Household mobility post-crisis

Examining the impact of macroeconomic and institutional developments on household mobility in the Netherlands

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Preface

This thesis was written as part of my graduation from the Delft University of Technology, MSc Complex Systems Engineering & Management. Commissioned by the OTB and the NVM, this research initially set out to construct both household and dwelling profiles that could be applied in practice to improve the alignment between housing demand and supply. Following a series of setbacks with respect to the availability data as well as the methodology, the focus gradually shifted towards a more exploratory study that attempted to link contextual developments to changes in household mobility in an attempt to identify the cause(s) of the recent overheating of housing markets across the Netherlands. Regardless of the adjustments, this research was deliberately designed to integrate the various perspectives on household mobility from the start and, by doing so, capture its complexity.

Readers interested in the macroeconomic and institutional developments affecting housing markets are referred to chapter 3. Empirical analyses of the stated preferences of households and their development over time can be found in chapter 5, whereas chapter 6 compares the actual moving behaviour in contemporary housing markets to the preferences of households intended to move. The main conclusions, shortcomings, and recommendations can be found in chapter 7.

I would like to express my gratitude towards all of the members of the graduation committee that have supervised me throughout this challenging process. Without the provision of data and feedback, this research would not have been possible. Above all, however, I would like to thank my first supervisor dr. H.J.F.M. Boumeester. Aside from the extensive and valuable feedback, he has contributed greatly to assembling and organising meetings with the graduation committee as well as resolving many of the issues that I faced during this research.

Delft, 27th of January 2019.

Summary

The crash of the Dutch housing market following the economic crisis of 2008 initiated a wave of policy reforms that, amongst others, significantly reduced the borrowing capacity of households. This was initially believed to limit annual house price increases to approximately 2% for at least a decade after the crisis. Yet just five years after the initial recovery, the owner-occupied housing market overheated once again with prices exceeding the pre-crisis peak, price increases accelerating, and the number of transactions falling. Considering that the Netherlands features a stock market in which the demand for housing is particularly important with regards to house price developments, the recent surge in prices could thus indicate a change in the housing preferences and moving behaviour of households. Based on the literature, three general categories of determinants were distinguished: demographic and socio-economic characteristics of households, policies, and (macro)economic developments. To obtain a better understanding of the astounding recovery of the housing market, the goal of this research is to determine whether household mobility changed in response to the crisis and position these changes, or the lack thereof, in the context of macroeconomic and institutional developments. To this end, the following research question was formulated:

What are the impacts of macroeconomic developments and policy reforms following the crisis of 2008 on household mobility in the Dutch owner-occupied sector?

Changes in the context of the Dutch housing system

Both the economy and housing market were booming at the turn of the century as a result of the dotcom bubble and the introduction of two-earner mortgages. That said, economic growth and house price increases were decelerating very rapidly. While financial and mortgage product innovation initially provided a new source for growth, resulting in a relatively stable period between 2004 and 2008, it simultaneously contributed to the housing bubble and ultimately triggered the crisis. Gradual interest rate increases from 2006 onwards caused many households with non-traditional mortgages (e.g. variable rate interest-only) and, by extension, mortgage-backed securities to default. Apart from a strong economic contraction, the crisis also started a prolonged decline in house prices between 2009 and 2013. Recent years have witnessed increasing economic growth and, as mentioned above, accelerating house price increases. Two additional macroeconomic developments are worth noting. First, average mortgage interest rates have been steadily declining over the last decades, reaching a historic low after the crisis. Second, there is an increasing flexibilization of labour that could threaten the accessibility of the owner-occupied sector as mortgage lenders typically require security of income.

Macroeconomic conditions were the least favourable during the crisis due to the economic instability and decreasing house prices. Ceteris paribus, this is expected to translate in a reduced preference for homeownership in both quantitative and qualitative terms. The period after the crisis is on the other end of the spectrum due to the historically low interest rates, accelerating economic growth and house price increases that add an investment incentive to household mobility. With both the economy and house price developments decelerating, macroeconomic conditions were not necessarily unfavourable prior to the crisis, but not as stimulating as after the crisis.

In response to the crisis, numerous policy measures were implemented in an attempt to avoid the collapse of the financial sector, restore confidence in banks, regain financial stability, and reduce risk exposure. With respect to the structural reforms specifically intended for the owner-occupied housing market, two clear motives are visible: reducing mortgage debt and preventing speculative behaviour. Amongst others, lending criteria were tightened so that the value of a mortgage can no longer exceed that of the collateral, co-financing of maintenance was restricted, and mortgage interest deduction

linked to annual repayments. In addition, the social rental sector was reformed in response to the crisis. Most notably, new allocation procedures and income-dependent rent increases were implemented to restrict the inflow and stimulate the outflow of households that do not belong to the target group.

Considering that all of these reforms were implemented after 2009, the effects of the policy reforms will only be visible in the models of 2015 – 2017. How it will affect household mobility in the owner-occupied sector, however, is uncertain. On the one hand, tighter lending criteria is believed to result in polarisation. Households that do not possess the required equity, assets from which equity can be released, or intergenerational support available will lose access to the owner-occupied sector. This is exacerbated by the (low) middle incomes that search for affordable alternatives being excluded from the social rental sector due to the increased competition in the lower segments of the market. On the other hand, the increased cost of financing is simultaneously expected to result in structurally lower house price levels.

Analysing household mobility

Logistic regression analysis is used to examine household mobility. To enable evaluating changes in the housing preferences over time, models are estimated for three periods based on the Dutch national housing surveys: 2002 – 2004 (WBO 2002), 2009 – 2011 (WoON 2009), and 2015 – 2017 (WoON 2015). In terms of the actual moving behaviour, models could only be estimated for the latest period using data supplied by the NVM.

The empirical models of housing preferences show that the crisis mainly affected the overall demand for owner-occupied housing quantitatively. The probability that a household is intended to move nearly doubled from 21% in 2002 to 39% in 2015. Remarkably, this increase was already visible at the beginning of the crisis (26% in 2009). The preference for homeownership, on the other hand, was virtually unaffected. In terms of qualitative changes of the housing demand within the owner-occupied sector, the crisis caused a significant decrease in the preference for more expensive dwellings which only partially recovered after. As such, there was a small majority of households (54%) searching for housing below the average price level in 2015. Despite single-family dwellings still being favoured by most households, multi-family dwellings have rapidly gained popularity as illustrated by the shift in respective probabilities from 86% and 14% in 2002 to 76% and 24% in 2015. Oddly enough, the preferred size of the dwelling hardly changed accordingly with roughly 60% of households wanting a relatively large (> 120 m^2) house before, during, and after the crisis. The most surprising development over time, however, is the convergence of households from different income categories with respect to the intention to move, the preferred tenure, and desired purchase price. Based on the contextual developments, the opposite was expected to occur. Granted that this research does not cover the true escalation of house prices as is observed currently, it is possible that the combination of relatively cheap housing and low interest rates compensated for the polarising effects of the policy reforms. In addition, these reforms likely placed more emphasis on the importance of own equity and previous tenure, both of which were not included as independent variables due to data limitations.

As far as a comparison was possible, the actual choice behaviour of households appears to correspond with what the models of housing preferences suggest with respect to the price and type of housing. Regarding size, there is a notable difference between the average probability between the models of stated and revealed preference (59% compared to 39%). Taking into account that only 45% of the purchases was above the average price level, this seems to be a clear example of households formulating unrealistic preferences. Closer examination of the models reveals that households appear to consistently underestimate the regional variances when formulating preferences, although this might be partially due to the change in level of aggregation. Given the many contradictions, household

characteristics are assumed to have little impact on the chosen dwelling type. Instead, regional variances appear decisive, suggesting that this choice is mostly dependent on the available supply. With respect to the actual purchasing price and size of the dwelling, household income seems to be the most important determinant.

The impacts of macroeconomic developments and policy reforms on household mobility

Aside from the strong increase in the intention to move, presumably due to households postponing movements during the crisis, the observed changes in housing preferences appear relatively weak in light of the macroeconomic developments and policy reforms. This could suggest that households formulate their preferences largely independent from the context, which seems to be supported by the consistent underestimation of regional variances. Alternatively, it is also highly probable that the favourable macroeconomic conditions shortly after the crisis temporarily ameliorated the negative effects of the institutional changes. For example, the reduced borrowing capacity being more than compensated for by the lowered transfer tax, low mortgage interest rates, and relatively low house price levels. This simultaneously explains the convergence of income categories. Granted that a household can meet the equity requirements and moving itself does not result in large residual debts (mainly referring to households that purchased a home shortly before the crisis), the owner-occupied sector was extremely affordable in 2014 – 2015. The crisis thus seemingly improved the (perceived) chances of lower income households to obtain homeownership. However, similar to the surge of the intention to move, this is assumed to be only temporary. Because house prices did not truly escalate until 2016 and afterwards, the tightened lending criteria did not yet impose serious constraints at the time the survey was conducted for the WoON 2015. With only some minor signs visible in the empirical models featured in this research, further analysis based on more recent data is required to verify whether or not the policy reforms caused polarisation amongst households active in the owner-occupied housing market.

Contents

1. Introduction

What began as a financial crisis in the United States in 2007 cascaded in the worst economic crisis since the Great Depression (Storm & Naastepad, 2012). As the housing bubble burst, confidence in financial institutions and markets disappeared almost overnight, soon to be followed by the implosion of the sector and collapse of economies and housing markets worldwide (van der Heijden et al., 2011; Harvey, 2011). The Dutch housing market was no exception: between 2008 and 2013, nominal house prices decreased by approximately 20% (real prices over 30%), the number of transactions by more than 50%, and the number of new dwellings sold by roughly 75% (Boelhouwer, 2017). This spectacular crash evoked many policy responses from both the government and mortgage lenders alike in an attempt to avoid the collapse of the financial sector, restore confidence in banks, regain financial stability, and reduce risk exposure (van de Heijden et al., 2011; Boelhouwer, 2014; Stellinga, 2015). Especially the borrowing capacity, regarded as the most important indicator for the accessibility of owner-occupied housing, was significantly reduced due to a lower loan-to-value (LTV) ratio, lower mortgage guarantee limit, and revised norms for housing costs (Boelhouwer, 2014). Furthermore, mortgage product innovations that stimulated overconsumption of housing and maximum debt financing prior to the crisis were ceased and, in some cases, even reversed (Glaeser & Shapiro, 2002; Rouwendal, 2007; Scanlon et al., 2008; Scanlon et al., 2011; Priemus, 2010). An example of which are new mortgages being restricted to a maximum of 50% interest-only that, in addition, is exempt from tax relief (Boelhouwer, 2014). Overall, the reforms appeared to curtail that on which the housing system had become increasingly reliant: price increases (Elsinga et al., 2011).

After five years of crisis, the housing market finally displayed signs of recovery in 2014. Sharply declining deposition rates, defined as the average number of months a dwelling is offered for sale, and climbing prices indicated that demand was increasing fast (Ministry of the Interior and Kingdom Relations, 2016). While it was initially still believed that annual price increases would be limited to approximately 2% for at least a decade after the crisis, *figure 1.1* shows that the housing market has only gained momentum since (Blom et al., 2015). Reaching an average price of €284,000 in May 2018,

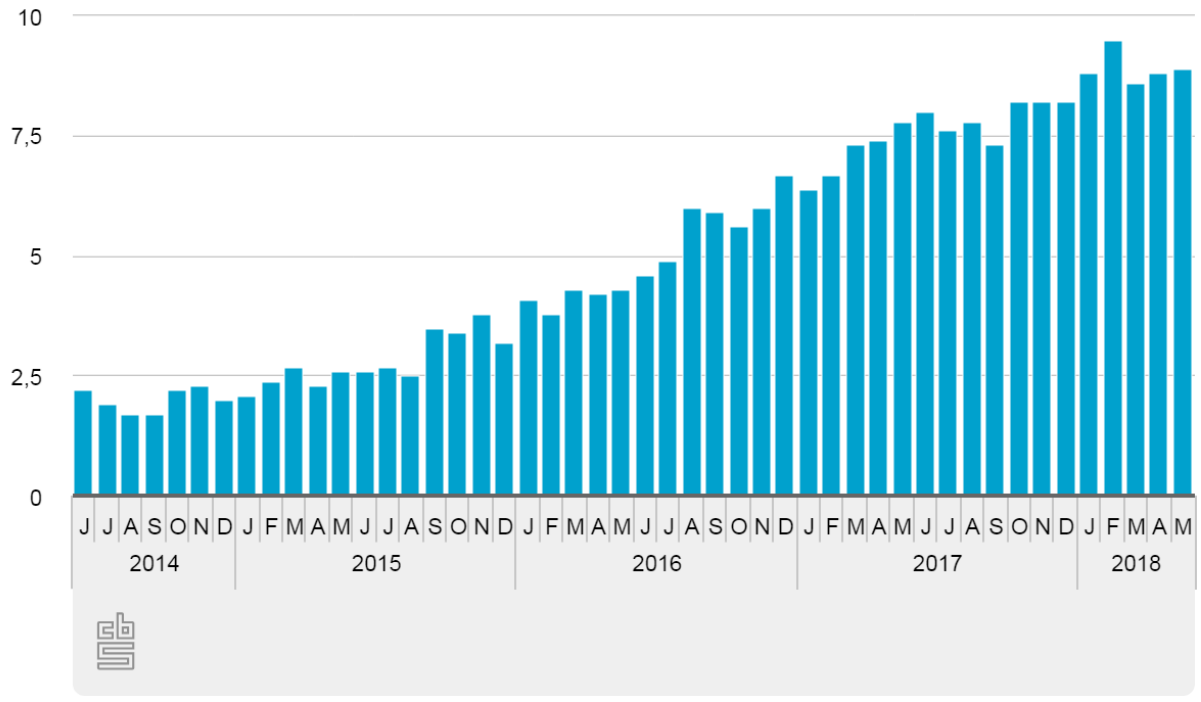

Figure 1.1 Price development of owner-occupied housing in the Netherlands (%-mutation compared to the previous year). *Source:* Statistics Netherlands, 2018[b].

owner-occupied housing has never been so expensive (Statistics Netherlands, 2018[b]). The Dutch branch organisation of real estate agents and appraisers (hereafter referred to as NVM) is simultaneously reporting a decline in the number of transactions, concluding that supply simply cannot keep up with the high demand (NVM, 2018). Briefly put, the Dutch housing market is overheated once again and beginning to stall. This naturally raises the question how such a significant decline in the borrowing capacity of households can be accompanied by escalating prices, especially considering the relatively strong relation between the two throughout history (Boelhouwer, 2014).

