of the entrants of the three types of neighbourhoods are used. By defining the appropriate socioeconomic and sociodemographic characteristics that affect residential mobility, it is possible to discern and highlight how household-level characteristics affect locational outcomes (Woldoff, 2008). In a similar study, Freeman (2005) analyses household-level characteristics through separate bivariate models; one for each attribute he wishes to examine. This does allow him to establish certain relationships between these characteristics and moving into a gentrifying neighbourhood. Yet with this method, it is unclear whether these associations would hold if controlled for each other. To overcome this adversity, this thesis measures these resources jointly in a multivariate multinomial logistic regression model. Previous quantitative gentrification studies commonly selected indicators of socioeconomic status as independent variables, e.g. income, wealth and educational attainment. This is unsurprising, given that gentrification is inherently a narrative predominantly driven by higher-income households moving into originally lower-income neighbourhoods (Coenen et al., 2018; Fouch, 2012). This study employs disposable income and the householder's highest attained level of education as socioeconomic characteristics. These indicators are overall the most straightforward and frequently used indicators of socioeconomic status (Meraviglia et al., 2016), as well as being the best available in the dataset *Verhuisstromen*. Out of all 123,840 cases in the dataset, 6,956 have no information on their income and 2,129 have negative values of income. Given that income data is frequently excessively skewed to the right and has some extreme outliers, which is the case in this dataset, disposable income is log-transformed in order to approximate a normal distribution. For negative values of income, a log transformation is not possible. As a result, they are excluded from the analysis, as are those with an income unknown.

The second characteristic to reflect the household socioeconomic resources is education, which is measured by the highest attained level of education of the householder – the main wage earner within the household (CBS, 2016). The variable contains three categories for the level of education: *Low*, *Middle*, and *High*. Low educational attainment includes primary education and the Dutch *vmbo* and *mbo 1*. Middle represents *mbo 2/4*, *havo* and *vwo*. High educational attainment is comprised of *hbo*, university and postgraduate. The considerable number of missing values for educational attainment poses an issue for this analysis. For circa thirty-seven percent of all cases, the educational attainment is unknown. Excluding these cases from the analysis would mean a considerable loss of respondents for which other variables are present in the dataset, therewith reducing the statistical power of the analysis (Kang, 2013). Moreover, the missing values are not missing at random (MNAR), as there are two major causes for missing data. Firstly, householders who have attained their highest level of education abroad do not have their education level registered in the Dutch population records. Consequently, many immigrants do not have an indication of their educational attainment. To illustrate: of movers that lived abroad directly prior to their move, almost ninety-five percent do not have data for educational attainment. Making any inferential remarks on education for this group would be of no avail. Secondly, the coverage ratio of householders' highest attained level of education decreases with age. The Dutch population records have only started including educational attainment as a standard indicator since the late 1990s. Information on education levels for older householders is acquired via the national workforce survey (EBB) but is only present for a minority of the population. Considering that the missing values are MNAR and add up to almost forty percent of the total cases, current imputation methods will likely not reflect on the actual missing cases and bias the results for worse (Madley-Dowd et al., 2019; Pereira et al., 2019). Hence, the issue of missing values in this variable is overcome by adding a fourth category, namely *Education unknown*, which hosts all cases that do not have a record for educational attainment. This is

unquestionably a suboptimal approach towards the issue at hand, but the suitable yet complex imputation methods would simply be too demanding for a study of this magnitude (Madley-Dowd et al., 2019; Schafer & Graham, 2002). With the addition of a fourth category, it is paramount to recognise that these missing values are inherent to a selective group within the population. Therefore, any inferences and interpretations should be made with caution.

For sociodemographic characteristics, the dataset *Verhuisstromen* provides information through which these attributes can be operationalised in multiple variables. The type of household is represented by a categorical variable, which makes essential distinctions between various household compositions. This variable incorporates household size, partnership status and presence of a child into one indicator. By doing so, the variable reflects the sociodemographic resources and restrictions as well as the household's (preferred) lifestyle. For example, the presence of children in the household theoretically restricts the tendency to move into a gentrifying area (Lees et al., 2013; McKinnish et al., 2010). Similarly, a childless couple presumably has more resources than a one-person household (Kerstein, 1990; Rerat, 2012). Household type can also be an indication of the household's lifestyle preferences which it takes into account when opting for a particular locational outcome (Cocola-Gant & Lopez-Gay, 2020; Olaru & Smith, 2013; Walker & Li, 2007). Following Ley's (1996) premise, the (childless, high-educated, etc.) new middle-class pursues an urban lifestyle: one they might find in inner-city, gentrifying areas. Hence, household type is a crucial determinant of the locational outcome; a well operationalised yet logical indicator is therefore quintessential. In this case, the variable is divided into five categories: *One-person households*, *Couple without children*, *Couple with children*, *Single parent household*, and *Other*. The second sociodemographic variable is the householder's age. It is used as a proxy for the lifecycle stage the household currently finds itself in, as is done in the majority of demographic gentrification studies (Ellen & O'Regan, 2011; Freeman, 2005; Gibbons, 2019; Hochstenbach & Boterman, 2018). The last variable to reflect sociodemographic characteristics is the householder's ethnic origin. This variable is used to estimate if there are structural differences in the gentrification-specific locational outcomes for different ethnic groups in the Netherlands. The variable is split into three categories: *native Dutch*, *Western non-native* and *non-Western non-native*. The category of *non-Western non-native* contains households of Turkish, Moroccan, Surinamese, Antillean and Aruban origin. Including these ethnic groups as single categories would cause them to be too small to derive any meaningful outcomes. Therefore, they are included as one category in the variable for ethnic origin.

Lastly, two additional variables are added to the model. The first of the two is the geographic origin. Three categories are constructed to reflect the geographic origin, namely *Within municipality Amsterdam*, *Outside municipality Amsterdam*, and *Abroad*. The second is a control variable for housing tenure before the move. Overall, households with homeownership can be considered to be more affluent than those in the rental sector (Freeman, 2008). Still, adding a variable for being either a former homeowner or renter would overlook the distinction between the public and private rental sectors. Assuming former private renters have more resources than those coming from public housing, they are also more likely to be entrants of gentrifying than their public housing counterparts. To distinguish between these three groups of households, the control variable is given three values: *Public rental*, *Private rental*, and *Owner-occupied*.

All in all, a total of 114,755 cases has been selected from the dataset *Verhuisstromen* to find differences in the socioeconomic and sociodemographic characteristics between in-movers of gentrifying neighbourhoods, nongentrifying and nongentrifiable neighbourhoods in the municipality of Amsterdam. Summarized, these are household income and householder educational attainment for socioeconomic attributes; household type, ethnic origin and householder age for sociodemographic factors; geographic origin as an additional variable; and a control variable for housing tenure before the move.

4.5. Multinomial and binomial logistic regression models

The analysis of this study is focused on examining the household-level characteristics of in-movers of gentrifying neighbourhoods and in-movers of low-income neighbourhoods that did not undergo gentrification. The first part of the analysis employs a multinomial regression model, with the socioeconomic and sociodemographic attributes as explanatory variables and the trichotomous gentrification outcome as the dependent variable. These specifications lead to the following multinomial logit model:

$$\ln\left(\frac{P(G_i = 2)}{P(G_i = 1)}\right) = \beta_{0i} + \beta_1 I_i + \beta_2 E_i + \beta_3 A_i + \beta_4 H_i + \beta_5 O_i + \beta_6 GO_i + \beta_7 T_i + \varepsilon_i$$

$$(1) \quad \ln\left(\frac{P(G_i = 3)}{P(G_i = 1)}\right) = \beta_{0i} + \beta_1 I_i + \beta_2 E_i + \beta_3 A_i + \beta_4 H_i + \beta_5 O_i + \beta_6 GO_i + \beta_7 T_i + \varepsilon_i$$

$$P(G_i = 1) + P(G_i = 2) + P(G_i = 3) = 1$$

where G_i is the indicator for the gentrification status of the neighbourhood in which the household i moved into. G_i is based on the aforementioned gentrification index and is subsequently given three values: 1=move into a nongentrifying neighbourhood (the reference category); 2=move into a gentrifying neighbourhood; and 3=move into a nongentrifiable neighbourhood. Naturally, the probability of moving into a nongentrifying neighbourhood, for instance, is $P(G_i=1)$; the dependent variable is the log odds of moving into a gentrifying or nongentrifiable neighbourhood as opposed to a nongentrifying neighbourhood. Even though the comparison between nongentrifying and gentrifying areas is most interesting for answering the research questions, the outcomes for the nongentrifiable neighbourhoods are included as well. The in-movers of these neighbourhoods should logically exhibit particular outcomes, e.g. have higher incomes than entrants of both the nongentrifying and gentrifying neighbourhoods. Considering that gentrifiers are expected to have a different profile than in-movers of both nongentrifying and nongentrifiable neighbourhoods, the inclusion of all locational outcomes provides the broadest context to the results for gentrifying neighbourhoods. The dependent variable is referred to as 'the gentrification outcome' in the remainder of this thesis.

The independent variables that reflect the household's socioeconomic attributes in this model are the indicators I_i and E_i , representing the household income and educational attainment of the householder. I_i is calculated as the natural log of household income to compensate for the severe skewness of the original income data, to improve linearity between the logit of the dependent variable and household disposable income, and to make a more meaningful interpretation of the coefficient. E_i is specified in the categories of *Low*, *Middle*, and *High educational attainment*, as well as a category for *Education unknown*. Various sociodemographic indicators are added to the model as well. A_i is the householder's age in years; H_i represents the household type. The ethnic origin of the householder is represented through the categorical variable O_i . Differences in the geographic origin of the household prior to moving are accounted for through GO_i . With the indicator T_i , the difference of distinct housing tenure types before moving is taken into account. Lastly, ε_i indicates the stochastic error term.

An important note is the choice of specification of the model. Similar studies on the characteristics of gentrifiers choose to categorise cases based on combinations of multiple household attributes (e.g. Blasius et al., 2016; McKinnish et al., 2010). These studies have composite variables for every combination of characteristics. For instance, they create a single variable for which the reference category represents a group consisting of high income, high educated couples aged 20-40 without children. All other demographic groups that can be computed are subsequently compared with this reference category. Not only does the above-mentioned specification make interpreting the results particularly complicated due to its many different categories; it would also require a great number of cases to ensure the statistical power of the model. Although the dataset used in this thesis has quite a number of cases, the number of variables would lead to an extraordinary quantity of categories. To retain the number of coefficients limited and facilitate interpreting the results, the explanatory variables are kept separate from one another for the most part. The only exception is the variable for household type, which simultaneously measures multiple sociodemographic characteristics. Grouping together these variables has the benefit of comparing various household types with each other, instead of diffusing these characteristics over various dummy variables. All other explanatory variables in the model are estimated separately, so distinct associations with the dependent variable can be calculated and assessed.