Provided that the Netherlands features a stock market with a highly inelastic supply, changes in the demand for housing are particularly important for the development of house prices (Boelhouwer, 2005; Priemus, 2010). Hence, the recent surge in house prices could indicate an underlying structural change in the housing preferences and/or moving behaviour of households, also referred to as household mobility, that ultimately shape the demand. While important, the borrowing capacity is just one of many determinants of household mobility. A literature review revealed that three categories can be distinguished: demographic and socio-economic characteristics of households, policies, and (macro)economic developments (e.g. Boumeester, 1996; Dol & Boumeester, 2017; Munro, 2007; van der Heijden et al., 2011; Boelhouwer, 2011; Nneji et al., 2013). To better understand the astounding recovery of the Dutch housing market, the goal of this research is to examine whether household mobility has in fact changed following the crisis and position these changes, or the lack thereof, within the context of macroeconomic developments and regulatory changes (the demographic and socio-economic characteristics of households being included in the analyses of household mobility itself). The focus will primarily be on the owner-occupied sector as it is deemed to most closely resembles a 'free' market. Where choice is relatively limited in the rental sector, whether that is due to strict regulations or severe scarcity of supply, the owner-occupied sector features a wide variety of supply available to any household with sufficient resources. As such, it imposes less constraints on households when expressing their demand and thus better reflects their true preferences. Based on this, the main research question is formulated as follows:

What are the impacts of macroeconomic developments and policy reforms following the crisis of 2008 on household mobility in the Dutch owner-occupied sector?

Before proceeding, it is important to clarify that household mobility can reflect two different types of housing demand depending on whether stated or revealed preferences are taken into consideration. Stated preferences refer to the desired housing attributes (i.e. housing preferences) as expressed by households intended to move and are typically used to approximate the potential demand. Revealed preferences, on the other hand, refer to the actual moving behaviour (i.e. dwelling choices) observed in the housing market and thereby reflect the realised demand. Readers unfamiliar with the field of housing studies must be aware that these terms are used interchangeably throughout this research. That said, answering this question will thus require the examination of multiple different aspects. To ensure that all are addressed appropriately, five additional sub questions were formulated:

(1) *What are the main determinants of household mobility?*
(2) *To what extent has the macroeconomic and institutional context of the Dutch housing market changed during and after the crisis?*
(3) *What are the expected impacts of contextual developments on household mobility?*
(4) *How did the stated preferences of households change during and after the crisis?*
(5) *To what extent do the revealed preferences of households match the stated preferences in general during the post-crisis period?*

The purpose of chapter 2 is to establish the theoretical framework for the remainder of this research. It features an introduction to mobility research, deemed necessary to understand what makes housing markets and household mobility so unique, and identifies the main determinants of household mobility, thereby answering the first sub question from the list above.

Chapter 3 subsequently discusses the macroeconomic and institutional developments. Rather than addressing each development separately, which have been researched extensively in the past, it predominantly focusses on the overarching nature of the developments with examples provided to support the arguments. This broadly illustrates how the context has changed during and after the crisis from which expectations regarding changes in household mobility are derived. As such, this chapter provides an answer to the second and third sub question.

The fourth chapter elaborates on the methodology and data used for the quantitative analyses of household mobility. It starts by explaining the selection of dependent variables and choice for three time periods (2002 – 2004, 2009 – 2011, and 2015 – 2017) to be included in the analyses. Next, it elaborates on the available data and the alterations made due to the limitations thereof.

Within chapters 5 and 6, logistic regression is used to estimate models of household mobility. Chapter 5 focusses on the potential demand or, in other words, stated preferences. Separate models are estimated for the selected periods to determine the change in housing preferences over time after which the results are compared. Additionally, it is argued whether or not changes in the potential demand conform to the expectations based on the macroeconomic and institutional developments. Due to a lack of data, models of realised demand (i.e. revealed preferences) only concern the latest period (2015 – 2017). Nevertheless, it is still considered a useful addition to the research as it illustrates to what extent observed moving behaviour matches housing preferences in the Dutch housing market. Together, these quantitative analyses provide an answer to the last two sub questions.

Having answered all the sub questions, chapter 7 aims to combine all the results into a single comprehensive answer to the main research question. In addition, it will address shortcomings of the research and provide recommendations for future research.

2. Unravelling the complexity of household mobility

Household mobility can essentially be viewed as a collection of relatively simple choices that together form an elaborate decision-making process. It starts once a household develops the intention to move after which it must decide on the type of tenure, type of dwelling, price range, location, etcetera (De Groot et al., 2011). Aside from the number of choices involved, household mobility thus seems to differ little from standard decision-making processes. As argued by Marsh & Gibb (2011), however, housing markets possess distinctive features that impede the use of standard consumer theory, which resulted in the establishment of mobility research as a field on its own. The purpose of this chapter is to acquire a basic understanding of mobility research and identify the main determinants of household mobility in order to establish a theoretical framework for this research. Section 2.1 begins with discussing the differences between mobility research and standard consumer theory to examine what makes household mobility so complex, followed by an overview of three conceptual models to further explore what drives household mobility in section 2.2. The identification of the main determinants of household mobility is featured in section 2.3, with the final section describing the theoretical framework constructed for this research.

2.1. The inadequacy of standard consumer theory

Standard consumer theory is a branch of (neoclassical) microeconomics that describes how consumers allocate their income among various goods (Gowdy & Mayumi, 2001). This theory is often used to construct the supply and demand curves from which concepts such as the equilibrium price, allocative efficiency, and welfare losses can be derived (see van Gent et al., 2004; Boardman et al., 2011). As noted by Boelhouwer (2005), this in turn forms the foundation of how prices are assumed to develop in markets. Like most theories related to decision-making, standard consumer theory relies heavily on the assumption of rationality. Originally, this entailed consumers to be fully informed about both the available options as well as the corresponding outcomes, capable of ordering these options accordingly, and making choices so as to maximise utility (Edwards, 1954). It was soon recognised that this portrayed an unrealistic image of consumer behaviour as it is, more often than not, simply impossible to be fully informed, resulting in the somewhat relaxed definition of bounded rationality: consumers are assumed rational if they seek to maximise their utility within the boundaries of computational limitations and accessible information (Simon, 1955).

Despite receiving its fair share of criticism over the years, standard consumer theory has become a staple for modelling consumer behaviour in markets (Marsh, 2012). However, housing markets appear to be a major exception. As mentioned earlier, this is due to the distinctive features of housing markets that separate them from 'ordinary' markets of which Maclennan (1982) identified seven:

(1) Consumers have imperfect information about the housing market because of the infrequency of transactions;
(2) The market changes and evolves between transactions, potentially rendering previously acquired information obsolete;
(3) Consumers engage in costly search processes due to the high costs of recontracting in housing markets;
(4) Evaluating different alternatives is problematic as housing is a complex commodity;
(5) The spatially dispersed nature of alternatives increases the difficulty of evaluating alternatives;
(6) Purchasing a house often involves engaging in some form of bidding;
(7) Due to the relatively permanent nature of housing and inelasticity of supply, substantial disequilibria can arise in submarkets due to changes in demand.

According to Marsh & Gibb (2011), these features revolve around three key elements: the central role of time, the complexity of evaluating alternatives, and the importance of information acquisition. To better understand how mobility research differs from standard consumer theory, each of these elements will be discussed in the remainder of this section.

The importance of time seems self-explanatory, yet is an aspect often overlooked or deliberately neglected (for reasons of theoretical simplification) in most economic theories (Marsh, 2012; Maclennan, 2012). Consequently, models grounded in economics tend to treat time as logical rather than historical, resulting in the passing of time not impacting market structure, knowledge acquisition, or learning on the part of actors (Marsh & Gibb, 2011). While this simplification might work for choice behaviour in 'ordinary' markets, applying it to household mobility causes particular problems for two main reasons. The first is that housing systems, including markets, are continuously changing due to their inherent complexity and natural path dependency (Byrne, 2012; Bengtsson, 2012). The second reason is that households tend to make housing choices based primarily on future expectations rather than their current situation (Maclennan, 2012). A likely explanation for this behaviour is that housing choices often involve large-scale and long-term commitments with substantial social and economic consequences for the households making them (Marsh & Gibb, 2011). In addition, households are also incentivised to consider future costs and returns in the decision-making process due to the role of housing as an asset (van Gent, 2010; Flavin, 2012).

The importance of time is widely acknowledged throughout housing research. There is a continuously growing body of literature detailing all the developments affecting housing systems, collectively creating an extensive, albeit scattered, timeline of their evolution (e.g. Salet, 1999; van der Heijden et al., 2002, 2011; Stephens, 2007; Boelhouwer & Priemus, 2012; Priemus, 2013, 2014; Huisman, 2016; Boelhouwer, 2017; Hoekstra, 2017). In turn, these developments often elicit responses in the behaviour of households on the market, requiring researchers to periodically re-examine if theories and models of household mobility are still correct. It is therefore common for empirical studies to include both a concise overview of recent changes in the housing system as well as estimate separate models for different time periods in order to determine whether notable shifts in behaviour have occurred (e.g. Boumeester, 1996; Dol & Boumeester, 2017).

The complexity of evaluating alternatives largely stems from the complexity of housing as a commodity itself. As stated by van Ham (2012), housing is a composite good:

> "The various characteristics of a dwelling such as tenure, size, style, and quality cannot be bought (or rented) separately. The bundle of characteristics also includes the (relative) location of a dwelling, including neighbourhood characteristics, such as access to facilities and the reputation of the neighbourhood." (pp.42).

This description illustrates the extreme heterogeneity of housing, with some researchers even going as far as to claim that no two houses are exactly the same (e.g. Andrews, 2012). Regardless, standard consumer theory presumes households to be capable of ordering alternatives and maximise their utility based on the assumption of (bounded) rationality. Due to its composite nature, households are required to evaluate a wide range of housing attributes in conjunction (Smith & Olaru, 2013). As mentioned previously, this typically involves making inherently uncertain predictions about potential future outcomes as well. It is also important to note that most households consist of more than one person, whereas a rational consumer is ought to be autonomous (Edwards, 1954). While there is little objection to viewing a household as a single autonomous entity, it must be realised that the internal processes of formulating preferences and ordering alternatives are likely more akin to social choice

theory[1]. Even if households attempt to behave rationally, it is highly questionable whether they are capable of accurately ranking the available alternatives.

Mobility research is yet to truly resolve this problem. Coolen & Jansen (2012) describe the various popular methods for measuring housing preferences. Both the multi-attribute utility method as well as conjoint analysis can be employed to estimate the utility of housing profiles. However, these methods do not address the concern described above, instead relying on the very same presumption. Most studies simply circumvent this concern by refraining from the use of utility all together, typically focusing more on the relation between household characteristics and housing preferences or -choices (e.g. Kim et al., 2000; Musterd, 2014).

Now, the importance of information acquisition becomes plain to see. Given the significance and complexity of housing choices, households generally want to gather as much information as possible before making a decision. Lacking the knowledge and expertise to correctly assess housing quality themselves, households mainly rely on experts instead (MacLennan, 2012). This implicitly highlights another important aspect of household mobility, namely transaction costs. Hazeu (2014) defines transaction costs as all costs to be made in order to make a transaction, including nonmonetary costs such as time, energy, and effort. Van Ommeren & van Leuvensteijn (2005) found empirical proof that an increase in transaction costs results in a reduction of residential mobility, thereby contributing to the misallocation of housing and even preventing households from making optimal choices (Van Ommeren, 2012). Naturally, this directly violates the assumption of rationality.

That being said, transaction costs are, to the best of my knowledge, rarely included in mobility research (especially in empirical studies). It is plausible that this is mostly for pragmatic reasons as it would make the analysis of household mobility overly complex. Contrary to monetary costs, measuring nonmonetary costs poses a significant challenge and is often highly subjective: what one household considers to be little effort might be experienced as a great ordeal by another. Moreover, transaction costs encompass much more than just information acquisition and can even be incurred in the absence of an actual transaction due to, for instance, a perceived loss of other values (Van Ommeren, 2012; Hazeu, 2014). Despite being often excluded, the existence of transaction costs should at least be recognised as it helps to understand why household are not constantly on the move even if housing preferences gradually change.

When combining these three elements, the inadequacy of standard consumer theory becomes evident. It portrays an ideal situation in which time is not a factor, households have clearly articulated preferences as well as the capability to accurately evaluate alternatives, and making transactions bears no additional costs. With respect to household mobility, standard consumer theory oversimplifies reality to the point that it loses most of its explanatory power. Mobility research, on the other hand, generally adopts a more realistic approach by recognising the complexity of housing systems and the limitations of households.

2.2. Conceptual models of household mobility

Rossi's (1955) work on the relationship between household careers and housing careers in the mid-20th century is widely regarded as the first serious attempt in the area of household mobility (Clark & Onaka, 1983; Boumeester, 1996). Despite being a relatively young field of study, mobility research has already experienced multiple paradigm shifts since (Feijten & van Ham, 2007). Consequently, numerous conceptual models describing household mobility can be found throughout the literature.

[1] Peterson (2009) offers a concise explanation of social choice theory as well as some of the challenges faced when ordering preferences as a group.

Morrow-Jones & Wenning (2005) examined three that are particularly popular: the housing ladder, housing life-cycle, and housing life-course. This section provides a brief overview of these models to further explore what drives household mobility.

Housing ladder

The housing ladder is the simplest of the three, constructed around the belief that there is a hierarchy of housing as displayed in *figure 2.1*. As explained by Morrow-Jones & Wenning (2005), the rewards of owner-occupancy and increases in housing equity are considered to be so strong that households want to climb the rungs of the ladder as they acquire the resources to do so, only moving down if necessary (e.g. divorce, death of spouse, etc). As such, the approach relies on the characteristics of the householder.

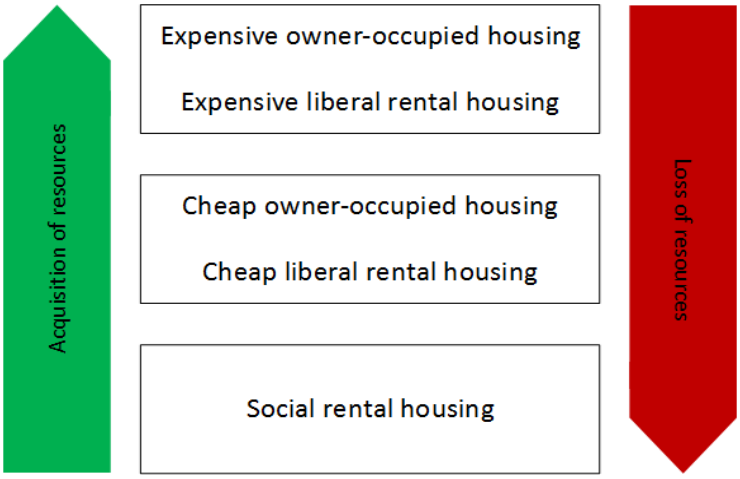

Figure 2.1 Simplified illustration of a housing ladder for the Dutch housing market.