Still, gentrifiers might have a preference for a relatively higher-income destination, making them more likely to move into the upper end of lower-income neighbourhoods. If this is the case, failing to account for neighbourhood average income would erroneously estimate this preference as a tendency of moving into a gentrifying neighbourhood. This biases the results and will undoubtedly make any interpretations questionable. Controlling for neighbourhood income corrects such a tendency. However, there is one hurdle to overcome when neighbourhood average income is added to the model – also the reason that the base multinomial logit model does not include such a control. Neighbourhood average household income data are also used for the classification of nongentrifying, gentrifying and nongentrifiable neighbourhoods in Amsterdam. Adding a control for neighbourhood average income would pose no issue for nongentrifying neighbourhoods and their gentrifying counterparts: the two types alternate over ascending order of neighbourhood income as shown in Appendix A. By contrast, all nongentrifiable neighbourhoods have average household incomes above a certain threshold. Neighbourhood income levels beyond this parameter thus perfectly predict the neighbourhood outcome of moving into a nongentrifiable area; a situation in which the logit model cannot produce any meaningful coefficients for this variable. To circumnavigate this issue, the following binomial regression model is employed:

$$(2) \quad \ln\left(\frac{P(G_i = 1)}{P(G_i = 0)}\right) = \beta_{0i} + \beta_1 I_i + \beta_2 E_i + \beta_3 A_i + \beta_4 H_i + \beta_5 O_i + \beta_6 GO_i + \beta_7 T_i + \beta_8 N_i + \varepsilon_i$$

The indicator for this model's gentrification status (G_i) is divided into 0=moving into a nongentrifying neighbourhood (the reference category) and 1=moving into a gentrifying neighbourhood. The model's independent variables are all aforementioned socioeconomic and sociodemographic attributes as well as a control for neighbourhood average income of the household's destination in 2011: N_i . This method is used by McKinnish et al. (2010) to control for neighbourhood income in their study on gentrifiers as well. Considering that neighbourhood average income is identical for households moving into the same neighbourhood, standard errors are robust clustered by neighbourhood. This binomial logit model will elucidate to which extent the destination neighbourhood's average income is associated with the gentrification outcome; and if the associations of household characteristics found by the multinomial logistic regression still hold when controlled for neighbourhood average income.

4.6. Limitations

The application of the operationalisation of gentrification has several caveats. Firstly, it is assumed that neighbourhoods that are defined as gentrifying in the period 2011-2018 are still actually gentrifying in the years 2017-2018. However, it is possible that a neighbourhood was experiencing gentrification before these two years and is now a stable, nongentrifiable neighbourhood. In this case, these neighbourhoods are mistakenly deemed to be gentrifying and distort the actual household resources and restrictions of gentrifiers. Secondly, the results reflect the household attributes for in-movers of all nongentrifying, gentrifying or nongentrifying neighbourhoods. No distinctions can be made between different gentrifying neighbourhoods. Yet, gentrification processes are likely to differ in pace and magnitude among neighbourhoods (Fransham, 2020). Considering that gentrifying neighbourhoods are analysed as a whole and not individually, it is impossible to address the possible geographical heterogeneity of gentrification processes. Alongside inter-neighbourhood differences, differences within a neighbourhood might exist as well. The processes of gentrification might be strongly clustered within a particular part of a neighbourhood (McKinnish et al., 2010). If this clustered process is strong enough to increase the overall neighbourhood income considerably, the neighbourhood is subsequently defined as gentrifying as a whole. In-movers of the nongentrifying parts are falsely labelled as gentrifiers.

5. Results

5.1. Descriptive results

All households that moved into an Amsterdam neighbourhood in either 2017 or 2018 are exhibited according to the gentrification outcome of their destination in Table 1. The 4,419 households that moved into an unassigned neighbourhood are irrelevant and therefore excluded from the rest of the analysis.

Table 1. Households by gentrification outcome

	Observations	Percent	Valid
Nongentrifying	56,248	43.86	45.42
Gentrifying	23,775	18.54	19.20
Nongentrifiable	43,817	34.16	35.38
Total (<i>valid</i>)	123,840	96.55	100.00
Missing	4,419	3.45	
Total (<i>dataset</i>)	128,259	100.00	

For the continuous variables of household disposable income, age, and neighbourhood average income, descriptive statistics are shown in Table 2. Minimum and maximum values are omitted from the tables to preserve confidentiality of households present in the *Verhuisstromen* dataset. The descriptive statistics for age and income are accompanied by pairwise multiple comparison test results to determine any differences in the variable means among the three gentrification outcomes. The test results of Tables 3 and 4 show significant differences in group means for both variables ($p < 0.001$), thereby hinting at the presupposed differences in characteristics between the two groups. Entrants of gentrifying neighbourhoods are ca. 1.9 years younger and have a disposable income 6,487 euro higher than those of nongentrifying neighbourhoods. Compared with in-movers of nongentrifiable neighbourhoods, gentrifiers are also considerably younger (on average 1.7 years) and their income is substantially lower—something to be expected considering the categorisation of gentrification status based on neighbourhood income level. Nonetheless, it is important to consider the 9,085 excluded cases due to unknown and negative values of income. The presence of missing data of income is significantly higher for the in-movers of nongentrifying as opposed to gentrifying neighbourhoods ($p < 0.001$).

Table 2. Descriptive statistics of continuous variables

	Observations	Mean	Std. Dev.
Disposable Income	114,755	40,067.38	67,828.00
Age	123,840	33.56	12.33
Neighbourhood Average Income	123,840	33,566.40	9642.82

Table 3. Age – group statistics and pairwise multiple comparison test results

	Observations	Mean	Std. Dev.
Nongentrifying	56,248	33.96	12.87
Gentrifying	23,775	32.11	10.82
Nongentrifiable	43,817	33.85	12.32
Total	123,840	33.56	12.33

Source	SS	df	MS	F	Prob > F
Between groups	62,800	2	31,400.04	207.35	0.000
Within groups	18,752,921.90	123837	151.43		
Total	18,815,722.00	123839	151.94		

Table 4. Household disposable income – group statistics and pairwise multiple comparison test results

	Observations	Mean	Std. Dev.
Nongentrifying	52,146	32,376	30,383
Gentrifying	22,544	38,864	46,019
Nongentrifiable	40,065	50,755	102,919
Total	114,755	40,067	67,828

Source	SS	df	MS	F	Prob > F
Between groups	7.69E+00	2	3.85E+16	848.47	0.000
Within groups	5.20E+18	114,752	4.53E+13		
Total	5.28E+18	114,754	4.60E+13		

Descriptive results for the categorical variables are exhibited in cross-tabulations, showing the variable's distribution over the case-total and stratified according to their gentrification outcome (Table 5). Pearson chi-square test values are added to reflect on the supposed independence of variable distributions on population. All Pearson chi-square statistics show significant results, implying the distributions of the categorical variables are associated with the gentrification status of the destination. A complete overview of the counts per category for all categorical variables can be found in Appendix B.

The results in Table 5 suggest that entrants of gentrifying neighbourhoods are overall more highly educated as opposed to those of nongentrifying ones. When comparing entrants of gentrifying neighbourhoods to those of higher-income neighbourhoods, no such difference can be discerned. However, important to note is the moderate number of cases that have missing data on education. Of the households that moved to a gentrifying area, circa thirty-four percent have missing education data. This is thirty-eight percent of those moving into nongentrifying neighbourhoods and forty-two percent of in-movers of nongentrifiable households. Considering the sources of missing data, namely absent data for immigrants and households in a later lifecycle stage, these distributions suggest that, on average, in-movers of gentrifying neighbourhoods are younger and less likely to be non-natives than their counterparts in alternative destinations – which is an apparent notion in previous research. Regarding non-natives, the distribution in ethnic origin signals that gentrifiers have an overall higher ratio native to non-native when compared to entrants of nongentrifying and – to a lesser extent – in-movers of nongentrifiable neighbourhoods.

Households that include children seem to be less common among the in-movers of gentrifying neighbourhoods as opposed to their nongentrifying and nongentrifiable counterparts. An astonishing ninety percent of gentrifier households is childless; this is eighty-four percent for entrants of nongentrifying neighbourhoods and in stark contrast with the fifty-nine percent for those moving into a nongentrifiable area. For the geographic origin of in-movers, the descriptive results exhibit peculiar figures as well. Gentrifiers originate predominantly from within the Netherlands: their share of in-movers originating from municipality Amsterdam or an alternate Dutch municipality is greater than for the other two types of in-movers. In other words, it is less common for gentrifiers to have moved from abroad. Lastly, tenure type before moving is examined. In the order of nongentrifying, gentrifying and nongentrifiable neighbourhoods, the share of households that were previously homeowners increases and the share of those coming from public housing decreases. Those with a background in the private rental sector are least represented among entrants of nongentrifying neighbourhoods. The proportion of previously private renters is approximately identical for those moving into gentrifying and nongentrifiable neighbourhoods, with only a slightly higher share for gentrifiers. These figures are fairly similar for gentrifying and nongentrifiable neighbourhoods and are in such contrast with the share in nongentrifying neighbourhoods, even though gentrifying and nongentrifying neighbourhoods are unquestionably more akin in terms of neighbourhood average income.

Table 5. Descriptive statistics and chi-square test results of categorical variables

	Nongentrifying (n=56,248)		Gentrifying (n=23,775)		Nongentrifiable (n=43,817)		Total (n=123,840)		X ²
Educational attainment	Percent	Valid Percent	Percent	Valid Percent	Percent	Valid Percent	Percent	Valid Percent	
Low educational attainment	11.57%	18.71%	5.83%	8.89%	4.58%	7.92%	7.99%	13.08%	p<0.001
Middle educational attainment	24.45%	39.52%	22.37%	34.11%	19.96%	34.56%	22.46%	36.75%	
High educational attainment	25.84%	41.77%	37.39%	57.00%	33.21%	57.51%	30.66%	50.17%	
Unknown	38.15%		34.41%		42.25%		38.88%		
Household type	Percent	Valid Percent	Percent	Valid Percent	Percent	Valid Percent	Percent	Valid Percent	
One-person household	63.45%	-	62.37%	-	59.29%	-	61.77%	-	p<0.001
Couple without children	20.61%		27.84%		24.01%		23.20%		
Couple with children	8.86%		5.63%		11.91%		9.32%		
Single parent household	5.52%		2.76%		3.65%		4.33%		
Other	1.56%		1.40%		1.14%		1.38%		
Origin household	Percent	Valid Percent	Percent	Valid Percent	Percent	Valid Percent	Percent	Valid Percent	
Native	34.99%	-	48.12%	-	43.63%	-	40.57%	-	p<0.001
Non-Western non-native	37.40%		20.78%		22.70%		29.01%		
Western non-native	27.62%		31.10%		33.67%		30.43%		

Table 5. Descriptive statistics and chi-square test results of categorical variables (continued)

	Nongentrifying (n=56,248)		Gentrifying (n=23,775)		Nongentrifiable (n=43,817)		Total (n=123,840)		X ²
Geographic origin	Percent	Valid Percent	Percent	Valid Percent	Percent	Valid Percent	Percent	Valid Percent	X²
Within municipality Amsterdam	59.05%	-	61.17%	-	56.06%	-	58.40%	-	p<0.001
Outside municipality Amsterdam	25.48%		26.95%		26.68%		26.19%		
Abroad	15.47%		11.88%		17.26%		15.41%		
Housing tenure before moving	Percent	Valid Percent	Percent	Valid Percent	Percent	Valid Percent	Percent	Valid Percent	X²
Private rental	26.71%	34.68%	36.70%	46.39%	34.10%	46.13%	31.24%	40.94%	p<0.001
Public rental	27.42%	35.60%	17.79%	22.49%	13.93%	18.84%	20.80%	27.25%	
Owner-occupied	22.89%	29.72%	24.62%	31.13%	25.89%	35.03%	24.28%	31.82%	
Unknown	22.98%		20.89%		26.08%		23.68%		

5.2. Inferential analysis

The base regression model shown in Table 6 concerns the results of the multinomial logistic regression of Equation (1). It contains the trichotomous dependent variable, several explanatory variables which reflect household resources and restrictions as well as additional variables for geographic origin and tenure before the move. This model accounts for 114,755 households, limited by the missing cases for disposable income. Its chi-square statistic of 10,693.03 results in a $p < 0.0001$, corroborating that this model is thus a better fitting model than one without any independent variables. In other words, the independent variables help in explaining the gentrification outcome of a household. For continuous variables, the coefficient and standard errors are displayed. They depict the absolute change in log odds for a household of moving to either a gentrifying or non-gentrifiable neighbourhood, as opposed to the reference category of moving into a nongentrifying neighbourhood. If not specified otherwise, any statements made in this part thus use this default reference category. For the continuous independent variables, this entails that one unit of change results in change of the aforementioned odds. Categorical variables depict all but their reference category, accompanied by the according change in log odds when the household belongs to this group as opposed to the reference. For each categorical variable, the reference category is specified in the table.

The base model shows that the socioeconomic household resources of income and educational attainment have a significant effect on the gentrification outcome ($p < 0.001$); the hypothesis that the independent variables are associated with the gentrification outcome is therefore supported. Unsurprisingly, household disposable income affects the household's destination, as is apparent from theory and previous academic works. In line with expectations, the effect of income is of considerable size for moving into a gentrifying neighbourhood – and logically even more so for moving into a high-income, nongentrifiable neighbourhood. The results for household income show that with every one percent increase in household income, the odds of being a gentrifier increase with 0.16 percent. Similarly, when income increases with fifty percent, the odds of being a gentrifier increase with 6.7 percent – and every one hundred percent increases the odds with 11.9 percent. These results are in line with the idea that motivation of higher-income households to move into a gentrifying neighbourhood is induced by their preference for residence close to or within the inner-city (Millard-Ball, 2002). However, due to the relatively high rents and property prices in higher-income neighbourhoods, some households instead choose to move into upcoming, gentrifying neighbourhoods. Ellen et al. (2013) explain that large house price appreciation can reinforce this tendency for moving into gentrifying neighbourhoods. In general, this will only persist for future homeowners; for those moving into a house in the private rental sector, a move into a drastically appreciating neighbourhood would most likely result in rising rents. However, the context of the Dutch housing market – with tenant protection and rent control – might counteract these tendencies (Hochstenbach et al., 2015). Still, considering that the gentrification is defined by increasing neighbourhood average income in this thesis, which in turn is the result of higher-income households entering the neighbourhood, the overall result for income is not surprising.

Table 6. Base model logit results – ref. category = Nongentrifying

	Gentrifying		Nongentrifiable	
	<i>Coeff.</i>	<i>Std. Err.</i>	<i>Coeff.</i>	<i>Std. Err.</i>
Natural log of household disposable income	0.162***	(0.0102)	0.208***	(0.00865)
Highest attained level of education (ref. = Low educational attainment)				
Middle educational attainment	0.235***	(0.0358)	0.444***	(0.0310)
High educational attainment	0.477***	(0.0356)	0.606***	(0.0309)
Unknown	0.352***	(0.0367)	0.624***	(0.0311)
Householder age	-0.0126***	(0.000794)	-0.00192***	(0.000622)
Type of household (ref. = One-person households)				
Couple without children	0.0542**	(0.0211)	-0.0631***	(0.0183)
Couple with children	-0.494***	(0.0354)	0.239***	(0.0248)
Single parent household	-0.443***	(0.0465)	-0.137***	(0.0349)
Other	-0.252***	(0.0677)	-0.389***	(0.0600)
Origin householder (ref. = Native)				
Non-Western non-native	-0.685***	(0.0228)	-0.619***	(0.0188)
Western non-native	-0.153***	(0.0233)	-0.127***	(0.0196)
Geographic origin of the household prior to moving (ref. = Within municipality Amsterdam)				
Outside municipality Amsterdam	-0.0874***	(0.0200)	0.0774***	(0.0169)
Abroad	-0.425***	(0.0382)	-0.161***	(0.0310)
Housing tenure before moving (ref. = Public rental)				
Private rental	0.397***	(0.0237)	0.630***	(0.0207)
Owner-occupied	0.224***	(0.0255)	0.515***	(0.0218)
Unknown	0.507***	(0.0344)	0.722***	(0.0293)
Constant	-2.321***	(0.102)	-3.113***	(0.0871)

Note: significance and probability values are as indicated *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The householder's highest attained level of education shows an expected pattern. Higher levels of education show stronger associations with moving into a gentrifying neighbourhood, a pattern similar to earlier studies (Freeman, 2005; Freeman & Braconi, 2004; McKinnish et al., 2010). Compared with households of low educational attainment, the middle and highly educated have 1.27 and 1.61 times the odds of being gentrifiers. This pattern is all the more pronounced for nongentrifiable neighbourhoods: for middle and higher educational attainment, the odds are raised to 1.56 and 1.83. Still, approximately thirty-nine percent of all households that moved do not have an indication of highest educational attainment. A large part of these missing cases originates from immigrant households or those in a later life cycle stage. Given the plausibility that this 'Unknown' group is heterogeneous, it is infeasible to derive any interpretations of its coefficient. In order to assess how robust the base model is to missing educational data, additional regression models were estimated (Appendix C and D). The first model accounts for households that have moved within the Netherlands, omitting those who moved from abroad. Therewith, the share of households with their education unknown drops from thirty-eight percent to twenty-eight percent. The coefficients of all variables remain mostly unchanged, with minor disparities in significance levels for household type. Additionally, a model is run which omits cases with missing data on educational attainment. Once again, major changes in the regression outcomes are absent with the exception of some small changes in significance for the group 'nongentrifiable'. Fortunately, the outcomes for other variables thus seem not to be affected as much due to the absent education data.

The householder's age is negatively associated with moving into a gentrifying or nongentrifiable neighbourhood as opposed to a nongentrifying area ($p < 0.01$). The relative risk of being a gentrifier decreases with a factor of $e^{-.0126} = 0.987$ with every year of increasing age – and only with factor $e^{-.00192} = 0.998$ for moving into a nongentrifiable neighbourhood as opposed to a nongentrifying neighbourhood. Hence, it is slightly more likely for younger households to move into gentrifying areas than it is for older households, *ceteris paribus*. A similar but weaker effect is found for entering nongentrifiable versus nongentrifying neighbourhoods. The age-differential is also reflected in the descriptive results for age as exhibited in Table 6. This result lends support to the hypothesis that lower householder age increases the probability of moving into a gentrifying as opposed to a nongentrifying neighbourhood. Still, this specification assumes a linear relationship between age and the logit of the gentrification outcomes, whilst a non-linear association might in fact be present. To account for this possibility, the squared term of age is included in an additional regression (Appendix E). Only the coefficients for age and age squared are shown: the coefficients for the other variables have hardly changed. The coefficient age squared is negative and very small for gentrifiers; therefore the interpretation of the householder age can remain unchanged. For in-movers of nongentrifiable neighbourhoods however, the negative coefficient of age combined with the positive coefficient of age's squared term does imply a curvilinear relationship. As people get older, the negative effect of age on moving into a nongentrifiable neighbourhood lessens. In Appendix F, it is shown that at age fifty-four the deceleration of this effect stops and reverses. Overall, people tend to move less with increasing age (Booi & Boterman, 2020). However, Hochstenbach (2019) argues that in their post empty-nest or retirement life stages, the affluent elderly might be inclined to move to the city again, seeking residence in the higher-end of inner-city neighbourhoods. Therefore, these elderly are more likely to move into affluent rather than lower-income neighbourhoods. Whilst this presumption has not been empirically proven, Hochstenbach's notion might perhaps explain the non-linear relationship found in these results.