According to Munro & Madigan (1998), the popularity of the housing ladder can be attributed to its simple yet powerful imagery. However, they were also quick to point out that it is, in hindsight, a 'gross simplification' of household mobility due to the various trends that have impacted housing market outcomes since. Most importantly, the growing diversity of households (i.e. lifestyles, composition, and career patterns) and increasing variety of housing (i.e. types and quality) makes it impossible to reach a single consensus on a hierarchy of housing. In addition, they add that the risk of market downturns undermines the certainty of financial accumulation through homeownership. It goes without saying that the housing ladder is no longer an accurate representation of household mobility.

Housing life-cycle

Whereas the housing ladder focussed solely on the characteristics of the householder (i.e. head(s) of the household), the housing life-cycle adopts a more comprehensive approach by taking the entire household into consideration (Morrow-Jones & Wenning, 2005). It views household mobility as a response to changes in the life-cycle, typically distinguishing five stages: young but unmarried, just married, young married, married with school-age children, older married or older unmarried (Estiri et al., 2013). The original housing life-cycle was thus firmly based on standard nuclear family formation (Feijten & van Ham, 2007; see also Glick, 1947). Exactly what the relation is between the life-cycle and household mobility is explained by Estiri et al. (2013):

> "Most of the changes in socioeconomic characteristics of households are a function of changes in lifecycle stages, which make the transition between these stages the principal determinant of residential mobility. The basic principle is that as households move between life cycle stages, it is likely that they re-evaluate the characteristics of their current composition of the bundle of housing services based on new standards" (pp.3).

As households progress through the various stages of the life-cycle, their housing needs and preferences change accordingly. The resulting dissatisfaction with the current residence and its location subsequently increases the potential that a household becomes inclined to move (Clark &

Onaka, 1983). While the overall (expected) trajectory of housing consumption strikes some similarities to the housing ladder, increasing as households expand and decreasing as they contract (see *figure 2.2*), the housing life-cycle does not assume a hierarchy of housing nor that residential moves are only motivated by economic considerations (Estiri et al., 2013).

Despite being a significant improvement compared to the housing ladder, the housing life-cycle has also lost most of its explanatory power (Boumeester, 1996). Amongst others, it could not cope with deviations from the standard nuclear family formation, was criticised for having poorly articulated life-cycle concepts, and was deemed too normative (Feijten & van Ham, 2007; Morrow-Jones & Wenning, 2005). Later iterations expanded the model and remedied some of its issues, but were ultimately unable to prevent it from becoming obsolete (e.g. Stapleton, 1980).

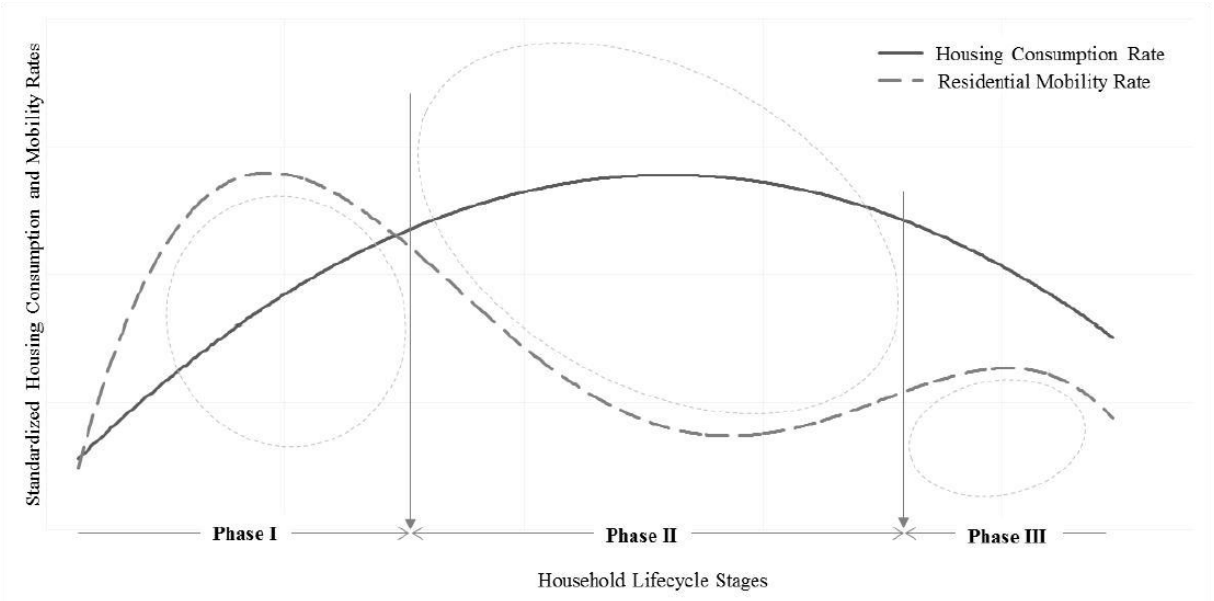

Figure 2.2 Housing consumption and household mobility in a condensed three-stage household life-cycle. *Source:* Estiri et al., 2013.

Housing life-course

The last model to be discussed in this section is currently the dominant model in mobility research: the housing life-course. Depicted in *figure 2.3*, the life-course model departs from the strong emphasis on families and adopts a more individualistic approach. As stated by Morrow-Jones & Wenning (2005):

> ". . . the family is only one of the major life institutions in which people participate. Movement through all of the different life 'careers', including 'housing careers' is marked by major events… these events mark an individual's entrance into and out of specific life-states in different life institutions. The timing, sequencing and combination of these events constitute a person's life-path with all of its opportunities and constraints" (pp. 1742).

Besides the inclusion of careers other than the family career, the initiation of household mobility is nearly identical to that of the housing life-cycle. Transitions between different life-states cause the demand for housing services to change, resulting in dissatisfaction with the current dwelling. What truly sets the life-course model apart is that it explicitly includes (part of) the context in which housing choices are made, thereby acknowledging that a household's ability to realise their preferences is not solely dependent on their own characteristics (Abramsson, 2012; see also Holland & Peace, 2012). Whereas the importance of policies is relatively straightforward, the inclusion of local housing market conditions indicates that the (desired) location of a dwelling also affects the opportunities and

constraints of households active in the housing market. This has been confirmed by, amongst others, empirical results of Brounen & Huij (2004), demonstrating that there are undeniable differences between regional housing markets and their response to economic developments. Rather than viewing the Dutch housing market as a single market, it should thus be perceived as a collection of regional or even local markets (Vlak et al., 2017).

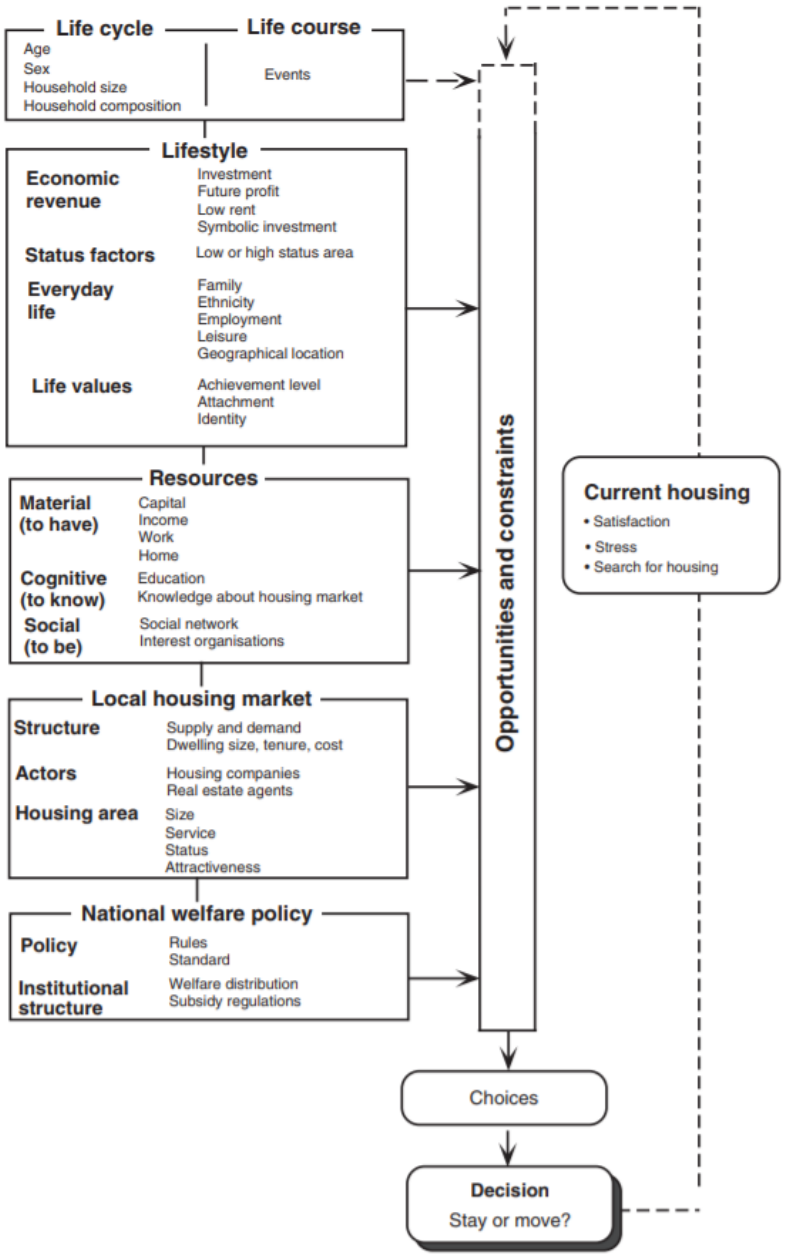

Figure 2.3 Household mobility according to the housing life-course model. *Source:* Abramsson, 2012.

The housing life-course manages to illustrate the sheer complexity of household mobility, but still contains some flaws. While a commendable addition, the inclusion of policies is shallow at best (at least in Abramsson's adaptation). Referring only to welfare policies, *figure 2.3* basically suggests that other policies do not affect household mobility. As will be explained in the next section, this is far from true. In addition, predicting housing preferences and choices with the life-course model is extremely difficult, if not practically impossible, due to the plethora of variables included of which many are either subjective or ambiguous (e.g. symbolic investment, knowledge, attractiveness). Naturally, this is not

the intended purpose of a conceptual model. The life-course model should therefore be valued for what it is, namely a theoretical foundation for further research. Thinking in terms of needs, preferences, opportunities, and constraints may aid in explaining observed changes in household mobility or, in the case of discrepancies, indicate external influences beyond the scope of study.

The three conceptual models discussed in this section were all constructed around the relation between household and housing careers, albeit in very different ways. Where the housing ladder was still heavily inspired by economic theory, the housing life-cycle emphasised the importance of the household and associated mobility with transitions between different stages in life. The housing life-course took it a step further and abandoned nuclear family formation as leading principle, allowing for much more flexibility to accommodate for the growing complexity of housing markets and variety of both housing and households. Moreover, the life-course model recognises the importance of context by incorporating local housing market conditions and policies. Based on these models, the fundamental drivers of household mobility thus appear to be (changes in) the household characteristics and context.

2.3. Main determinants of household mobility

Considering that the housing life-course model is far too elaborate to be used in practice, the number of variables to be included in the research inevitably must be reduced. This is not only for the sake of clarity of the analysis of household mobility itself, but also to ensure that the research remains feasible within the allocated time. Hence, the purpose of this section is to identify the main determinants of household mobility based on a review of the literature.

Socioeconomic and demographic characteristics of households

There is one category of variables prominently present throughout the history of mobility research and that is the characteristics of households. Being the primary focus of earlier models, housing characteristics and changes in the life-cycle (or life-course) are still often used to analyse housing needs and preferences (Floor & van Kempen, 1997; Andersen, 2011). As stated by Boumeester (1996):

> "Again and again, researchers demonstrate the relation between demographic and socio-economic characteristics of households, on the one hand, and dwelling choice (with respect to type, sector, and price) and moving behaviour on the other" (p. 257).

Despite currently being considered severely outdated, two important household characteristics can be elicited from Rossi's work: age and composition. Feijten & Mulder (2002) compared the timing of household and housing events between different cohorts (i.e. generations) in the Netherlands and found that moving into so-called long-stay housing, defined as single-family rental and owner-occupied dwellings, depends on the level of commitment in the household which, generally speaking, increases with age as unions are formed and children are born. However, the inclusion of age in an empirical model comes with a caveat: it may implicitly reflect other characteristics. According to Morrow-Jones & Wenning (2005) people are likely to experience, amongst others, increases in income, wealth, social status, and household size as they progress through the various life careers. The opposite occurs once children start leaving the parental home, households separate, or people enter retirement. To isolate the true impact of age on household mobility, it is therefore necessary to control for these indirect effects. Feijten & Mulder (2002) also acknowledge the relationship between financial resources and household mobility, revealing another important determinant: household income (potentially also including savings and debts). As demonstrated by Boelhouwer (2017), household income determines the borrowing capacity and, consequently, the opportunities of a household on the owner-occupied market. In turn, both education and employment status are often closely associated with household

income. Several studies have shown that these are significant predictors of mobility which can, at least partially, be attributed to the requirements posed by mortgage providers when applying for a loan (e.g. Dol & Boumeester, 2017). Finally, another recurring determinant is the previous tenure of a household. Being a previous homeowner increases the likelihood of both preferring and moving into another owner-occupied dwelling (Boumeester, 1996; Aarland & Nordvik, 2009).

The reviewed literature thus reveals a consensus on the relevant household characteristics. Age, household composition, income, employment status, education, and previous tenure are all proven determinants of household mobility. As was concluded by Boumeester (1996) over two decades ago, traditional socioeconomic and demographic variables still prove to offer an adequate explanation of dwelling choice and moving behaviour. That said, changes in household mobility must always be viewed within the broader context of the housing system rather than directly attributed to changing preferences of households.

Policy

The introduction of the Housing Act (*Woningwet*) in 1901 marked the first governmental intervention in the Dutch housing system, resulting in the formal establishment of the social rental sector (Elsinga et al., 2014). After the Second World War, the focus gradually shifted away from the provision of social housing towards stimulating homeownership as this would (allegedly) stimulate social behaviour, civic responsibility, and commitment to the neighbourhood (van der Heijden et al., 2002; Arnott, 2015). The reviewed literature shows that it is not only housing policy that can be employed to this extent. In fact, it may even be argued that other policy domains exert a greater influence on household mobility. On the other hand, it must be noted that the boundaries between these domains are obscure. For instance, should mortgage interest deduction be perceived as tax policy, since it is incorporated in the Act income taxes 2001 (*Wet inkomstenbelasting 2001*), or as housing policy utilised to promote homeownership? Regardless of the exact taxonomy, the policies frequently related to household mobility as well as affected by the crisis will be discussed below.

The Housing Act remains the most tangible example of housing policy. Its main purpose is to regulate the construction of dwellings and provision of social housing. While this might appear irrelevant for household mobility in the owner-occupied sector, it is important to realise that the sectors in the Dutch housing system are interconnected, simultaneously complementing and competing with each other. Granted that approximately 95% of the rented stock in 2010 was regulated, the expected residualisation in Dutch social housing and gradual retrenchment of the social welfare state following the revision of the Housing Act in 2015 are therefore bound to affect household mobility in the owner-occupied sector as well (Priemus, 2010; Hoekstra, 2017; van Gent, 2010).