Overall, childless households have the lowest odds of moving into a gentrifying neighbourhood. Compared to one-person households, both single parent households and couples with children have a lower propensity of being a gentrifier: the former with odds of 0.61 times that of one-person households, the latter 0.64 (both $p < 0.01$). This result supports the hypothesis that households without children are more likely to be gentrifiers than those with children, as they are not restricted by the presence of children in the household. Moreover, childless couples seem to have slightly higher odds of being a gentrifier than one-person households. With 1.06 times their odds, childless couples have the highest chance of being a gentrifier among all household compositions. Still, the association is fairly weak and only significant at a p-value just below 0.05. These results support the idea that childless couples have overall higher level of resources than one-person households, which increases their chances of being gentrifiers. Surprisingly, the results also indicate that single parent households have higher odds of being gentrifiers than couples with children. Following gentrification theory, the restrictions for both household compositions are roughly assumed to be equal due to the presence of a child. Additionally, in the cases where both parents have an income, the household would in essence have twice the resources. Theoretically, couples with children would be more likely to be gentrifiers as opposed to single parent households. Overall, the results for household type are consistent with the empirical findings of McKinnish et al. (2010) and Ellen et al. (2013) who also take household composition into consideration. As they explain, childless households are not bounded by the extra considerations for housing and residential area that are included for households with children. Instead of emphasizing local amenities and services, their residential and locational needs and preferences are more focused on the city, instead of the neighbourhood (Ellen et al., 2013). Still, previous research does not find higher odds for couples with children to be gentrifiers compared with one-parent households. Bourne (1993) and (Rose, 1984) argue that single parents are more likely to choose for inner-city, gentrifying neighbourhoods as opposed to higher-income, nongentrifiable neighbourhoods due to the richer demographics of these neighbourhoods. This allows them to utilise informal childcare networks, in order for them to save such expenses. However, these assumptions are made in the North-American context; it is not sure whether such dynamics are also at play in Amsterdam.

Non-natives have a significantly lower probability of moving into a gentrifying neighbourhood than their native Dutch counterparts. Still, there is a great difference in the size of the coefficients among the households with a non-Dutch background. Western non-natives exhibit $e^{-0.153}=0.858$ times the odds of moving into a gentrifying neighbourhood, whilst their non-Western peers have approximately half the odds of natives, with odds equal to $e^{-0.685}=0.504$. Therefore, ethnic origin is the sociodemographic variable most strongly associated with being a gentrifier or not. The probability of moving into a gentrifying or nongentrifiable neighbourhoods compared to the nongentrifying ones is highest for natives, followed by Western non-natives and is lowest for non-Western natives. Ethnocentric gentrification studies by Freeman (2005), Ellen & O'Regan (2011) and McKinnish et al. (2010) find similar patterns, where gentrifiers are more likely to be of native origin as opposed to movers of other low-income neighbourhoods. What these studies lack unfortunately, is an additional comparison outcome for nongentrifiable, higher-income neighbourhoods. The incorporation of such a group in the model of this thesis shows quite an interesting result regarding ethnic origin. To illustrate, the overall coefficients for ethnic origin are weaker for entrants of nongentrifiable neighbourhoods when compared with gentrifiers, signifying weaker associations. Changing the reference category confirms that the coefficient-differential is significant for the non-Western non-native households ($p < 0.01$). In other words, not only do these households have lower odds of moving into a gentrifying neighbourhood than a nongentrifying one compared to native households – they also exhibit

lower odds of moving into a gentrifying area as opposed to a nongentrifiable, higher-income neighbourhood than natives.

Households originating from outside Amsterdam have a significantly lower probability of being a gentrifier as opposed to those moving within the municipality's borders. This falls in line with Gale's (1979) presupposition that gentrifiers are more likely to be inter-neighbourhood movers, already living within the (inner-)city. It is also evident that moving from outside of Amsterdam is associated with a lower probability of moving into gentrifying neighbourhoods. The combination of these observations hint at a serious threat of Amsterdam becoming an enclave for the affluent. Considering that in-movers of higher-income, nongentrifiable neighbourhoods have a relatively high income, it is also more likely for higher-income households originating from outside Amsterdam to move into these neighbourhoods, as opposed to lower-income ones (Hochstenbach & Musterd, 2018). Combined with the lower odds for outside-Amsterdam households to move into gentrifying areas compared with households moving from within the city, this might imply that lower-income households originating from outside the municipality experience a greater difficulty moving into Amsterdam. Although these results do not substantiate such conclusions, they do lend suspicion for such a development. The notion of transnational gentrification does not seem to be apparent in the results. Instead, movers from abroad exhibit considerably lower odds of being a gentrifier than those moving within the Netherlands. Still, transnational gentrification should not simply be disregarded. The inflow from abroad is underestimated in the dataset *Verhuisstromen*, as immigrants who make a subsequent move after their arrival in Amsterdam are classified as movers within municipality borders. Additionally, studies on transnational gentrification in Barcelona have focussed on particular neighbourhoods that seem to be highly attractive for immigrants (Cocola-Gant & Lopez-Gay, 2020; López-Gay et al., 2021). This thesis' operationalisation does not allow for such a precise distinction; it analyses gentrifying neighbourhoods as a collective. Certain Amsterdam neighbourhoods might be undergoing processes of transnational gentrification, but a much more detailed analysis per neighbourhood is needed in order for such processes to come to light.

Households that were either in a private rental or owner-occupied house before moving display elevated odds of moving into a gentrifying or nongentrifiable neighbourhood when compared with those coming from the public rental sector. A possible explanation for this pattern is that homeowners and private renters can be assumed to have more resources than those coming from public housing (Freeman, 2008). Following this rhetoric however, homeowners would have to exhibit a stronger effect on moving into a gentrifying area compared to private renters. Yet, such dynamics cannot be found: the coefficient is higher for private renters than for the homeowners. This might be explained by the notion that gentrifying (and higher-income) neighbourhoods are places with an escalator function (Hochstenbach et al., 2015). Former renters in the private sector might not be looking for a considerably more permanent residence in the form of homeownership as much as former homeowners. Instead, some former renters wish to utilize their residence in Amsterdam's relatively inexpensive gentrifying neighbourhoods as a stepping stone for ultimately better life outcomes – and therefore use the city as an escalator. An alternative explanation, somewhat in line with the 'escalator hypothesis', is posed by Ellen et al. (2013). They argue that former renters face lower transaction costs and less risks when moving, therewith having a more comfortable position to try out their new neighbourhood. Considering a move into a gentrifying neighbourhood might be a risky venture, renters are more likely to make such a move in comparison with homeowners. These motives might be plausible explanations for the elevated odds of moving into a gentrifying neighbourhood for former renters compared to former homeowners.

The binomial regression of Equation (2) is estimated as an additional model to control for the differences in neighbourhood average income. If potential gentrifiers have an implicit preference for the upper-end of lower-income neighbourhood, the results of this model show the differences in resources and restrictions between entrants of nongentrifying neighbourhoods and gentrifiers, adjusted for the average income of their destination neighbourhood. Standard errors are corrected for the clustering of households in the fifty-four gentrifiable neighbourhoods. Naturally, neighbourhood average income is available only at the neighbourhood levels. Therefore, there are forty-five unique values among all in-movers (excluding nongentrifiable neighbourhoods). The results for the binomial logistic regression are shown in Table 7. Neighbourhood average income is provided per thousand euros. Looking at the coefficient for neighbourhood income, it is visible that neighbourhood average income is not significantly associated with moving into a gentrifying neighbourhood as opposed to a nongentrifying one, with a p-value of greater than 0.10. Although the model suggests that odds are multiplied with $e^{0.116}=1.12$ for every one thousand euro increase in neighbourhood average income, it cannot be stated with certainty that destination neighbourhood average income affects the gentrification outcome. Hence, the results indicate that a possible preference for upper-end lower-income neighbourhoods is not apparent among gentrifiers.

This outcome is also reflected in the coefficients for the other variables. Overall, the coefficients for entering a gentrifying versus a nongentrifying neighbourhood have hardly changed. There are no surprising changes in neither coefficient sign or size. All coefficients have shifted a bit closer to zero than the coefficients of the base model. The sole exception is found for movers coming from outside of municipality of Amsterdam: the difference in odds of moving into a gentrifying neighbourhood as opposed to a nongentrifying one is even greater when including neighbourhood average income. Yet, the p-value shifts from less than 0.01 to a bit less than 0.1. Additionally, there is a notable difference in the result of the odds for couples without children compared with one-person households. Whereas couples without children have a significantly higher probability of being a gentrifier in the base model, the binomial logit model shows no significant result. According to this model, there is therefore no evidence of childless couples being more likely to be a gentrifier household as opposed to one-person households. For the remaining variables, the binomial logit model does not exhibit any substantial changes. All in all, it seems that the neighbourhood average income does not impact the gentrification outcome of those moving into or within Amsterdam. Therefore, the results exhibited by the multinomial model are considered as the main results of this thesis.

Table 7. Results for binomial logit for outcome 'Gentrifying'– ref. category = Nongentrifying

Gentrifying		
	<i>Coeff.</i>	<i>Std. Err.</i>
Natural log of household disposable income	0.161***	(0.0440)
Highest attained level of education (ref. = Low educational attainment)		
Middle educational attainment	0.211***	(0.0566)
High educational attainment	0.425***	(0.0815)
Unknown	0.297***	(0.0605)
Householder age	-0.0111***	(0.00350)
Type of household (ref. = One-person households)		
Couple without children	0.0459	(0.0554)
Couple with children	-0.451***	(0.126)
Single parent household	-0.397***	(0.0808)
Other	-0.241**	(0.0995)
Origin householder (ref. = Native)		
Non-Western non-native	-0.609***	(0.108)
Western non-native	-0.148***	(0.0487)
Geographic origin of the household prior to moving (ref. = Within municipality Amsterdam)		
Outside municipality Amsterdam	-0.0958*	(0.0581)
Abroad	-0.394***	(0.0846)
Housing tenure before moving (ref. = Public rental)		
Private rental	0.329***	(0.0766)
Owner-occupied	0.179***	(0.0689)
Unknown	0.442***	(0.0977)
Neighbourhood income	0.116	(0.145)
Constant	-1.205***	(0.127)

Note: significance and probability values are as indicated *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

6. Conclusion

This thesis aimed to identify the household-level resources and restrictions that are associated with moving into a gentrifying neighbourhood in the city of Amsterdam and gain more insight into them. Through an analysis of theory and previous research on residential mobility and gentrification, the importance of the household's resources and restrictions became clear. Particular socioeconomic and sociodemographic characteristics were hypothesised to affect a household's locational outcome. Gentrification literature established that gentrifier households commonly are affluent, highly-educated, young, native and childless. The empirical results support this thesis' hypotheses that these characteristics are associated with moving into upcoming, gentrifying neighbourhoods, as opposed to low-income neighbourhoods that are not gentrifying. Gentrifier households have more socioeconomic resources, with higher disposable income and higher educational attainment compared to households that move into low-income, nongentrifying neighbourhoods. The sociodemographic household attributes of ethnic origin and type of household have a major role as well. Having a native origin and being childless both have a substantial positive effect on a household's probability of moving into a gentrifying neighbourhood, as opposed to a nongentrifying one. We also see that younger households are more likely to be gentrifiers than older households. Hence, these findings thus suggest that these household-level resources and restrictions do indeed have a considerable effect on moving into Amsterdam's gentrifying neighbourhoods.

Overall, the theory on residential mobility and gentrification is fairly exhaustive. The life course approach was essential in defining the resources and restrictions that influence residential mobility behaviour. Theory on the concept of lifestyle endorses the effect of these characteristics but does not include any new factors that should be taken into consideration. The locational attainment model specifies how these characteristics affect a household's locational outcome. Understanding the concept of locational attainment helped in comprehending how gentrification comes into being. It was also very beneficial in constructing the thesis' methodological approach. Lastly, gentrification-specific theories, i.e. stage theory of gentrification and the notion of exclusionary displacement, were key in specifying the characteristics of gentrifier households – and how gentrifiers differ from the entrants of nongentrifying, low-income neighbourhoods. Still, contemporary gentrification theory and research have overlooked the importance of the household's geographic origin. The incorporation of geographic origin into this study has yielded interesting results, which cannot be neglected in an examination of the attributes affecting gentrification outcomes. Entrants of higher-income, nongentrifiable neighbourhoods are most likely to be households originating from outside the city. However, gentrifiers are most likely to originate from within the city limits. For both these gentrification outcomes, a higher income increases the chance of moving into these neighbourhoods, which indicates that these neighbourhoods are mainly the destination for affluent households. Hence, it is less likely for lower-income households to move into gentrifying and nongentrifiable areas – especially so for those originating from outside of the city. Geographic origin arguably is a key facet in dissecting entrant characteristics of distinct neighbourhoods and should consequently be included in (future) demographic studies of gentrification.

As to the concern of Amsterdam becoming a city for the rich, the inclusion of geographic origin sprouts a concerning observation. The higher-income, nongentrifiable neighbourhoods are not the only areas that are less likely to be the destination of lower-income households moving from outside the city; it also applies to gentrifying neighbourhoods. These households are therefore likely to end up in nongentrifying, lower-income neighbourhoods. If gentrification processes were to expand across the city, an increasing number of neighbourhoods are less likely to become the destination of lower-income households from outside the city. It would foster a tendency of

neighbourhoods becoming enclaves for the affluent – which is worrisome for Amsterdam’s social geography. From a policy perspective, these findings help to alleviate the shortage of scientific empirical data on gentrification in the city of Amsterdam. This thesis provides the municipality of Amsterdam with demographic figures on gentrification in the city, with consideration for a long line of gentrification research and literature. It addresses where gentrification occurs and gives insights into the profile of gentrifiers in Amsterdam. It can be used to explain how socioeconomic and sociodemographic differences in the cityscape are explained by the residential mobility of different groups and their characteristics. If the current pattern of residential mobility continues, gentrifying and nongentrifiable neighbourhoods are likely to become inaccessible for those with few resources and more restrictions. Ultimately, longitudinal analyses of the in-movers’ resources and restrictions can examine how the inflow of gentrifying neighbourhoods is changing. Such analyses could then determine if Amsterdam is indeed becoming an enclave for the rich. If this is the case, then there is a need for changes in policy that focus on retaining Amsterdam accessible for lower-income households.

Considering the concept of geographies of gentrification, the outcomes for gentrification in the context of Amsterdam are not so generalisable for other regions. Yet, this study’s methodological framework can be considered to be an effective instrument for understanding gentrification in other contexts. It aligns remarkably well with the literature and previous research on gentrification and alleviates the absence of demographic gentrification studies on the micro-level. The methodological approach and operationalisation have proven to unveil interesting results and can therefore be used to determine household-level characteristics of gentrifiers in a host of contexts, both in other Dutch cities and internationally. This would create a better understanding of the contextual factors that influence these characteristics and therefore incite cross-comparisons of the resources and restrictions that affect the gentrification outcomes in different environments. Still, the results of this study rely greatly on the indicator of gentrification. It is likely that other matrices of gentrification, such as neighbourhood mean property values or percentage of higher-educated, yield different results than found in this study. Gentrification is and remains a chaotic concept and its definition, conceptualisation and operationalisation should always be considered as vital determinants of the results.

Overall, the empirical analysis on the level of households has allowed a detailed examination of how resources and restrictions affect a household’s gentrification outcome – which is a relatively uncharted area in gentrification studies. Nevertheless, some shortcomings within the data and methodology confine this study and its outcomes. For one, the lack of education data for a grand portion of the households in the dataset *Verhuisstromen* makes it difficult to generalise the effect of educational attainment on one’s gentrification outcome. It would merit similar studies if education data are thoroughly estimated and impute for households that have missing values for this variable. Additionally, the analysis of in-moving households occurs in 2017 and 2018, which is at the end of the observation period 2011-2018 through which any neighbourhood’s gentrification status is determined. Those neighbourhoods classified as gentrifying might in some cases already be finished gentrifying before the analysis, which biases the results. Ideally, a method is developed to determine if gentrification processes are happening within a given year. Then, analysis of the household characteristics within this year would provide more certain results. Lastly, cumulating all gentrifying neighbourhoods into one category disregards any heterogeneity in the gentrification processes of different neighbourhoods; any neighbourhood-specific elements are therefore overlooked. If all of the neighbourhoods were to be considered as separate locational outcomes, then area-specific differences in resources and restrictions can come to light, which can further increase the understanding of these characteristics in light of gentrification in Amsterdam.

Aside from overcoming these limitations, future research thus needs to focus on longitudinal analyses to determine how the inflow is changing over time. Moreover, adding interaction terms for various socioeconomic and sociodemographic characteristics might highlight striking dynamics that do not come forward through the methodology of this study. For instance, one might be curious as to the way that disposable income has different effects on the gentrification outcome among households of various ethnic origins. Lastly, comprehensive qualitative studies can complement these quantitative studies to grand more insight into the motivations of gentrifiers to move into gentrifying neighbourhoods. Understanding the incentives of entrants of gentrifying neighbourhoods can in turn help demographic studies to better explain what characteristics influence residential mobility in the context of gentrification.

7. References

- Aalbers, M. B. (2019). Introduction To The Forum: From Third To Fifth-Wave Gentrification. *Tijdschrift voor Economische en Sociale Geografie*, 110(1), 1–11. <https://doi.org/10.1111/tesg.12332>
- Aeroe, T. (2001). *Residential preferences, choice of housing, and lifestyle* [PhD Thesis]. PhD dissertation (English summary), Aalborg University.
- Aeroe, T. (2006). Residential Choice from a Lifestyle Perspective. *Housing, Theory and Society*, 23(2), 109–130. <https://doi.org/10.1080/14036090600773139>
- Atkinson, R. (2000). Measuring Gentrification and Displacement in Greater London. *Urban Studies*, 37(1), 149–165. <https://doi.org/10.1080/0042098002339>
- Barton, M., & Brault, E. (2018). *Evaluating gentrification's relation to neighborhood and city health*. 18.
- Beauregard, R. A. (1985). Politics, Ideology and Theories of Gentrification. *Journal of Urban Affairs*, 7(4), 51–62. <https://doi.org/10.1111/j.1467-9906.1985.tb00094.x>
- Ben-Akiva, M., Bowman, JohnL., & Gopinath, D. (1996). Travel demand model system for the information era. *Transportation*, 23(3). <https://doi.org/10.1007/BF00165704>
- Berry, B. J. (1985). Islands of renewal in seas of decay. *The New Urban Reality*, 69–96.
- Blasius, J., Friedrichs, J., & Rühl, H. (2016). Pioneers and gentrifiers in the process of gentrification. *International Journal of Housing Policy*, 16(1), 50–69. <https://doi.org/10.1080/14616718.2015.1071029>
- Booi, H., & Boterman, W. R. (2020). Changing patterns in residential preferences for urban or suburban living of city dwellers. *Journal of Housing and the Built Environment*, 35(1), 93–123. <https://doi.org/10.1007/s10901-019-09678-8>
- Bosch, E. (2015). Gentrification in all boroughs of Amsterdam: Increasing land values and socio-spatial change, little direct displacement. *Territorio*, 73, 23–29. <https://doi.org/10.3280/TR2015-073004>
- Bostic, R. W., & Martin, R. W. (2003). Black home-owners as a gentrifying force? Neighbourhood dynamics in the context of minority home-ownership. *Urban Studies*, 40(12), 2427–2449.
- Boterman, W., Karsten, L., & Musterd, S. (2010). Gentrifiers Settling Down? Patterns and Trends of Residential Location of Middle-Class Families in Amsterdam. *Housing Studies*, 25(5), 693–714. <https://doi.org/10.1080/02673037.2010.483586>
- Boterman, W., & Musterd, S. (2017). Differentiated Residential Orientations of Class Fractions. In J. A. Hannigan & R. Greg, *The SAGE Handbook of New Urban Studies* (pp. 388–407). SAGE Publications Ltd. <https://doi.org/10.4135/9781412912655.n25>
- Boterman, W. R. (2012). Residential Mobility of Urban Middle Classes in the Field of Parenthood. *Environment and Planning A: Economy and Space*, 44(10), 2397–2412. <https://doi.org/10.1068/a44558>
- Boterman, W. R., Hochstenbach, C., Ronald, R., & Sleurink, M. (2013). Duurzame toegankelijkheid van de Amsterdamse woningmarkt voor starters. *Amsterdam: University of Amsterdam*.