Another frequently mentioned determinant is the availability of credit (e.g. Stephens, 2007; Munro, 2007). As noted by Boelhouwer (2014), the borrowing capacity is predominantly determined by the credit conditions of mortgage brokers and banks, interest rates, and household income. While the latter two have little to do with housing policy, credit conditions are laid down in the code of conduct for mortgage loans (*Gedragscode Hypothecaire Financieringen*) which is formally adopted in the temporary regulation of mortgage credit (*Tijdelijke regeling hypothecair krediet*). Essentially, this code defines the maximum loan-to-value and loan-to-income ratios based on norms established by the National Institute for Family Finance Information (NIBUD)[2]. In addition, household are eligible for a

[2] The NIBUD norms indicate the maximum financial burden of a mortgage expressed in a percentage of the household income (National Institute for Family Finance Information, n.d.)

national mortgage guarantee for loans up to €265,000 (in 2018). In exchange for a fee, the guarantee fund will cover any remaining debt of a household in the event of a forced sale (Priemus, 2013). As this ensures repayment of loans, lenders charge lower interest rates (less perceived risk) which is beneficial for the borrowing capacity of households. Finally, the availability of credit is also influenced by the regulation of financial markets in general. The rapid innovation in mortgage products following the deregulation of financial markets caused a significant increase in homeownership (Scanlon et al., 2008; Haffner et al., 2017). As these products proved unsustainable, partially responsible for the pre-crisis housing boom, governments as well as banks and mortgage lenders issued reforms to ration credit and establish more stringent requirements for obtaining mortgages (Davis & van Nieuwerburgh, 2015; Priemus, 2010; Scanlon et al., 2011).

Lastly, mortgage interest deduction has been a recurring subject of fierce (political) debate. The Netherlands, being one of the few countries where interest paid on mortgage loans is fully deductible from taxable income, originally adopted this measure to ensure equal treatment between landlords and homeowners: costs incurred to realise income are exempt from taxation. Basically, a homeowner was perceived as a tenant of its own dwelling. Similarly, the benefits derived from owning a house were taxed as well through imputed rent (Rouwendal, 2007). What is important to realise, however, is that mortgage interest deduction alone subsidises housing consumption rather than homeownership due to the inelasticity of supply (Glaeser & Shapiro, 2002; Priemus, 2010). Nevertheless, it has seemingly been successfully used to stimulate homeownership, albeit at the cost of maximum debt financing and house price increases of approximately 20% on average (Rouwendal, 2007; Boelhouwer & Priemus, 2012). While mortgage interest deduction is the most prominent example for the owner-occupied sector, it should be noted that taxes and subsidies in general influence household mobility by artificially altering the cost of housing.

Macroeconomic developments

The final category of determinants discussed in this section is not included in the housing life-course model as it does not directly influence the mobility of individual households. However, considering the devastating impact of the recent economic crisis on housing markets worldwide, the relationship between macroeconomics and household mobility deserves renewed attention. First, consider the description by Nneji et al. (2013):

> "Real estate cycles are often characterised by a surge in prices followed by a fall or crash. . . . These cycles are often linked with changes in macroeconomic drivers such as interest rates and economic growth" (pp. 172).

Housing market cycles are therefore not only similar to, but actually connected to macroeconomic cycles. According to Muellbauer (2012), there are three main interactions between housing and macroeconomic activity which operate through the investment, consumption, and banking channels as shown in *figure 2.4*. While this particular example illustrates

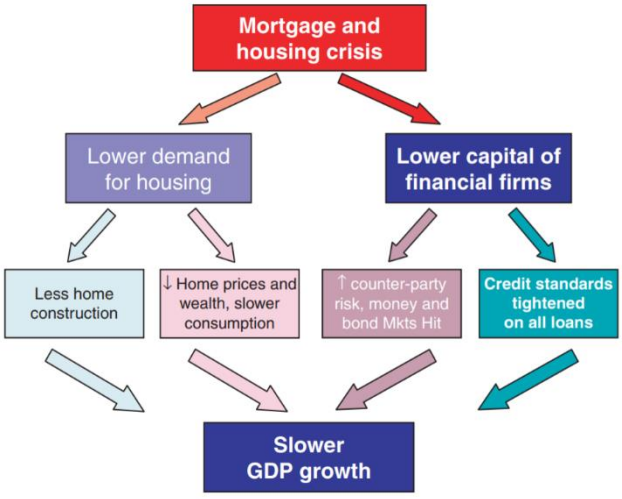

Figure 2.4 Interaction between housing and the macroeconomy. *Source:* Muellbauer, 2012.

how a mortgage and housing crisis negatively impacts economic growth, it can easily be reversed. As economic growth increases, the demand for housing grows resulting in higher prices and more construction. Simultaneously, there is more capital available for financial firms and less risk due to the increasing value of collateral, resulting in a relaxation of credit standards. The missing link in this explanation is why economic growth causes an increase in housing demand in the first place. The answer is twofold: trust and monetary policy. Elsinga et al. (2011) argue that trust is crucial in housing markets. If there is no trust in the economy, households tend to postpone large investments like buying a new home. More importantly, however, is monetary policy. The objective of the European Central Bank (ECB) is to ensure price stability by keeping inflation rates below, but close to, 2% over the medium term (European Central Bank, n.d.). This is done according to the Non-Accelerating Inflation Rate of Unemployment (NAIRU) model which assumes that there is an equilibrium unemployment rate at which inflation is stable (see Storm & Naastepad, 2012 for a detailed analysis and criticism of this model). Put crudely, interest rates are lowered to stimulate the flow of capital (i.e. money in 'active' circulation) if inflation is deemed too low and vice versa. As a result, credit becomes relatively cheaper and thus more accessible. This is generally believed to have a positive impact on economic growth as it encourages consumption and investment (including home purchases). The effects of such a reduction are often only temporary in the case of housing demand due to the high inelasticity of supply. Any reduction in the cost of financing will eventually be mostly absorbed by a rising selling price (Boelhouwer, 2017).

According to the literature, macroeconomic developments can thus greatly impact household mobility. Economic growth is generally associated with increases in household mobility as it provides the trust required in the economy and housing markets (i.e. positive future expectations). Aside from credit conditions, the availability of credit is also largely dependent on the interest rates that, in turn, are assumed to be related with inflation and employment. Finally, macroeconomic developments are also believed to affect local market conditions due to differences in the response of these markets as was noted in section 2.2.

2.4. Constructing a theoretical framework

The theoretical framework for this research was constructed based on the results discussed in the preceding sections. Presented in *figure 2.5*, it provides an overview of the main determinants and their respective categories with household mobility at the centre of it all. Moreover, it shows the interdependencies between the categories. Due to the inherent complexity and path dependency of housing systems, a change in any of these determinants can resonate both within its own category and through the others, unfolding in radical changes. To use the words of Byrne (2012):

> "Complex systems are nested and intersecting. All systems are contained within and intersect with other systems. Boundaries are fuzzy and plastic. . . . Nested systems have a recursive deterministic relationship with the systems within which they are nested. Potentially every level has implications for every other level" (pp. 210).

For this research, the categories policy and economy are perceived as contextual due to their universal and relatively static nature. In the absence of major shocks, such as the crisis, institutional and macroeconomic conditions do not change overnight. Instead, they gradually evolve over an extended period of time. Hence, the impact of these two categories on household mobility mainly lies in framing the possibilities, whether that is through offering opportunities (e.g. housing allowances and mortgage guarantees) or imposing constraints (e.g. allocation procedures for social housing). This is not to imply that policies never take household characteristics into consideration nor that everyone is equally affected by the macroeconomic developments. However, households with the same characteristics

(are assumed to) have the same possibilities on the housing market. Contextual changes in response to the crisis and the expected impact thereof on household mobility will be discussed in chapter 3.

The household characteristics will be used as independent variables in the empirical analyses of household mobility. As mentioned earlier, a common distinction made in housing research is between stated and revealed preferences (see Coolen & Jansen, 2012). While stated preferences are typically believed to better reflect the true housing demand of a household, the desired combination of housing attributes may be either unavailable or unobtainable given the characteristics of the household. Alternatively, revealed preferences can be heavily influenced by the available supply or other constraints (Boumeester, 2004). To partially compensate for these weaknesses, both stated and revealed preferences will be examined. The results of the analyses of stated preferences are presented in chapter 5, whereas those of revealed preferences are presented in chapter 6.

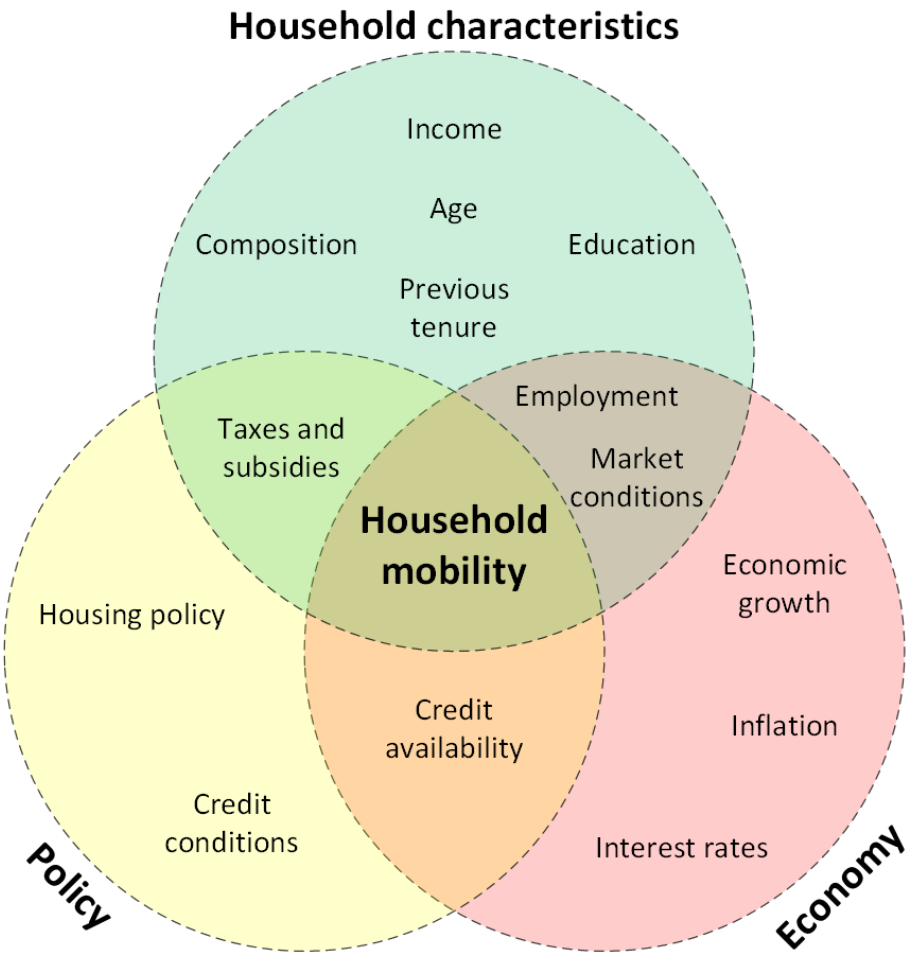

Figure 2.5 A theoretical framework of household mobility.

3. Changes in the context of the Dutch housing system

The economic crisis is among the biggest turning points in recent history. As it unfolded, it laid bare the systemic flaws and fragilities of the global economic system. While the exact cause of the crisis is a heavily debated subject, it is undeniable that the housing bubble at least triggered the initial financial crash (see Palley, 2012). According to Elsinga et al. (2011), the origin of the housing bubble can be traced back to the reduction of interest rates in the United States following the stock market collapse (caused by the dotcom-bubble) and 9/11 terrorist attacks to stimulate the economy. Both households and banks made ample use of the cheap credit available, resulting in predatory lending practices with subprime mortgages. Once the Federal Reserve later decided to increase the interest rates to stabilise the economy, these were the first to default. As stated by van der Heijden et al. (2011):

> "As many over-indebted US households have variable-rate mortgages, a series of (minor) interest rate increases in 2006 rapidly led to default for many homebuyers. Indeed, mortgage lending can be very risky in the USA as a number of states have anti-deficiency laws (whereby on foreclosure the homeowner is not responsible for any deficit between the sale price and the outstanding mortgage)" (pp. 269).

The increase in the number of foreclosures combined with the retreat of investors from the housing market tipped the balance and caused house prices to fall (Harvey, 2011; Elsinga et al., 2011). Underestimating the correlation between the defaults of households, allegedly safe mortgage-backed securities began to default soon after (Coval et al., 2009). Suddenly faced with large losses and uncertainty, the confidence between banks as well as in financial markets quickly eroded (van der Heijden et al., 2011). The subsequent implosion of the US financial sector, most notably the bankruptcy of Lehman Brothers in 2008, turned the national financial crash into a global economic crisis.

The goal of this chapter is to identify changes in the macroeconomic and institutional context of the Dutch housing system during and after the crisis as well as to formulate expectations regarding the consequences of these changes for household mobility in the Netherlands. Section 3.1 describes the macroeconomic and institutional developments, whereas section 3.2 discusses how these developments are believed to impact household mobility. A summary of the main conclusions is provided in section 3.3.

3.1. Macroeconomic and institutional developments in the Netherlands

Based on the determinants identified in the previous chapter (see *figure 2.5*), this section describes the macroeconomic and institutional developments in response to the crisis. As opposed to the policy reforms, the Dutch economy responded almost immediately to the crisis and will therefore be discussed first. Data from the open database Statline, published by Statistics Netherlands, was used to evaluate the macroeconomic developments, with the exception of the average mortgage interest rates that were retrieved from the open database of the Dutch Central Bank. Granted that this data concerns the macroeconomic developments on a national level, local housing market conditions will not be discussed in this section. As will be explained in chapter 4, they will be included in the empirical analyses instead.

The collapse and recovery of the economy

The gross domestic product (GDP) of a country is regularly used as an indicator for economic growth. The GDP is often expressed in terms of market prices, which often exaggerates economic growth and could even falsely imply growth where there is none (if inflation exceeds the economic contraction). For this reason, it was decided to use the GDP corrected for inflation (price level 2015) instead. As

shown in *figure 3.1*, the Netherlands experienced a period of rapidly decelerating growth after the turn of the century. This was followed by a period of relatively steady growth between 2004 and 2008, partially due to the securitisation of (non-traditional) mortgages, amongst others, providing ample opportunities to invest[3] (Harvey, 2011; Elsinga et al., 2011). The effects of the crisis became truly noticeable in 2009 as the economy contracted by almost 4% after which the economy became volatile, alternating between modest increases and decreases of the GDP. Once the crisis ended in 2014, economic growth has been accelerating.