- Boterman, W. R., & Van Gent, W. P. (2014). Housing Liberalisation and Gentrification: The Social Effects of Tenure Conversions in Amsterdam. *Tijdschrift voor Economische en Sociale Geografie*, 105(2), 140–160.
- Bourne, L. S. (1993). The demise of gentrification? A commentary and prospective view. *Urban Geography*, 14(1), 95–107.
- Butler, T., & Robson, G. (2001). Social capital, gentrification and neighbourhood change in London: A comparison of three south London neighbourhoods. *Urban Studies*, 38(12), 2145–2162.
- CBS. (2011). *Integral income and wealth statistics*. Statistics Netherlands. <https://www.cbs.nl/en-gb/onze-diensten/methods/surveys/korte-onderzoeksbeschrijvingen/integral-income-and-wealth-statistics>
- CBS. (2016). *Particuliere huishoudens naar leeftijd hoofdkostwinner*. Centraal Bureau voor de Statistiek. <https://www.cbs.nl/nl-nl/maatwerk/2016/20/particuliere-huishoudens-naar-leeftijd-hoofdkostwinner>
- Chelcea, L., Popescu, R., & Cristea, D. (2015). Who are the gentrifiers and how do they change central city neighbourhoods? Privatization, commodification, and gentrification in Bucharest. *Geografie*, 120(2), 113–133.
- Clapham, D. (2002). Housing Pathways: A Post Modern Analytical Framework. *Housing, Theory and Society*, 19(2), 57–68. <https://doi.org/10.1080/140360902760385565>
- Clark, E. (1991). Rent gaps and value gaps: Complementary or contradictory. *Urban Housing for the Better-off: Gentrification in Europe, Utrecht: Stedelijke Netwerken*, 17–29.
- Clay, P. L. (1979). The mature revitalized neighborhood: Emerging issues in gentrification. *The Gentrification Reader*, 37–39.
- Cocola-Gant, A., & Lopez-Gay, A. (2020). Transnational gentrification, tourism and the formation of ‘foreign only’ enclaves in Barcelona. *Urban Studies*, 57(15), 3025–3043. <https://doi.org/10.1177/0042098020916111>
- Coenen, A., Verhaeghe, P.-P., & Van de Putte, B. (2018). Should I stay or should I go? The association between upward socio-economic neighbourhood change and moving propensities. *Environment and Planning A: Economy and Space*, 50(2), 370–390. <https://doi.org/10.1177/0308518X17740896>
- Coulton, C., Theodos, B., & Turner, M. A. (2012). Residential Mobility and Neighborhood Change: Real Neighborhoods Under the Microscope. *Cityscape*, 14(3), 55–89.
- Couzy, M. (2019, November 16). *Hoogleraar Sako Musterd: ‘Amsterdam dreigt uit te groeien tot stad voor superrijken.’* Het Parool. <https://www.parool.nl/gs-b3866ee2>
- Davidson, M., & Lees, L. (2005). New-Build ‘Gentrification’ and London’s Riverside Renaissance. *Environment and Planning A: Economy and Space*, 37(7), 1165–1190. <https://doi.org/10.1068/a3739>
- Ding, L., Hwang, J., & Divringi, E. (2016). Gentrification and residential mobility in Philadelphia. *Regional Science and Urban Economics*, 61, 38–51. <https://doi.org/10.1016/j.regsciurbeco.2016.09.004>

- Easton, S., Lees, L., Hubbard, P., & Tate, N. (2020). Measuring and mapping displacement: The problem of quantification in the battle against gentrification. *Urban Studies*, *57*(2), 286–306. <https://doi.org/10.1177/0042098019851953>
- Ellen, I. G., Horn, K. M., & O'Regan, K. M. (2013). Why Do Higher-income Households Choose Low-income Neighbourhoods? Pioneering or Thrift? *Urban Studies*, *50*(12), 2478–2495. <https://doi.org/10.1177/0042098012474511>
- Ellen, I. G., & O'Regan, K. M. (2011). How low income neighborhoods change: Entry, exit, and enhancement. *Regional Science and Urban Economics*, *41*(2), 89–97. <https://doi.org/10.1016/j.regsciurbeco.2010.12.005>
- Farwick, A. (2010). Internal Migration. In *Building on Progress* (1st ed., pp. 723–738). Verlag Barbara Budrich. <http://www.jstor.org/stable/j.ctvbkk43d.45>
- Finney, N. (2011). Understanding ethnic differences in the migration of young adults within Britain from a lifecourse perspective. *Transactions of the Institute of British Geographers*, *36*(3), 455–470.
- Fouch, N. (2012). *Planning for Gentrification: A Geographic Analysis of Gentrification Susceptibility in the City of Asheville, N.C.* *1428*(1), 146-158.
- Fransham, M. (2020). Neighbourhood gentrification, displacement, and poverty dynamics in post-recession England. *Population, Space and Place*, *26*(5), e2327. <https://doi.org/10.1002/psp.2327>
- Freeman, L. (2005). Displacement or Succession?: Residential Mobility in Gentrifying Neighborhoods. *Urban Affairs Review*, *40*(4), 463–491. <https://doi.org/10.1177/1078087404273341>
- Freeman, L. (2008). Is Class Becoming a More Important Determinant of Neighborhood Attainment for African-Americans? *Urban Affairs Review*, *44*(1), 3–26. <https://doi.org/10.1177/1078087408315876>
- Freeman, L., & Braconi, F. (2004). Gentrification and Displacement New York City in the 1990s. *Journal of the American Planning Association*, *70*(1), 39–52. <https://doi.org/10.1080/01944360408976337>
- Gale, D. E. (1979). Middle class resettlement in older urban neighborhoods: The evidence and the implications. *Journal of the American Planning Association*, *45*(3), 293–304.
- Galster, G., & Peacock, S. (1986). Urban gentrification: Evaluating alternative indicators. *Social Indicators Research*, *18*(3), 321–337.
- Gibbons, J. (2019). Are gentrifying neighborhoods more stressful? A multilevel analysis of self-rated stress. *Population Health*, *9*.
- Glass, R. (1964). Aspects of change. *The Gentrification Debates: A Reader*, 19–30.
- Haase, A., Kabisch, S., Steinführer, A., Bouzarovski, S., Hall, R., & Ogden, P. (2010). Emergent spaces of reurbanisation: Exploring the demographic dimension of inner-city residential change in a European setting. *Population, Space and Place*, *16*(5), 443–463. <https://doi.org/10.1002/psp.603>
- Hammel, D. J., & Wyly, E. K. (1996). A model for identifying gentrified areas with census data. *Urban Geography*, *17*(3), 248–268.

- Hayes, M., & Zaban, H. (2020). Transnational gentrification: The crossroads of transnational mobility and urban research. *Urban Studies*, 57(15), 3009–3024. <https://doi.org/10.1177/0042098020945247>
- Hochstenbach, C. (2017). *Hoe gentrificatie mainstream is geworden*. <https://geografie.nl/artikel/hoe-gentrificatie-mainstream-is-geworden>
- Hochstenbach, C. (2019). The age dimensions of urban socio-spatial change. *Population, Space and Place*, 25(2), e2220. <https://doi.org/10.1002/psp.2220>
- Hochstenbach, C., & Boterman, W. (2018). Age, life course and generations in gentrification processes. In *Handbook of gentrification studies*. Edward Elgar Publishing.
- Hochstenbach, C., & Musterd, S. (2018). Gentrification and the suburbanization of poverty: Changing urban geographies through boom and bust periods. *Urban Geography*, 39(1), 26–53. <https://doi.org/10.1080/02723638.2016.1276718>
- Hochstenbach, C., Musterd, S., & Teernstra, A. (2015). Gentrification in Amsterdam: Assessing the Importance of Context. *Population, Space and Place*, 21(8), 754–770. <https://doi.org/10.1002/psp.1854>
- Hochstenbach, C., & van Gent, W. P. (2015). An anatomy of gentrification processes: Variegating causes of neighbourhood change. *Environment and Planning A: Economy and Space*, 47(7), 1480–1501. <https://doi.org/10.1177/0308518X15595771>
- Kang, H. (2013). The prevention and handling of the missing data. *Korean Journal of Anesthesiology*, 64(5), 402.
- Kerstein, R. (1990). Stage Models of Gentrification: An Examination. *Urban Affairs Quarterly*, 25(4), 620–639. <https://doi.org/10.1177/004208169002500406>
- Kirkland, E. (2008). What's Race Got to Do With it? Looking for the Racial Dimensions of Gentrification. *The Western Journal of Black Studies*, 32(2), 14.
- Lees, L. (2000). A reappraisal of gentrification: Towards a 'geography of gentrification.' *Progress in Human Geography*, 24(3), 389–408. <https://doi.org/10.1191/030913200701540483>
- Lees, L. (2016). Gentrification, Race, and Ethnicity: Towards a Global Research Agenda? *City & Community*, 15(3), 208–214. <https://doi.org/10.1111/cico.12185>
- Lees, L., & Phillips, M. (2018). *Handbook of Gentrification Studies*. Edward Elgar Publishing. <https://doi.org/10.4337/9781785361746>
- Lees, L., Slater, T., & Wyly, E. (2013). *Gentrification*. Routledge.
- Lees, L., Slater, T., & Wyly, E. K. (2010). *The gentrification reader* (Vol. 1). Routledge London.
- Ley, D. (1996). *The New Middle Class and the Remaking of the Central City*. Oxford University Press.
- Lin, J.-J., & Chung, J.-C. (2017). Metro-induced gentrification: A 17-year experience in Taipei. *Cities*, 67, 53–62.
- López-Gay, A., Andújar-Llosa, A., & Salvati, L. (2020). Residential Mobility, Gentrification and Neighborhood Change in Spanish Cities: A Post-Crisis Perspective. *Spatial Demography*, 1–28.

- López-Gay, A., Cocola-Gant, A., & Russo, A. P. (2021). Urban tourism and population change: Gentrification in the age of mobilities. *Population, Space and Place*, 27(1), e2380. <https://doi.org/10.1002/psp.2380>
- Madley-Dowd, P., Hughes, R., Tilling, K., & Heron, J. (2019). The proportion of missing data should not be used to guide decisions on multiple imputation. *Journal of Clinical Epidemiology*, 110, 63–73.
- Marcuse, P. (1985). Gentrification, abandonment, and displacement: Connections, causes, and policy responses in New York City. *Wash. UJ Urb. & Contemp. L.*, 28, 195.
- Martin, R. W. (2017). A Quantitative Approach to Gentrification: Determinants of Gentrification in US Cities, 1970-2010. *Department of Insurance, Legal, Studies, and Real Estate, Terry College of Business, University of Georgia*.
- McKinnish, T., Walsh, R., & Kirk White, T. (2010). Who gentrifies low-income neighborhoods? *Journal of Urban Economics*, 67(2), 180–193. <https://doi.org/10.1016/j.jue.2009.08.003>
- Meraviglia, C., Ganzeboom, H. B. G., & Luca, D. D. (2016). A new international measure of social stratification. *Contemporary Social Science*, 11(2–3), 125–153. <https://doi.org/10.1080/21582041.2016.1215512>
- Millard-Ball, A. (2002). Gentrification in a Residential Mobility Framework: Social Change, Tenure Change and Chains of Moves in Stockholm. *Housing Studies*, 17(6), 833–856. <https://doi.org/10.1080/02673030215997>
- Modan, G., & Wells, K. (2015). Gentrification in the Media. *Capital Dilemma: Growth and Inequality in Washington*. New York: Routledge.
- Mulder, C. H., & Hooimeijer, P. (1999). Residential relocations in the life course. In *Population issues* (pp. 159–186). Springer.
- Municipality of Amsterdam. (2021). *Data en informatie—Amsterdam*. <https://data.amsterdam.nl/>
- Musterd, S. (2014). Public Housing for Whom? Experiences in an Era of Mature Neo-Liberalism: The Netherlands and Amsterdam. *Housing Studies*, 29(4), 467–484. <https://doi.org/10.1080/02673037.2013.873393>
- Musterd, S., & Arnoldus, M. M. (2002). *Wonen in de ambitieuze stad: Stedelijke leefstijlen en woonmilieus*.
- OIS. (2021). *Data en informatie*. Basisbestand Gebieden Amsterdam (BBGA). <https://data.amsterdam.nl/>
- Olaru, D., & Smith, B. (2013). Lifecycle Stages and Residential Location Choice in the Presence of Latent Preference Heterogeneity. *Environment and Planning A: Economy and Space*, 45(10), 2495–2514. <https://doi.org/10.1068/a45490>
- Pattison, T. J. (1977). *The process of neighborhood upgrading and gentrification: An examination of two neighborhoods in the Boston metropolitan area*. [PhD Thesis]. Massachusetts Institute of Technology.
- Pereira, R. C., Santos, M. S., Rodrigues, P. P., & Abreu, P. H. (2019). MNAR imputation with distributed healthcare data. *EPIA Conference on Artificial Intelligence*, 184–195.

- Piketty, T. (2015). About capital in the twenty-first century. *American Economic Review*, 105(5), 48–53.
- Ragas, W. R., & Miestchovich, I. (1977). Summary analysis of households in the Lower Garden District. New Orleans: University of New Orleans. *Urban Studies Institute*.
- Rayle, L. (2015). Investigating the Connection Between Transit-Oriented Development and Displacement: Four Hypotheses. *Housing Policy Debate*, 25(3), 531–548.
<https://doi.org/10.1080/10511482.2014.951674>
- Rerat, P. (2012). Gentrifiers and Their Choice of Housing: Characteristics of the Households Living in New Developments in Swiss Cities. *Environment and Planning A*, 44, 221–236.
<https://doi.org/10.1068/a4496>
- Rose, D. (1984). Rethinking Gentrification: Beyond the Uneven Development of Marxist Urban Theory. *Environment and Planning D: Society and Space*, 2(1), 47–74.
<https://doi.org/10.1068/d020047>
- Sakızlıoğlu, B., & Lees, L. (2020). Commercial Gentrification, Ethnicity, and Social Mixedness: The Case of Javastraat, Indische Buurt, Amsterdam. *City & Community*, 19(4), 870–889.
<https://doi.org/10.1111/cico.12451>
- Salomon, I., & Ben-Akiva, M. (1983). The Use of the Life-Style Concept in Travel Demand Models. *Environment and Planning A: Economy and Space*, 15(5), 623–638.
<https://doi.org/10.1068/a150623>
- Schafer, J. L., & Graham, J. W. (2002). Missing data: Our view of the state of the art. *Psychological Methods*, 7(2), 147.
- Sharkey, P. (2012). Residential Mobility and the Reproduction of Unequal Neighborhoods. *Cityscape*, 14(3), 9–31.
- Shaw, K. (2008). Gentrification: What It Is, Why It Is, and What Can Be Done about It. *Geography Compass*, 2(5), 1697–1728. <https://doi.org/10.1111/j.1749-8198.2008.00156.x>
- Smith, N. (1987). *Gentrification and the rent gap*.
- Somashekhar, M. (2020). Racial Inequality between Gentrifiers: How the Race of Gentrifiers Affects Retail Development in Gentrifying Neighborhoods. *City & Community*, 19(4), 811–844.
<https://doi.org/10.1111/cico.12421>
- Tammaru, T., Van Ham, M., Marcińczak, S., & Musterd, S. (2015). *Socio-economic segregation in European capital cities: East meets West*. Routledge.
- Teernstra, A. (2014). Neighbourhood Change, Mobility and Incumbent Processes: Exploring Income Developments of In-migrants, Out-migrants and Non-migrants of Neighbourhoods. *Urban Studies*, 51(5), 978–999. <https://doi.org/10.1177/0042098013494422>
- Tieleman, J. (2014). *Het stedelijk landschap van Amsterdam*.
- Van Gent, W. P. (2013). Neoliberalization, Housing Institutions and Variegated Gentrification: How the ‘Third Wave’ Broke in Amsterdam. *International Journal of Urban and Regional Research*, 37(2), 503–522.
- Van Weesep, J. (1994). Gentrification as a research frontier. *Progress in Human Geography*, 18(1), 74–83.

- Van Weesep, J., & Musterd, S. (1991). *Urban housing for the better-off: Gentrification in Europe*. UtrechtStedelijke Netwerken.
- Waddell, P. (2001). *Towards a Behavioral Integration of Land Use and Transportation Modeling*.
- Walker, J. L., & Li, J. (2007). Latent lifestyle preferences and household location decisions. *Journal of Geographical Systems*, 9(1), 77–101. <https://doi.org/10.1007/s10109-006-0030-0>
- Walks, A., Hawes, E., & Simone, D. (2021). Gentrification in large Canadian cities: Tenure, age, and exclusionary displacement 1991-2011. *Urban Geography*, 1–31. <https://doi.org/10.1080/02723638.2020.1832376>
- Wang, J., & Lau, S. S. Y. (2009). Gentrification and Shanghai's new middle-class: Another reflection on the cultural consumption thesis. *Cities*, 26(2), 57–66. <https://doi.org/10.1016/j.cities.2009.01.004>
- Williams, K. N. (2015). Towards a universal operationalization of gentrification. *Sociation Today*, 13(2), 1.
- Woldoff, R. A. (2008). Wealth, Human Capital and Family across Racial/Ethnic Groups: Integrating Models of Wealth and Locational Attainment. *Urban Studies*, 45(3), 527–551. <https://doi.org/10.1177/0042098007087334>
- Zhang, Z., & He, S. (2018). Gentrification-induced displacement. In *Handbook of Gentrification Studies*. Edward Elgar Publishing.

8. Appendix

Appendix A. Amsterdam neighbourhoods in ascending order of neighbourhood average disposable income in 2011, including neighbourhood average disposable income in 2018m, Gentrification Index and associated Gentrification Index Values.

Neighbourhood	Code	Average Disposable Income 2011	Average Disposable Income 2018	Absolute Difference	Gentrification Index	Gentrification Index Value
Volewijck	N60	24000	28800	4800	0.98440	1
Betondorp	M57	24100	29400	5300	1.00074	1
Bijlmer-Centrum (D,F,H)	T93	24400	28200	3800	0.94809	1
Van Galenbuurt	E41	24900	31800	6900	1.04765	2
IJplein/Vogelbuurt	N61	25200	30500	5300	0.99286	1
De Kolenkit	E39	25500	32100	6600	1.03265	1
Indische Buurt Oost	M32	26000	32600	6600	1.02857	1
Zuid Pijp	K26	26100	31600	5500	0.99320	1
Hoofdweg e.o.	E42	26200	33600	7400	1.05203	2
Slotermeer-Noordoost	F76	26300	31200	4900	0.97317	1
Slotermeer-Zuidwest	F77	26300	31000	4700	0.96693	1
Indische Buurt West	M31	26500	34300	7800	1.06179	2
Dapperbuurt	M29	26700	35300	8600	1.08456	2
Transvaalbuurt	M30	26700	33900	7200	1.04154	2
Bijlmer-Oost (E,G,K)	T94	26700	31100	4400	0.95552	1
Van Lennepbuurt	E19	26800	33600	6800	1.02847	1
Spaarndammer- en Zeeheldenbuurt	E13	26800	33200	6400	1.01623	1
Landlust	E37	27000	33800	6800	1.02693	1
Tuindorp Nieuwendam	N62	27300	32700	5400	0.98259	1
Buikslotermeer	N69	27600	31300	3700	0.93030	1
Tuindorp Buiksloot	N63	27700	32300	4600	0.95656	1
Kinkerbuurt	E18	28000	37400	9400	1.09573	2
Geuzenveld	F78	28100	33500	5400	0.97797	1
Oosterparkbuurt	M28	28200	35800	7600	1.04141	2
Holendrecht/Reigersbos	T96	28200	31900	3700	0.92796	1
De Punt	F83	28300	32300	4000	0.93628	1
Slotervaart Zuid	F89	28300	32400	4100	0.93918	1
Tuindorp Oostzaan	N65	28400	35100	6700	1.01386	1
Chassébuurt	E75	28500	37400	8900	1.07650	2
Banne Buiksloot	N70	28700	34100	5400	0.97468	1
Osdorp-Midden	F82	28700	34400	5700	0.98325	1
Waterlandpleinbuurt	N68	28800	34500	5700	0.98269	1
Frederik Hendrikbuurt	E16	28900	37600	8700	1.06728	2
Osdorp-Oost	F81	29000	32500	3500	0.91934	1
Staatsliedenbuurt	E14	29200	37100	7900	1.04227	2
Overtoomse Veld	F86	29400	35100	5700	0.97937	1
IJselbuurt	K53	29700	35600	5900	0.98329	1
Erasmuspark	E38	29700	37400	7700	1.03301	1
Nieuwe Pijp	K25	30000	38900	8900	1.06370	2
Burgwallen-Nieuwe Zijde	A01	30100	36700	6600	1.00020	1
Rijnbuurt	K54	30100	37200	7100	1.01383	1
Burgwallen-Oude Zijde	A00	30300	34800	4500	0.94216	1
Frankendael	M55	30500	38300	7800	1.03012	1