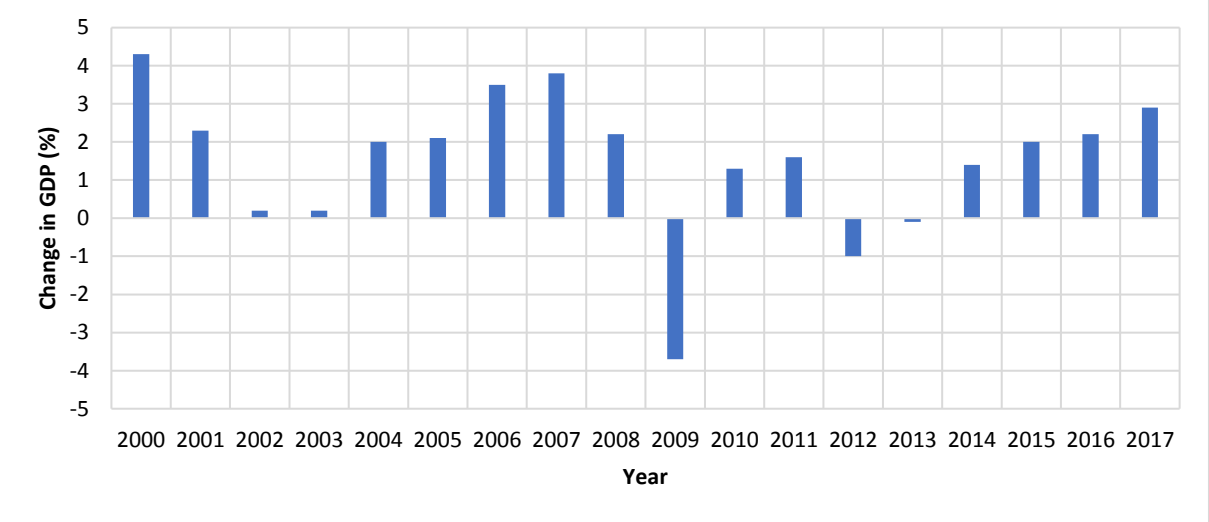

Figure 3.1 Annual growth of the GDP (corrected for inflation). *Source:* Statline (edited by the author).

Economic growth in itself is perhaps best viewed as the resultant of all (macro)economic developments. Albeit an excellent indicator of economic performance in general, it has little additional explanatory value. To better understand the macroeconomic conditions, it is therefore necessary to decompose economic growth and study the underlying developments: inflation, (un)employment, and interest rates. Based on the data in *table 3.1*, there appears to be a cubic relation between the inflation of consumer prices, on the one hand, and house prices on the other. Whenever the inflation of consumer prices exceeds 2%, house price increases decelerate (and decreases accelerate) noticeably, whereas the opposite is true for inflation rates below 1%. This can be explained by the interest rate adjustments used by central banks to ensure price stability. As stated by Praet, a member of the executive board of the ECB, during his speech at the Congress of Actuaries (European Central Bank, 2018):

> "A salient feature of the economic environment in advanced economies has been the steady decline of short and long-term interest rates over several decades to the extremely low levels which currently prevail. . . . Confronted with a declining equilibrium interest rate and the effective lower bound on policy rates, we had to resort to unconventional monetary policy measures in order to provide the necessary accommodation to support domestic demand, thwart the deflationary risks which were emerging in 2014 and prepare the way for inflation to return to our objective."

In response to the low inflation rates in the aftermath of the crisis, average mortgage interest rates decreased considerably from 4% in 2014 to just 2.3% in 2017. Although there is no apparent trend

[3] The contribution of financial product innovations to economic growth cannot be accurately determined as these were often traded within the 'shadow banking system': financial activities by banks off their balance sheets, free from most regulations (Ryan-Collins et al., 2011)

visible in the development of the unemployment rate, the crisis did cause a significant increase from 3.7% in 2008 to 7.4% in 2014. Finally, there is one development regarding employment worth mentioning that is not visible in the data: the increasing flexibilization of labour in the Netherlands. Considering that mortgage lenders typically require security of income before approving an application, the flexibilization of labour has proven to reduce the probability of moving into the owner-occupied sector (Dol & Boumeester, 2017).

Table 3.1 Consumer and housing price indices, annual inflation rates, unemployment, and mortgage interest rates. *Source:* StatLine.

Year	Consumer price index (2015 = 100)	Annual inflation (%)	Price index e.o.o. housing (2015 = 100)	Annual increase (%)	Unemployment rate (%)	Mortgage interest rates* (%)
2000	75.1	2.4	80.3	18.2	-	-
2001	78.2	4.1	89.2	11.1	-	-
2002	80.7	3.3	95.0	6.4	-	-
2003	82.4	2.1	98.4	3.6	4.8	5.4
2004	83.5	1.3	102.6	4.3	5.7	5.0
2005	84.9	1.7	106.6	3.9	5.9	4.4
2006	85.8	1.1	111.5	4.6	5.0	4.0
2007	87.2	1.6	116.2	4.2	4.2	4.6
2008	89.4	2.5	119.7	3.0	3.7	5.1
2009	90.4	1.2	115.6	-3.4	4.4	5.5
2010	91.6	1.3	113.0	-2.2	5.0	5.3
2011	93.7	2.3	110.3	-2.4	5.0	4.6
2012	96.0	2.5	103.1	-6.5	5.8	4.8
2013	98.4	2.5	96.4	-6.6	7.3	4.7
2014	99.4	1.0	97.2	0.9	7.4	4.0
2015	100.0	0.6	100.0	2.8	6.9	3.3
2016	100.3	0.3	105.0	5.0	6.0	2.8
2017	101.7	1.4	113.0	7.6	4.9	2.3

* Average interest rates in January for mortgages with a fixed period of 5 – 10 years. *Source:* Dutch Central Bank.

In terms of macroeconomic conditions, the crisis can thus best be described as a period of economic volatility. Despite relatively steady inflation rates and decreasing interest rates (i.e. from 2009 onwards), economic growth could not be maintained, house prices kept decreasing, and unemployment increased. As this demonstrates a clear lack of trust in both the economy and housing markets, it is considered least favourable with respect to household mobility. While unemployment rates were still relatively high immediately after the crisis and labour increasingly flexible, low average mortgage interest rates combined with relatively cheap housing due to price decreases during the crisis resulted in the most favourable macroeconomic conditions to enter the owner-occupied housing market after the crisis. The pre-crisis period falls in between with initially decelerating yet later steady economic growth (mirrored by the house price increases), steady inflation, and relatively high mortgage interest rates.

Reshaping the institutional framework

With regards to regulatory changes, the initial concern was to minimise the decline of house prices by stimulating the housing market and supporting the building industry. This involved keeping interest rates relatively low, raising the mortgage guarantee limit from €265,000 to €350,000 in 2009, subsidising new construction until January 2011, reducing the value-added tax on renovation between August 2010 and October 2011, and reducing the transfer tax from 6% to 2% in 2011 (Elsinga et al., 2011; Priemus, 2013; Boelhouwer, 2014; Scanlon & Elsinga, 2014). Almost all of these measures were temporary, the only exception being the transfer tax. While it was initially planned to be reduced for one year only, it has not been increased since (Scanlon & Elsinga, 2014).

The more pressing issue, however, was to remove or at least reduce the perverse incentives within the housing finance system. This resulted in substantial changes in mortgage lending in the Netherlands which started with a new code of conduct for mortgage loans in 2011. The following overview of policy measures is based on the works of Boelhouwer (2014 & 2017), Blom et al. (2015), and Priemus (2014):

- The maximum loan-to-value (LTV) norm was lowered to 106%, later to be incrementally reduced further to 100% between 2013 and 2018;
- The scope to deviate from loan-to-income (LTI) norms was reduced;
- A restriction on the co-financing of maintenance was introduced;
- New mortgages are restricted to a maximum of 50% interest-only as of 2013;
- The future earning capacity of households is now barely considered in mortgage applications;
- The right to mortgage interest deduction is linked to complete repayment of the debt during the term of the mortgage, thus only applying to traditional mortgages;
- Mortgage interest deductibility is currently incrementally being decreased to 38% in 2042 (from 51% in 2015);
- The NIBUD budget norms for housing costs were adjusted downwards.

Despite being only a selection of the large number of policy changes, the motives behind these reforms can easily be derived from the list above. Reducing mortgage debt was top priority as the crisis had proven that this poses tremendous financial risk for households, financial institutions, and the Dutch government alike (see Boelhouwer, 2017). Neglecting macroeconomic developments for the moment, primarily those of interest rates, the borrowing capacity has significantly declined due to the various stricter norms and restriction on co-financing maintenance. In addition, the incentive to maintain as much debt as possible was removed by restricting mortgage interest deduction to traditional mortgages and ensuring that at least half of the debt is repaid during the term of the mortgage. Another clear motive is preventing speculative behaviour by no longer allowing the value of a mortgage to exceed that of the underlying collateral or approving applications based on the expectation of income increases in the (near) future.

Even though this research focusses on the owner-occupied sector, it is important to realise that the different sectors in the Dutch housing system do not operate in complete isolation. Especially policy measures targeted at the social rental sector may indirectly affect the preference and choice for homeownership as the liberal rental sector, by virtue of its nature, is deprived of any governmental regulation. Reforms in response to the crisis mainly revolved around reducing what Musterd (2014) refers to as the skewness-problem: households staying even after experiencing significant increases in their income. For this to be achieved, a range of different measures were implemented. Following a dispute with the European Union, a new allocation procedure came into force in 2011, later to be complemented by income-dependent rent increases for households with higher incomes in 2013 (Hoekstra & Boelhouwer, 2014). This was intended to restrict the inflow to households belonging to the target group and stimulate the outflow of those that did not. Moreover, the government deemed the social rental sector too large in comparison to its intended audience. A landlord levy was introduced in 2014 (*Wet maatregelen woningmarkt 2014 II*), cadastral values were to be considered in the determination of maximum rent levels as of 2015 (*Besluit huurprijzen woonruimte*), and the liberalisation limit was frozen for three years in 2016 (Hoekstra, 2017; Government of the Netherlands, n.d.). Reducing the social housing stock thus hinged on weakening the financial position of housing associations, promoting them to sell dwellings, and 'naturally' pushing rent levels over the liberalisation limit following house prices increases.

The post-crisis period is by far the least favourable for household mobility when it comes to the institutional context. Not only were credit conditions tightened, access to the social rental sector was restricted and benefits of mortgage interest deduction were reduced. Differences before and during the crisis were considerably smaller. While the stimulatory measures are presumed to have stimulated the demand for owner-occupied housing to some extent, they ultimately proved unable to prevent the near-complete stagnation of the Dutch housing market.

3.2. The expected impacts on household mobility

Having described the macroeconomic and institutional developments, this section continues by formulating the expected impacts of changes in the context on household mobility. It is structured similar to the previous section, that is, starting with the impacts of macroeconomic developments before proceeding with the impacts of the policy changes following the crisis.

Expected impacts of macroeconomic developments

Despite the remarkable boom at the turn of the century due to the introduction of two-earner mortgages and, to a lesser extent, the dotcom bubble, house price increases were quickly decelerating (Boumeester, 2004). While the conditions were not necessarily unfavourable before the crisis, especially compared to the crisis itself, they did not provide the same investment incentive as opposed to the accelerating house price increases after the crisis. Combined with the historically low interest rates, it is reasonable to expect that housing preferences in general have shifted more towards owner-occupied housing shortly after the crisis. On the other hand, the current developments are also expected to work polarising. Strong price increases, especially when accelerating, indicate fierce competition on the housing market in which low-income household generally get the short end of the stick. The further prices increase, the more households lose access to the owner-occupied sector. Moreover, it also attracts (private) investors which further limits the supply of owner-occupied housing available to the public (Dutch Central Bank, 2018).

Based on the macroeconomic developments, the demand for owner-occupancy is therefore expected to be lowest during the crisis because of the sharp economic downturn and uncertainty about further house price decreases. When comparing before and after the crisis, it is believed that the demand for owner-occupied housing will be significantly higher in the latter. For one, the economy was gaining momentum rather than losing it, offering much better prospects for the near future. In addition, house prices were still relatively low and credit cheaper than ever, which greatly increased the accessibility of the owner-occupied sector for lower income households and offered interesting investment opportunities.

Expected impacts of institutional developments

The impacts on household mobility of policy reforms in response to the crisis are rather questionable. If a reduction in the cost of financing results in rising house prices, as explained in section 2.3, the opposite is expected to occur when mortgages become relatively more expensive due to tighter credit conditions, the own equity that is required to cover additional (transaction) costs, and reduced benefits of mortgage interest deduction. However, assuming that household incomes do not change, a drop of sufficient magnitude (i.e. more than compensating for the increased cost of mortgages) could actually improve the affordability and thus accessibility of the owner-occupied sector. Nevertheless, the reforms are still expected to induce further polarisation over time. Starters and low-income households are put at a disadvantage compared to higher income households or those already owning a house for one reason in particular: not having the equity required nor assets from which it can be

released. The further house prices increase, the more dependent these households will be on intergenerational support to bridge the gap or else risk being excluded from the owner-occupied sector altogether. Apart from the credit conditions, the reformation of the social rental sector is expected to translate in an increased preference for affordable owner-occupied housing among (low) middle-income households. The subsequent potential residualisation of the social rental sector (i.e. increasing concentration of low-income households) might result in increasing segregation and problem accumulation (Hoekstra, 2017). In that event, social housing could become stigmatised and even more households will prefer homeownership over rent for lack of a better alternative.

Judging strictly by the institutional context, regulatory changes following the crisis are believed to cause an increase in the demand for affordable owner-occupied housing as a result of the decreased availability of credit in combination with the restricted accessibility of the social rental sector. In addition, they are also expected to further polarise households by widening the gap between the rental and owner-occupied sector through equity requirements.

3.3. Conclusions

The goal of this chapter was to identify changes in the macroeconomic and institutional context of the Dutch housing system during and after the crisis as well as to formulate expectations regarding the consequences of these changes for household mobility in the Netherlands. This section summarises the main conclusions of this chapter.

The crisis can best be described as a period of economic volatility. Economic growth could not be maintained, house prices kept decreasing, and unemployment increased, illustrating a clear lack of trust in both the economy and housing markets. While unemployment rates were still relatively high immediately after the crisis and labour increasingly flexible, low average mortgage interest rates combined with relatively cheap housing due to price decreases during the crisis created the ideal conditions, from a macroeconomic perspective to enter the owner-occupied housing market after the crisis. Regarding institutional developments, the crisis had initiated a wave of policy reforms through which credit conditions were tightened, access to the social rental sector was restricted and benefits of mortgage interest deduction were reduced.

In terms of household mobility, the demand for homeownership is expected to be lowest during the crisis as a result of the economic instability and uncertainty about further house price decreases. When comparing before and after the crisis, it is believed that the demand for owner-occupied housing will be significantly higher in the latter despite the tighter lending criteria. On the one hand, this is due to the combination of relatively low house prices and low mortgage interest rates, which is believed to (temporarily) ameliorate the effects of the stricter credit conditions. On the other hand, the reformation of the social sector encourages households, especially (low) middle-incomes, to search for affordable alternatives. That said, the contextual developments are simultaneously believed to polarise households in the housing market. The strong price increases after the crisis indicate fierce competition in which low-income household generally get the short end of the stick. The further prices increase, the more households lose access to the owner-occupied sector. Moreover, the equity requirements imposed by the tighter lending criteria widen the gap between the rental and owner-occupied sector.

4. Methodology and data

Having examined the macroeconomic and institutional developments and their expected impacts on household mobility, the subsequent step is to empirically analyse how housing preferences and choices have changed in response to the crisis. In preparation thereof, this chapter elaborates on the methodology and data used in this research. In addition, it will address some important concessions and assumptions made before and during the research. Section 4.1 discusses the selection of dependent variables that are used to examine (changes in) household mobility. Next, section 4.2 will explain the choice for logistic regression analysis to estimate models of household mobility as well as the selection of three periods to reveal changes over time. Section 4.3 will elaborate on the available data, its limitations, and the adaptations that were made accordingly. Finally, section 4.4 provides a concise overview of the research design to conclude the chapter.

4.1. Selecting the dependent variables

As was explained in chapter 2, housing is a complex good that encompasses a wide range of attributes to be considered when households formulate preferences or make choices. Granted that it is infeasible to examine every single aspect within the allocated time, the purpose of this section is to select the dependent variables to be included in the empirical analyses of household mobility.

While this research primarily focusses on the owner-occupied sector, it is still wise to start with examining the overall development of household mobility. Although it is expected that the recent price increases indicate a change in the preferences of households (i.e. qualitative change), it might simply be caused by an increase in demand (i.e. quantitative change). The first dependent variables to be included are therefore intention to move and preferred tenure as this will enable determining whether the demand for housing in general, and homeownership in particular, have changed following the crisis. To examine whether the demand for housing has changed within the owner-occupied sector itself, three additional dependent variables were selected. Starting with price, changes in the value of housing over time are controlled for by adjusting all prices to the price level of 2015 using the price index for existing owner-occupied dwellings (PBK). Similarly, household incomes are corrected for inflation using the consumer price index (CPI). With price and income effects taken out of the equation, results of the analyses will reveal whether demand in relation to price has structurally changed in response to the contextual developments. This, in turn, serves as a proxy for the trust in the housing market and (perceived) accessibility of the owner-occupied sector. The remaining two variables are type and size. Combined, these three variables offer a general insight in the demand within the owner-occupied sector in qualitative terms. Granted that revealed preferences only provide information about the actual housing choices made in the owner-occupied housing market, analyses thereof will only focus on household mobility within the owner-occupied sector (i.e. excluding intention to move and tenure).

As such, five dependent variables were selected to analyse household mobility while remaining feasible within the time frame of this research: intention to move, preferred tenure, price, type, and size of the dwelling.

4.2. Logistic regression analysis

The next step is to determine the method that will be employed for the quantitative analyses. The aim is to estimate models that predict the housing preferences and moving behaviour of households based on their characteristics. However, the main issue is that most housing attributes are categorical rather than continuous, thereby violating the assumptions of normality and homoscedasticity required for

the commonly used linear regression model (Sieben & Linssen, 2009). This section will therefore explain the use of logistic regression analysis to model household mobility and the selection of periods to examine changes over time.

Modelling household mobility

Put crudely, logistic regression analysis allows to compute probabilities of dichotomous choices. Parameters are estimated in SPSS according to the following model:

$$\frac{P_1}{1-P_1} = e^{\beta_0 + \sum_{j=1}^{m} \beta_j X_j} \leftrightarrow log\frac{P_1}{1-P_1} = \beta_0 + \sum_{j=1}^{m} \beta_j X_j = \beta_0 + \beta_1 X_1 + \ldots + \beta_m X_m \qquad (1)$$

The value for the dependent variable represents the logarithm of the relative chance on a value for Y, also referred to as the logit, ranging between negative and positive infinity (Boumeester, 2004). Using model (1), the effect of a change of one unit in one of the independent variables, ceteris paribus, on this logit can be estimated. When performing logistic regression, SPSS estimates parameters using the maximum likelihood method so that they best fit the data. Recalling some of the distinctive features of housing markets addressed in chapter 2, it thus avoids the flaws of standard consumer theory by neither assuming households to behave rationality nor using maximum expected utility to determine the probabilities. Considering that the logit is an incredibly difficult quantity to interpret, Boumeester (2004) suggests using the anti-logarithm to compute the probability of the dependent variable having a value of 1 to occur. This can be done by substituting the results of the analysis into model (2):

$$P_1 = \frac{e^{\beta_0 + \sum_{j=1}^{m} \beta_j X_j}}{1 + e^{\beta_0 + \sum_{j=1}^{m} \beta_j X_j}} \qquad (2)$$

Within this research, probabilities will only be displayed for individual household characteristics to prevent the models becoming too large. This results in a simplified version of model (2), as shown below, in which the coefficient '*a*' represents the constant and '*b*' the coefficient estimated for the household characteristic. Note that omitting the coefficient '*b*', assigning it a value of 0, will yield the average probability observed in the sample.

$$P_1 = \frac{e^a * e^b}{1 + e^a * e^b} \qquad (3)$$

While this seems relatively straightforward, three additional remarks are required. First, logistic regression aggregates individual observations into a single probability for that particular subpopulation. With respect to this research, for example, one parameter is estimated for all single households. This implicitly assumes that households with the same characteristics have similar preferences and make similar choices. Second, as explained by Boumeester (2004), logistic regression needs a point of reference when all independent variables are categorical. By setting the contrast to 'deviation' in SPSS, the average probability for the entire sample is used as reference, which is reflected by the constant. The other parameters then show the effect of each category relative to this average probability when all others are kept constant. In other words, it illustrates how much different household types deviate from the average probability. Third, estimation of the models is done using the 'enter' method in which all selected independent variables are added simultaneously, irrespective of their contribution to explaining a particular dependent variable. While it may result in less efficient models, this is to ensure that the independent variables are identical across the different models. Even if, for example, a certain predictor loses its significance over time or is not significant for predicting every dependent variable, it still is necessary to control for potential indirect effects.

Considering that most housing attributes are inherently polychotomous, the choice for logistic regression might seem odd as it requires a dichotomous dependent variable. While there are methods available that can handle dependent variables with more than two categories, multinomial logistic regression for instance, attempts to use them resulted in extremely unreliable models. The presumed cause is that multinomial logistic regression calculates probabilities conditionally, thereby making all conceivable combinations of independent and dependent variables. Consequently, probabilities were either not calculated at all due to the absence of cases or estimated based on only a handful of cases. It was therefore decided to use logistic regression even though this meant having to reduce the dependent variables to a dichotomous level. While this is relatively easy for the intention to move, preferred tenure, and type of dwelling, national averages for 2015 were used to split the variables price and size into two categories: the average selling price and average floor area of €230,194 and 119 m^2, respectively (Statistics Netherlands, 2018[a] & 2018[c]). For the sake of simplicity, these have been rounded to €230,000 and 120 m^2. An overview of the categories and internal coding of the dependent variables is presented in *table 4.1*.

Table 4.1 Categories and internal coding of the dependent variables

Variable	0	1
Intention to move	Not intended to move	Intended to move
Preferred tenure	Rent	Owner-occupancy
Price	≤ 230,000	> 230,000
Type	Multi-family	Single-family
Size	≤ 120 m^2	> 120 m^2

Examining changes over time

Ideally, analyses are conducted on a year-by-year basis to generate the most insight in how household mobility develops within a continuously, albeit gradually and incrementally, evolving system. From a pragmatic point of view, this is unfortunately impossible given the time and data that are required for such an extensive study. Therefore, three periods were selected keeping both the context and availability of data in mind: 2002 – 2004, 2009 – 2011, 2015 – 2017. This will inevitably lead to the loss of information, especially concerning the subtler changes, but still enables the long-term developments in and effects of the crisis on household mobility to be uncovered.

4.3. Data

With the dependent variables and method selected, the last step is to prepare the data for the analyses. This section offers some general information about the available datasets, the selection procedure that was applied to exclude irrelevant cases, and the adjustments that were made either because of or to the data.

Available datasets

The data used for the quantitative analyses in this research stems from two sources. The first is the Dutch Housing Needs Research (*Woningbehoefte Onderzoek, WBO*) and its successor the Dutch Housing Research (*Woon Onderzoek Nederland, WoON*). These datasets are based on extensive surveys, containing questions about household characteristics, the intention to move, and the past, present, and preferred housing situation. Three editions were available for this research: WBO 2002 with 75,043 cases, WoON 2009 with 78,071 cases, and WoON 2015 with 62,688 cases. These will be used to examine the effects of the crisis on stated preference. While these datasets also include information regarding recently moved households, they are not particularly useful for examining revealed preference within the context of this research. The problem is that, in the original versions of

both the WBO and WoON, there is a mismatch between the respective time frames. To clarify, households are defined as recently moved if they moved house in the previous two years, whereas the intention to move covers the following two years.

Instead, a dataset provided by the NVM was used to model the actual movements. This contains a detailed account of transactions made on the housing market, featuring 33,075 cases for the period 2015 – 2017. The initial idea was to model revealed preferences for all three aforementioned periods. However, there is no information available regarding household characteristics for the earlier two periods. In addition, the household characteristics for the latest period are aggregated into 14 profiles with no means to separate them. This means that it is not possible to make a perfect comparison between stated and revealed preference. Regardless, it still offers valuable insight in the ability of households to realise their housing preferences in contemporary housing markets.

Selection of cases

Naturally, not all cases can be used for each analysis. A selection procedure was applied to exclude irrelevant cases that might affect the model results. Presented in *table 4.*2, it becomes increasingly narrow as the analyses become more specific. For those that want to reproduce the analyses, the syntax for the selection has been included as well. As pointed out by Dol & Boumeester (2017), the WoON features data about household income from the tax registry (the same applies to the WBO). As this is not available for people that intend to move for the first time, that is, moving out of a parental or student home, it is not possible to include starters in the analysis. Subsequently, the selection is restricted to those looking specifically for a dwelling to avoid including households that prefer, for example, accommodation in nursing homes or combinations of working and living (e.g. operational farms). Not only is it deemed unrepresentative for the preferences of the average household, it simultaneously eliminates those that plan to leave the housing market altogether. Removing these cases should reduce potential bias in the estimation of the parameters. The latest addition further limits the selection to households with a preference for homeownership. *Table 4.2* also displays how the selection procedure affects the overall size of the samples used to estimate the models. This is presented in ranges to reflect the lower and upper bound across the three separate datasets. Despite ultimately excluding up to 90% of the total number of cases in the datasets, the smallest sample still holds 6,123 cases and is thus sufficiently large to perform logistic regression analysis. Regarding the data supplied by the NVM, the selection of cases is far simpler as each case represents an actual transaction made on the housing market. With 'unordinary' transactions (e.g. forced sale or inheritance) absent, the only criterium applied is that the transaction involves a purchase rather than rent. As such, all models of revealed preference are based on the same sample consisting of 29,908 cases.

Table 4.2 Selection procedure for analyses based on the WBO and WoON datasets

Analysis	Selected cases	Syntax SPSS (WoON 2015) *	n (x1,000)
Intention to move	All households (excluding starters)	(HVS = 1 OR HVS = 2)	53 - 66
Preferred tenure	All households inclined to move and looking for a dwelling	(HVS = 1 OR HVS = 2) AND Verh = 1 AND GHvs_n = 1	11 - 15
Type, price, and size	All households inclined to move and looking for an owner-occupied dwelling	(HVS = 1 OR HVS = 2) AND Verh = 1 AND GHvs_n = 1 AND GHuKo_n = 1	6 - 8

* For both the WBO 2002 and WoON 2009, the variable names are slightly different: hvs, ghvs, verh, ghuko

Limitations and additions

Due to data limitations, it was necessary to make several concessions. First of all, the datasets contain little to no information about the employment status of households, resulting in its removal from the household characteristics to be included in the quantitative analyses of this research. Secondly, the previous tenure (or current when analysing stated preferences) was excluded as it would cut the number of usable cases in the NVM dataset roughly in half. While this appears to be more than sufficient to perform reliable analyses, the fact that the other household characteristics are aggregated into profiles resulted in some subpopulations becoming dangerously small and thus prone to inaccuracies. More importantly, the vast majority of information in the NVM data regarding previous tenure concerns owner-occupied dwellings, defeating the purpose of the variable in the first place. Thirdly, both the WBO and WoON datasets include a category 'other' in the variables for education. Because there is no meaningful way in ranking or converting this category, households with this type of education have been omitted from the analyses.

Aside from the removal of variables, the available data also allows for the inclusion of new variables. Up to this point, local housing market conditions have been largely neglected in favour of macroeconomic developments. This decision was based on the scope of the research being nationwide as well as the premise that changes in local housing market conditions are largely the resultant of these developments. Nevertheless, the influence of local housing market conditions on household mobility should not be neglected in the empirical analyses. As stated by Dol & Boumeester (2017):

> "In general, owner occupied dwellings are relatively scarce in urbanised areas, while there is relatively more supply in rural areas. In other words, the availability of owner occupied dwellings is expected to have a correlation with the propensity to move into owner occupation. Under conditions of ample demand for urban locations, this may lead to higher house price levels and crowding out of lower income households" (pp. 7).

Hence, the degree of urbanisation is included to reflect regional variances in a model estimated on a national level. The WBO, WoON, and NVM datasets all contain a variable for urbanisation, which uses a five-point scale based on the average density of addresses. It must be noted that this introduces another slight discrepancy in the comparison between stated and revealed preference. Both the WBO and WoON only feature the degree of urbanisation for the municipality in which the current dwelling is located, while it is highly likely that households will formulate their preferences based on the desired municipality. Computing a variable for the desired degree of urbanisation based on the desired municipality would require manually assigning a value to each municipality for 2002, 2009, and 2015. Considering that a significant share of the households intended to move has not specified the desired municipality and, to a lesser extent, the time frame of this research, it was deliberately chosen to use the available variable instead. To improve the accuracy of analyses, it still is recommended to include a variable for the degree of urbanisation of the desired municipality in future editions of the WoON.