Oude Pijp	K24	31100	39300	8200	1.03662	2
Nellestein	T95	31200	35100	3900	0.92287	1
Geuzenbuurt	E40	31300	38600	7300	1.01165	1
Oostelijke Eilanden/Kadijken	A09	31400	38100	6700	0.99537	1
Westindische Buurt	E43	31700	40700	9000	1.05323	2
Gein	T97	31700	36300	4600	0.93937	1
Schinkelbuurt	K45	31900	40400	8500	1.03891	2
Jordaan	A06	32300	39600	7300	1.00573	1
Da Costabuurt	E17	32700	42600	9900	1.06869	2
Noordelijke IJ-oever West	N71	32900	46700	13800	1.16442	2
Slotervaart Noord	F85	32900	36700	3800	0.91508	1
Westlandgracht	F87	33200	36800	3600	0.90928	3
Stadionbuurt	K48	33200	42400	9200	1.04765	3
Houthavens	E12	33300	51100	17800	1.25883	3
Overtoomse Sluis	E21	33600	44600	11000	1.08889	3
Nieuwmarkt/Lastage	A04	34600	41100	6500	0.97444	3
Centrale Markt	E15	34700	42300	7600	1.00000	3
Oostzanerwerf	N66	35300	39900	4600	0.92723	3
Hoofddorppleinbuurt	K44	35500	44700	9200	1.03292	3
Weesperzijde	M27	35800	48900	13100	1.12051	3
Haarlemmerbuurt	A05	35900	44200	8300	1.00999	3
Buitenveldert-Oost	K91	36600	41900	5300	0.93912	3
Weesperbuurt/Plantage	A08	37200	47700	10500	1.05188	3
Helmersbuurt	E20	37400	45700	8300	1.00238	3
Eendracht	F79	38100	41900	3800	0.90215	3
Buitenveldert-West	K90	38500	45200	6700	0.96309	3
IJburg Zuid	M51	40000	54400	14400	1.11565	3
Scheldebouurt	K52	40000	48600	8600	0.99670	3
Kadoelen	N67	40500	50000	9500	1.01275	3
De Weteringschans	A07	40500	50000	9500	1.01275	3
Sloter/Riekerpolder	F88	41300	48100	6800	0.95540	3
Driemond	T98	42000	44500	2500	0.86916	3
Middelvelde Akerpolder	F84	42200	48300	6100	0.93891	3
Middenmeer	M56	43500	50900	7400	0.95988	3
Oostelijk Havengebied	M33	44000	50500	6500	0.94152	3
Omval/Overamstel	M58	46000	41400	-4600	0.73830	3
IJburg West	M35	46300	55700	9400	0.98688	3
Elzenhagen	N74	46500	51400	4900	0.90677	3
Waterland	N73	50200	63500	13300	1.03767	3
Vondelbuurt	E22	54500	67100	12600	1.00999	3
Grachtengordel-Zuid	A03	55400	69300	13900	1.02615	3
Nieuwendammerdijk/Buiksloterdijk	N64	57500	69000	11500	0.98440	3
Grachtengordel-West	A02	59900	66900	7000	0.91620	3
Museumkwartier	K47	62200	80500	18300	1.06168	3
Prinses Irenebuurt e.o.	K59	63500	75100	11600	0.97019	3
Willemspark	K46	77300	110300	33000	1.17054	3

Apollobuurt	K49	80200	96400	16200	0.98603	3
Bedrijventerrein Sloterdijk	F11	n/a	n/a	n/a	n/a	99
Noordelijke IJ-oever Oost	N72	n/a	n/a	n/a	n/a	99
Amstel III/Bullewijk	T92	n/a	n/a	n/a	n/a	99
Sloterdijk	E36	n/a	n/a	n/a	n/a	99
IJburg Oost	M50	n/a	n/a	n/a	n/a	99
Westelijk Havengebied	B10	n/a	n/a	n/a	n/a	99
Zeeburgereiland/Nieuwe diep	M34	n/a	n/a	n/a	n/a	99
Zuidas	K23	n/a	n/a	n/a	n/a	99
Lutkemeer/Ookmeer	F80	n/a	n/a	n/a	n/a	99

Note: Neighbourhoods are colour-coded according to their gentrification status for visibility. Red represents nongentrifying neighbourhoods; green represents gentrifying neighbourhoods; blue represents nongentrifiable neighbourhoods; grey represents those areas that have missing income data.

Appendix B. Counts per category for all categorical variables

	Category	Observations
Educational attainment	Low educational attainment	9,900
	Middle educational attainment	27,816
	High educational attainment	37,974
	Unknown	48,150
	Total	123,840
Household type	One-person household	76,501
	Couple without children	28,734
	Couple with children	11,541
	Single parent household	5,359
	Other	1,705
	Total	123,840
Origin household	Native	50,236
	Non-Western non-native	35,922
	Western non-native	37,682
	Total	123,840
Geographic origin	Within municipality Amsterdam	72,325
	Outside municipality Amsterdam	32,429
	Abroad	19,086
	Total	123,840
Housing tenure before moving	Private rental	38,692
	Public rental	25,755
	Owner-occupied	30,072
	Unknown	29,321
	Total	123,840

Appendix C. Logit results for movers within the Netherlands (2) and from abroad (3) – ref. category = Nongentrifying

	Gentrifying (2)		Nongentrifiable (2)		Gentrifying (3)		Nongentrifiable (3)	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Natural log of household disposable income	0.130***	(0.0112)	0.194***	(0.00978)	0.295***	(0.0258)	0.245***	(0.0188)
Highest attained level of education (ref. = Low educational attainment)								
Middle educational attainment	0.228***	(0.0360)	0.437***	(0.0312)	n/a		n/a	
High educational attainment	0.491***	(0.0359)	0.614***	(0.0313)	n/a		n/a	
Unknown	0.374***	(0.0373)	0.637***	(0.0316)	n/a		n/a	
Householder age	-0.0130***	(0.000829)	-0.00262***	(0.000657)	-0.0123***	(0.00284)	0.00425**	(0.00201)
Type of household (ref. = One-person households)								
Couple without children	0.0413*	(0.0226)	-0.0574***	(0.0198)	0.249***	(0.0602)	-0.0616	(0.0485)
Couple with children	-0.518***	(0.0378)	0.251***	(0.0266)	-0.227**	(0.103)	0.181**	(0.0707)
Single parent household	-0.465***	(0.0484)	-0.120***	(0.0363)	-0.0919	(0.170)	-0.324**	(0.129)
Other	-0.265***	(0.0712)	-0.395***	(0.0637)	-0.0803	(0.219)	-0.350*	(0.180)
Origin householder (ref. = Native)								
Non-Western non-native	-0.665***	(0.0236)	-0.595***	(0.0196)	-1.220***	(0.0972)	-0.970***	(0.0796)
Western non-native	-0.135***	(0.0244)	-0.133***	(0.0208)	-0.610***	(0.0901)	-0.308***	(0.0760)
Geographic origin of the household prior to moving (ref. = Within municipality Amsterdam)								
Outside municipality Amsterdam	-0.0948***	(0.0201)	0.0743***	(0.0169)	n/a		n/a	
Abroad	n/a		n/a		n/a		n/a	
Housing tenure before moving (ref. = Public rental)								
Private rental	0.404***	(0.0238)	0.635***	(0.0208)	n/a		n/a	
Owner-occupied	0.234***	(0.0256)	0.522***	(0.0218)	n/a		n/a	
Unknown	0.499***	(0.0345)	0.719***	(0.0294)	n/a		n/a	
Constant	-1.999***	(0.111)	-2.966***	(0.097)	-2.706***	(0.276)	-2.046***	(0.206)

Note: significance and probability values are as indicated *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix D. Results for logit model where unknown education is omitted – ref. category = Nongentrifying

	Gentrifying		Nongentrifiable	
	<i>Coeff.</i>	<i>Std. Err.</i>	<i>Coeff.</i>	<i>Std. Err.</i>
Natural log of household disposable income	0.0391***	(0.0132)	0.0654***	(0.0116)
Highest attained level of education (ref. = Low educational attainment)				
Middle educational attainment	0.235***	(0.0362)	0.450***	(0.0313)
High educational attainment	0.554***	(0.0367)	0.709***	(0.0319)
Unknown	n/a		n/a	
Householder age	-0.00991***	(0.00113)	-0.000362	(0.000922)
Type of household (ref. = One-person households)				
Couple without children	0.120***	(0.0269)	-0.0321	(0.0241)
Couple with children	-0.439***	(0.0463)	0.310***	(0.0333)
Single parent household	-0.410***	(0.0550)	-0.0737*	(0.0420)
Other	-0.145*	(0.0750)	-0.253***	(0.0673)
Origin householder (ref. = Native)				
Non-Western non-native	-0.696***	(0.0271)	-0.630***	(0.0228)
Western non-native	-0.147***	(0.0295)	-0.0658***	(0.0254)
Geographic origin of the household prior to moving (ref. = Within municipality Amsterdam)				
Outside municipality Amsterdam	-0.0757***	(0.0230)	0.0345*	(0.0199)
Abroad	0.0687	(0.0997)	0.137	(0.0857)
Housing tenure before moving (ref. = Public rental)				
Private rental	0.372***	(0.0268)	0.540***	(0.0237)
Owner-occupied	0.185***	(0.0287)	0.435***	(0.0247)
Unknown	0.260***	(0.0494)	0.359***	(0.0434)
Constant	-1.205***	(0.127)	-1.705***	(0.111)

Note: significance and probability values are as indicated *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix E. Coefficients for age and its squared term in additional model – ref. category = Nongentrifying

	Gentrifying		Nongentrifiable	
	<i>Coeff.</i>	<i>Std. Err.</i>	<i>Coeff.</i>	<i>Std. Err.</i>
Householder age	-0.010951*	(0.00433)	-0.017035***	(0.00343)
Householder age squared	-0.000025	(0.00005)	0.000158***	(0.00004)

Note: only coefficients for age and age squared are shown, gives that the coefficients for the other variables remain virtually unchanged.

Significance and probability values are as indicated *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Appendix F. Formulas, first derivatives and minimum/maximum of model including age squared

Gentrifying	Nongentrifiable
Formula	Formula
$-0.0109508 * \text{age} - 0.0000249 * \text{age}^2$	$-0.0170347 * \text{age} + 0.0001582 * \text{age}^2$
First derivative	First derivative
$-0.0109508 - 2(0.0000249 * \text{age}) = 0$	$-0.0170347 + 2(0.0001582 * \text{age}) = 0$
Maximum	Minimum
$\text{age} = -219.895582$	$\text{age} = 53.839128$

Note: the coefficients for age and age squared are taken from the regression shown in Appendix E.