To check whether there are regional variances which cannot be explained by degree of urbanisation, a regional variable is also included. Initially, the research intended to focus on three regions specifically, each representing a different housing market type based on the tightness-indicator developed by the NVM (see *figure 4.1*). This indicator is a proxy for the options a potential buyer would have on the owner-occupied market and is calculated by dividing the supply of dwellings by the number of transactions, usually over the timespan of a month or quarter (NVM, 2017). Therefore, the lower the tightness-indicator, the tighter the housing market. During the exploration of the data, it was soon found that the sample sizes for these regions in the WBO and WoON datasets, most notably Southeast-Drenthe, were too small for reliable analyses. This led to the expansion of the scope to a national level and incorporating regional variances as discussed above. While models based on the

data of the NVM maintain the original regions, mostly due to time constraints, models based on either the WBO or WoON distinguish four larger regions as presented in *table 4.3.*

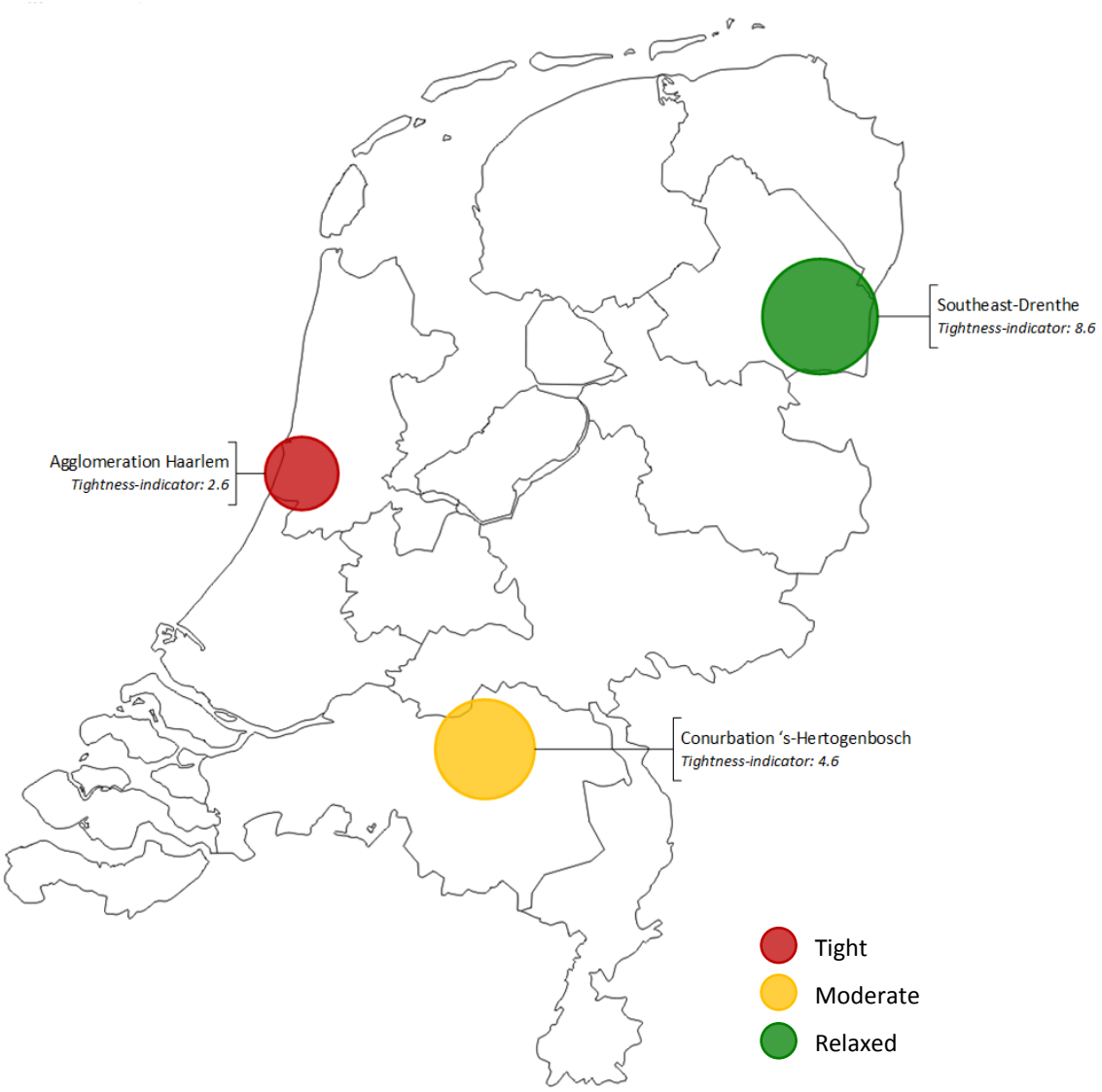

Figure 4.1 Regions used in models based on the NVM dataset. The reported tightness-indicator values are averages for 2017. *Source:* Harleman, personal communication, 2nd of February 2018.

Transformation of independent variables

Lastly, it is necessary to discuss the recoding of two important determinants, namely age and income. As is customary in studies of household mobility, both variables will be classified in this research. Starting with age, this decision was based on the inverted U relation between age and homeownership preferences and outcomes (Dol & Boumeester, 2017; see also Morrow-Jones & Wenning, 2005). Six age categories for the head of the household are distinguished in the analyses ranging from '24 and younger' to '65 and older' with four ten-year categories in between.

Likewise, most empirical studies of household mobility also classify income even though the reason for doing so is rarely explicitly stated (e.g. Boumeester, 1996; Musterd, 2014). Intuitively, it makes sense that slight increases in income do not affect household mobility too much and it therefore might behave similar to age. That is, there are certain thresholds, like the income limit for social housing, after which there is a jump in probability. Based on the study by Hoekstra & Boelhouwer

(2014), it is expected that such jumps mainly occur once households enter the middle-income class and lose access to the social rental sector. Five income categories are therefore distinguished within this research ranging from 'below modal' to 'more than three times modal' (modal being defined as €35,000 gross annual income). As was stated in section 4.1, income data from the WBO 2002 and WoON 2009 have been corrected for inflation using the consumer price index (CPI).

Table 4.3 provides a breakdown of all the independent variables used in the analyses based on the WBO or WoON datasets. As pointed out earlier, the NVM dataset features 14 household profiles which are, in turn, composed of multiple subgroups (50 in total; see *Appendix A*). Each profile contains information about household size (used as proxy for composition), household income, age, and education. As a result of the aggregation, however, the characteristics are often presented in ranges rather than single values or categories. Using the subgroups instead does not resolve this issue, potentially induces inaccuracies in the estimation of coefficients (several subgroups contain fewer than 50 cases), and makes interpreting the models overly complex. Because the subgroups themselves also frequently cover multiple, at times not even contiguous, categories with flexible boundaries, reconfiguring them into more homogenous profiles is impossible. As such, there was no other choice but to use the provided household profiles. An overview of the characteristics per profile will be presented before discussing the models of revealed preferences in chapter 6.

Table 4.3 Breakdown of independent variables into categories (WBO/WoON)

Variable (unit)	Categories	Additional information
Composition	Single Couple Family Single parent Other	 Couple with child(ren)
Income (gross income / year)	Below modal 1 – 1.5 times modal 1.5 – 2 times modal 2 – 3 times modal More than 3 times modal	≤ 34,999 35,000 – 52,499 52,500 – 69,999 70,000 – 104,999 ≥ 105,000
Age head of household (years)	≤ 24 25 – 34 35 – 44 45 – 54 55 – 64 ≥ 65	
Education	Low Middle High	Elementary, LBO, MAVO, MULO, VMBO HAVO, VWO, MBO HBO, WO
Degree of urbanisation (addresses / km^2)	Very strongly urbanised Strongly urbanised Moderately urbanised Weakly urbanised Rural	≥ 2500 1500 – 2500 1000 – 1500 500 – 1000 < 500
Region	North East West South	Groningen, Friesland, Drenthe Overijssel, Gelderland Noord-Holland, Zuid-Holland, Utrecht, Flevoland Zeeland, Noord-Brabant, Limburg

4.4. Overview of the methodology and data

The purpose of this chapter was to elaborate on the methodology and data used to analyse household mobility and examine whether it changed in response to the crisis. This section provides a concise overview of the research design and explains how this design deviates from the original intentions.

Five dependent variables were selected for the empirical analyses of household mobility: intention to move, preferred tenure, price, type, and size of the dwelling. Examining the intention to move and preferred tenure will reveal whether the demand for housing and homeownership has changed in quantitative terms, whereas the price, type and size of the dwelling are used to evaluate household mobility within the owner-occupied sector itself. Analyses of revealed preferences will only include the variables price, type, and size given that they only provide information about the actual housing choices made in the owner-occupied housing market.

Logistic regression analysis will be used to estimate models of household mobility. This method allows to compute probabilities for dichotomous dependent variables. With respect to the price and size of the dwelling, this meant that the national averages were used to reduce the variables to a dichotomous level. In order to examine how household mobility changed in response to the crisis, three periods were selected with the contextual developments and available data in mind: 2002 – 2004, 2009 – 2011, and 2015 – 2017.

The data used for the analyses of household mobility stems from two sources: the Dutch national housing surveys (WBO and WoON) and a dataset supplied by the NVM. The former will be used to estimate models of stated preferences, whereas the latter will be used for revealed preferences. Due to data limitations, several concessions had to be made. Most importantly, analyses of revealed preferences will be limited to the period 2015 – 2017 due to the lack of data regarding household characteristics for the earlier periods. Moreover, employment status was removed as an independent variable because data was either absent or extremely limited. Previous tenure was also removed to prevent subpopulations in the NVM dataset from becoming too small and thereby potentially inducing inaccuracies in the corresponding parameters. Besides removing variables, the data also allowed to incorporate the influence of local housing market conditions by including the degree of urbanisation in combination with a regional variable as a proxy for the available supply. To ensure that sample sizes were large enough, the analyses of stated preferences had to be expanded to a national level. The final alteration consists of the classification of both age and income despite being included as numeric variables in the WBO and WoON datasets. This was done because the relation between these variables and household mobility is assumed to be non-linear as well as to align this research with other studies in the field of mobility research.

Originally, it was intended to model both stated and revealed preferences for all three periods and make comparisons for each period as well as the development over time. Due to limitations of the available data, most notably the absence of data regarding household characteristics for 2002 – 2004 and 2009 – 2011 and aggregation of these characteristics into profiles for 2015 – 2017 in the NVM dataset, this was unfortunately not possible. This was further exacerbated by the necessitated change in scope for the models of stated preferences that could not be copied for the models of revealed preferences due to time constraints. Consequently, the analyses of revealed preferences were repurposed to serve as an indication to what extent households are capable of realising their preferences in contemporary housing markets.

5. Analysing household mobility – stated preferences

The expected impacts of contextual developments on household mobility have regularly been described as polarising. To add some nuance, this mainly applies to the developments that have occurred since the crisis broke out: the wave of policy reforms and recovery of the economy. Considering that the most significant difference between the first two periods, 2002 – 2004 and 2009 – 2011, was the sudden contraction of economic growth and deflation of housing prices, changes in household mobility are expected to be a decline in the intention to move and decreased preference for (expensive) owner-occupied housing regardless of household characteristics. This chapter sets out to explore how the crisis affected housing preferences in more detail and attempts to place these results in light of the changing context. First, however, section 5.1 will provide some general information about the models. Section 5.2 will subsequently discuss the overall demand for owner-occupied housing before examining preferences within the owner-occupied sector in section 5.3. Lastly, section 5.4 provides a summary of the main conclusions. While the models in this chapter only show the estimated coefficients and probabilities, the original models can be found in *Appendix B*.

5.1. General information about the models

Before discussing the model results, two aspects of the models require further explanation. The first is the number of cases used in the analyses. While it was stated in chapter 4 that the overall sample size is no reason for concern, it must be confirmed that each subpopulation is large enough to accurately estimate coefficients. *Table 5.1* displays the minimum number of cases used in the analyses of stated preferences (i.e. with the most restrictive selection applied) for each household characteristic as well as each period. With most subpopulations containing over a thousand cases and the smallest consisting of 158, it is safe to conclude that potential inaccuracies in the coefficients will not be related to sample size.

Table 5.1 Minimum number of cases used in analyses of stated preference. *Source*: WBO 2002, WoON 2009, WoON 2015.

Variable	2002	2009	2015
Household composition			
Single	1,343	2,191	1,579
Couple	2,556	2,541	1,955
Family	2,509	2,899	2,114
Single parent	239	427	317
Other	179	222	158
Household income			
≤ 34,999	1,379	1,797	1,338
35,000 – 52,499	1,653	2,092	1,507
52,500 – 69,999	1,432	1,722	1,284
70,000 – 104,999	1,497	1,761	1,332
≥ 105,000	865	908	662
Age head of household			
<25	401	422	208
25-34	2,833	2,765	1,734
35-44	1,941	2,340	1,555
45-54	1,012	1,516	1,206
55-64	462	852	829
≥65	177	385	591
Educational level			
Low	1,045	817	560
Middle	2,305	2,856	1,864
High	3,467	4,607	3,699

Table 5.1 (continued)

Degree of urbanisation			
Very strong	1,670	3,072	1,632
Strong	1,820	2,000	1,773
Moderate	1,479	1,795	1,249
Weak	1,036	885	1,102
Rural	821	528	367
Region			
North	724	436	431
East	1,438	1,580	1,000
West	3,382	5,147	3,359
South	1,282	1,117	1,333

The second aspect is information about the models themselves. Aside from the model coefficients, logistic regression analysis in SPSS returns several statistics describing the overall performance of the model. As these are important measures for the explanatory power of a model, a box containing these statistics is added to each at the bottom that, apart from the total number of cases, shows the various goodness-of-fit measures: the likelihood ratio (-2 log likelihood in SPSS), the model Chi-square, the Nagelkerke R^2, and the Hosmer and Lemeshow Chi-square.

The likelihood ratio serves as input for the Chi-square test in which the ratio of a model only containing a constant is compared to that of a model with the independent variables included as well. The difference in value between these two likelihood ratios is reported as the model Chi-square which, when statistically significant, confirms that the model with independent variables fits the data better than without (Sieben & Linssen, 2009). The Nagelkerke R^2 can best be perceived as a proxy of the R^2-coefficient featured in standard linear regression analysis. It reflects the proportion of variance in the dependent variable that can be explained by the independent variables (Cohen et al., 2013). Hence, the higher the value of the Nagelkerke R^2, the greater the explanatory power of the model. Lastly, the Hosmer and Lemeshow Goodness-of-Fit Test orders the cases according to ascending predicted probability of success and divides the population into 10 roughly even groups. Next, it compares the observed occurrences of the dependent variable having a value of either 0 or 1 to the predicted occurrences based on the model. The differences are subsequently tested using a Chi-square test (Sieben & Linssen, 2009). Contrary to the model Chi-square, a statistically significant difference here would indicate that the model does not fit the data well. One major issue with the Hosmer and Lemeshow Test, however, is that it is influenced by sample size. As noted by Sieben & Linssen (2009), the test often returns significant differences for (very) large samples even if there are none.

5.2. Intention to move and preferred tenure

The overall demand for owner-occupied housing is mostly dependent on the intention to move and the preference for homeownership. The former affects the number of households searching for a new home in general, whether rented or owned, whereas the latter affects the share of households specifically looking to purchase one. An increase in either of the two, all other things being equal, results in a higher demand for owner-occupied housing. However, it must be noted that this concerns potential demand. Some households may refrain from moving after all or not succeed, while others could have stated not to be intended to move yet do so shortly after. That said, it still is the best approximation of the actual demand as data regarding revealed preferences is not only scarce but also heavily dependent on the available supply. This section will therefore examine how the crisis has affected both the intention to move and preferred tenure.

Intention to move

Table 5.2 displays the results of the models regarding the intention to move. Judging by the statistics, the models appear to perform reasonable. The model Chi-squares indicate that the independent variables do contribute to predicting the intention to move, with the Nagelkerke R^2 for all periods being acceptable albeit not extremely high. The significance of the Hosmer and Lemeshow Chi-squares are most likely the result of the large sample size and are not considered to be valid indicators of a poor fit. Deviations from the average probability per category are presented in *figure 5.1*.

Surprisingly, the average probability that a household wants to move increased during the crisis. This clearly contradicts the expectations based on the macroeconomic conditions and lack of policy developments at the time (as stimulatory measures and reforms were yet to be implemented). One possibility is that households severely underestimated the impact of the crisis, perhaps even considering it a temporary dip which should be taken advantage of. Another explanation could be that households, especially those that had taken full advantage of mortgage product innovation prior to the crisis, actually feared further collapse of the housing market and attempted to bail out to avoid defaulting. Another substantial increase in the intention to move followed after the crisis, the average probability nearly doubling compared to 2002 – 2004, more in line with expectations. As the return of both economic growth and house price increases in 2014 signalled the end of the crisis, households that had been either unable or were deliberately postponing to move all returned to the housing market. That said, a nearly 40% chance of households being intended to move could also indicate a growing mismatch between housing demand and supply. It is therefore worth investigating whether this was only a temporary surge or a permanent increase once new data is published.

With respect to the influence of household characteristics on the intention to move, several interesting observations can be made based on *table 5.2*. Rather than addressing each individual result (which can be read directly from the table after all), it is more interesting to examine the relations between the independent and dependent variables that are revealed.

The effect of household composition appears to support the housing life-course model as being in a relationship and having children are typically associated with a lower tendency to move. This reflects the transitions between the different stages in life as described by the original life-cycle model while simultaneously showing that particular events can also have great impact. An example of the latter being the relatively high probability of single parents to move (e.g. following a divorce or death of a partner). In addition, the differences between the categories have grown larger over time, even when accounting for the general increase in the average probability. Between the two extremes (i.e. families and other households), the difference in probability has risen from approximately 8% in 2002 to 13% in 2009 and ultimately 22% in 2015 (see *figure 5.1*). In light of the macroeconomic and policy developments, there unfortunately is no clear explanation for what caused this divergence.

Surprisingly, the overall influence of household income on the intention to move has decreased after the crisis, illustrated by the convergence of all categories towards the average probability. Especially the significant increase between 2009 and 2015 for households with an income between €35,000 and €52,499 is striking. That said, probabilities have increased fairly uniformly across all categories during this period with the exception of households with an income below modal. The observed convergence can be explained by the radical change in context. The reformation of the social rental sector stimulates (low) middle-income households to search for an alternative, whereas favourable macroeconomic conditions and relatively low house prices encourages households to either enter into or move up within the owner-occupied sector.

Table 5.2 Results logistic regression analysis on the intention to move. *Source:* WBO 2002, WoON 2009, WoON 2015.

	2002			2009			2015		
	B	Sign	P	B	Sign	P	B	Sign	P
Constant	-1.319	**	0.211	-1.047	**	0.260	-0.430	**	0.394
Household composition									
Single	0.042		0.218	-0.012		0.257	0.087	**	0.415
Couple	-0.069	**	0.200	-0.100	**	0.241	-0.080	**	0.375
Family	-0.309	**	0.164	-0.367	**	0.196	-0.512	**	0.280
Single parent	0.126	**	0.233	0.145	**	0.289	0.068	*	0.410
Other	0.210	**	0.248	0.334	**	0.329	0.437	**	0.502
Household income									
≤34,999	0.241	**	0.254	0.235	**	0.307	0.051	*	0.406
35,000 - 52,499	0.087	**	0.226	0.090	**	0.277	0.062	**	0.409
52,500 - 69,999	-0.115	**	0.192	-0.070	**	0.247	-0.020		0.389
70,000 - 104,999	-0.117	**	0.192	-0.109	**	0.239	-0.063	**	0.379
≥105,000	-0.096	**	0.195	-0.146	**	0.233	-0.030	**	0.387
Age head of household									
≤24	1.011	**	0.424	0.983	**	0.484	0.864	**	0.607
25-34	0.670	**	0.343	0.731	**	0.421	0.638	**	0.552
35-44	0.125	**	0.232	0.152	**	0.290	0.140	**	0.428
45-54	-0.321	**	0.162	-0.202	**	0.223	-0.205	**	0.346
55-64	-0.596	**	0.128	-0.593	**	0.162	-0.507	**	0.281
≥65	-0.889	**	0.099	-1.070	**	0.107	-0.930	**	0.204
Educational level									
Low	-0.060	**	0.201	-0.067	**	0.247	-0.173	**	0.353
Middle	-0.068	**	0.200	-0.027		0.255	-0.035	*	0.386
High	0.128	**	0.233	0.093	**	0.278	0.208	**	0.445
Degree of urbanisation									
Very strong	0.396	**	0.284	0.339	**	0.330	0.263	**	0.458
Strong	0.181	**	0.243	0.104	**	0.280	0.115	**	0.422
Moderate	0.033		0.216	-0.005		0.259	-0.059	**	0.380
Weak	-0.223	**	0.176	-0.217	**	0.220	-0.139	**	0.361
Rural	-0.387	**	0.154	-0.220	**	0.220	-0.180	**	0.352
Region									
North	0.040		0,218	-0.092	**	0.243	0.086	**	0.415
East	0.031		0,216	0.115	**	0.282	-0.012		0.391
West	0.015		0,213	0.083	**	0.276	0.009		0.396
South	-0.085	**	0,197	-0.106	**	0.240	-0.083	**	0.374
Model information									
n	63418			66434			52623		
Model χ^2	5005	**	df = 22	6415	**	df = 22	5103	**	df = 22
-2 log likelihood	60300			67643			61593		
Nagelkerke R^2	0.118			0.137			0.129		
Hosmer and Lemeshow χ^2	41.623	**	df = 8	74.736	**	df = 8	135.901	**	df = 8

* $p < 0.05$; ** $p < 0.01$.

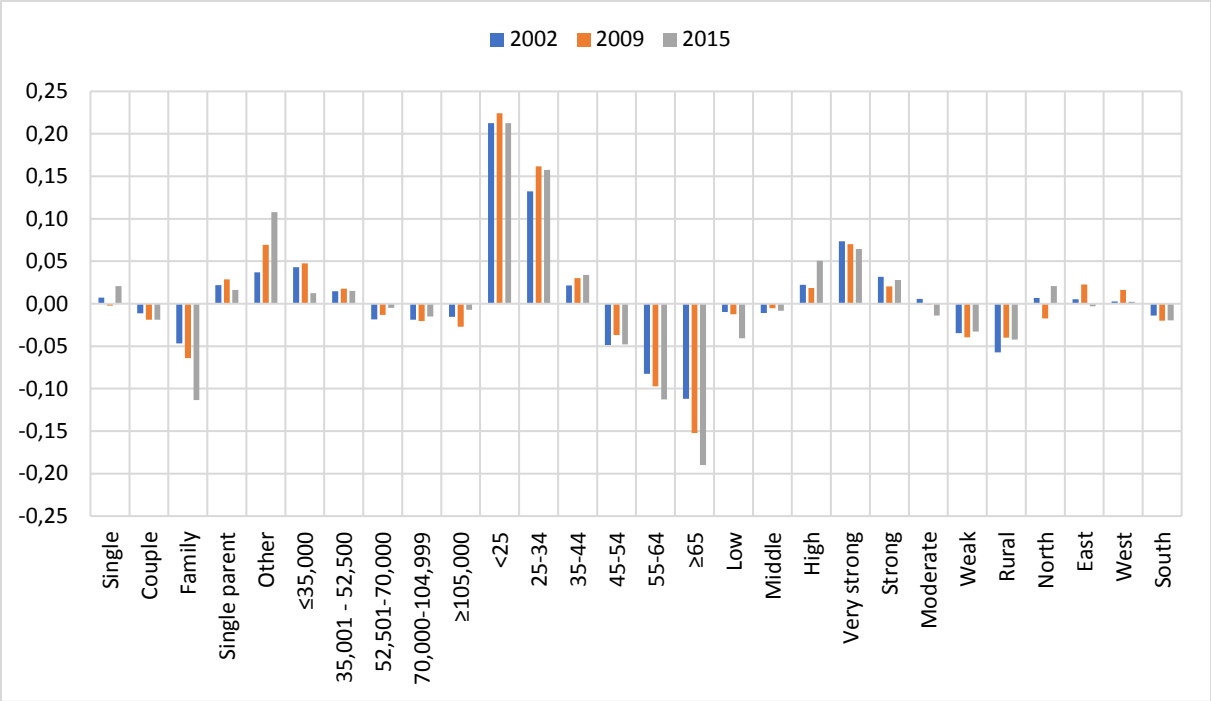

Figure 5.1 Deviations from the average probability per category for the intention to move.

The relation between intention to move and age can be described as inversely proportional: the older a household gets, the lower the probability of moving. Contrary to what the housing life-cycle assumes (see section 2.2, *figure 2.2*), these results seem to indicate the absence of a jump in mobility rate at higher age. In absolute terms, the probability of households aged 65 and over has even increased the least compared to the other age categories. Apart from this, the inversely proportional relation between intention to move and age is clearly visible in all three periods as shown in *figure 5.1*, suggesting that neither the crisis nor the changes thereafter have had much impact.

Conversely, the relation with intention to move is proportional for both the educational level of a household as well as the degree of urbanisation. While the differences between degrees of urbanisation are relatively stable over time, highly educated households show a much larger increase in their propensity to move after the crisis: approximately 17% versus 13% and 10% for middle and low, respectively. As logistic regression automatically controls for indirect effects caused by other variables in the model, the explanation must be sought elsewhere. Considering that unemployment rates are much lower among the highly educated, especially at its peak in 2014, it is reasonable to assume that these households generally have easier access to credit due to higher income security (Statistics Netherlands, 2017). This would in turn offer them more opportunities to act once the economy and housing market recovered and after the lending criteria were tightened. Lastly, there is no apparent relation between region and intention to move. Compared to degree of urbanisation, the impact of the regions appears negligible.

Preferred tenure

The model statistics presented in *table 5.3* show that household characteristics explain a substantial portion of the variance in the dependent variable. That said, the reduction in the Nagelkerke R^2 as well as the increase of the Hosmer and Lemeshow Chi-square over time indicate that the characteristics included have lost some of their explanatory power with respect to preferred tenure. As will be explained below, not all of the observed changes can be easily traced back to the contextual developments. This suggests that either determinants not included in the models have gained importance or that preferences have become more diverse and thus harder to predict.

It was initially expected that the crisis would cause a decline in the preference for owner-occupancy. However, *table 5.3* shows that this was hardly the case. Even more surprising is that the favourable economic conditions and low house prices after the crisis did not result in an increased preference for homeownership either. While it seems only logical to attribute this to the revision of the code of conduct for mortgage loans, the results are inconclusive. Based on the literature, reverting mortgage product innovation and tightening credit conditions should reduce the accessibility of the owner-occupied sector for younger households with relatively low incomes. This is supported by findings concerning the age of the head of the household when comparing 2015 with both 2002 and 2009: the chance of favouring homeownership has substantially declined among the youngest two categories as shown in *figure 5.2*. Household income, on the other hand, is a different story altogether. Although the proportional relation between income and preferred tenure remained intact, the coefficients display a convergence over time: households with incomes below two times modal increasingly preferring owner-occupancy as opposed to those above. Whereas the increase among lower income households can at least partially be attributed to the policy changes in response to the crisis, particularly those targeted at the social rental sector, the decrease among higher income households is puzzling.

Further examination of the deviations per category (*figure 5.2*) reveals that the crisis caused several other notable shifts, albeit most seem to be temporary. For example, there was a strong rise in the probability of singles and couples between 2002 and 2009, even surpassing families at the time. By 2015, however, the order had largely been restored with relatively minor differences compared to the pre-crisis period. Similar temporary shifts are observable among the lowly and highly educated households and, to a lesser extent, (very) strongly urbanised areas. More permanent decreases are visible in the age group 55 – 64, among households with a middle education (i.e. HAVO, VWO, MBO), and in weakly urbanised or rural areas. Aside from the relatively high preference for homeownership in the north in 2002, the region in which a household lives again appears to have little impact.

Based on these findings, the expected polarisation caused by contextual changes after the crisis appears not to apply to the preference for a type of tenure. The convergence of income categories even seems to suggest the opposite, especially when taking the tighter lending criteria into account. Then again, it must be emphasised that housing preferences are not always realistic and that prices did not truly began to escalate until after 2015. Combining the results of the intention to move with that of the preferred tenure, it can be concluded that the overall (potential) demand for housing has strongly increased since 2002. Contrary to the expectations, however, contextual developments seem to have hardly affected the preference for homeownership specifically. While there thus is a clear increase in the demand for owner-occupied housing, it appears almost entirely of quantitative nature.

Table 5.3 Results logistic regression analysis on the preferred tenure. *Source:* WBO 2002, WoON 2009, WoON 2015.

	2002			2009			2015		
	B	Sign	P	B	Sign	P	B	Sign	P
Constant	0.611	**	0.648	0.606	**	0.647	0.546	**	0.633
Household composition									
Single	-0.027		0.642	0.318	**	0.716	0.206	**	0.680
Couple	0.309	**	0.715	0.485	**	0.749	0.382	**	0.717
Family	0.374	**	0.728	0.215	**	0.694	0.547	**	0.749
Single parent	-0.369	**	0.560	-0.462	**	0.536	-0.381	**	0.541
Other	-0.288	**	0.580	-0.556	**	0.513	-0.753	**	0.449
Household income									
≤34,999	-1.640	**	0.263	-1.560	**	0.278	-1.309	**	0.318
35,000 - 52,499	-0.612	**	0.500	-0.451	**	0.539	-0.326	**	0.555
52,500 - 69,999	0.066		0.663	0.051		0.659	0.200	**	0.678
70,000 - 104,999	0.904	**	0.820	0.614	**	0.772	0.427	**	0.726
≥105,000	1.281	**	0.869	1.346	**	0.876	1.009	**	0.826
Age head of household									
≤24	0.319	**	0.717	0.461	**	0.744	0.001		0.634
25-34	0.774	**	0.800	0.967	**	0.828	0.604	**	0.760
35-44	0.606	**	0.772	0.709	**	0.788	0.750	**	0.785
45-54	0.143	*	0.680	-0.026		0.641	0.237	**	0.686
55-64	-0.386	**	0.556	-0.718	**	0.472	-0.576	**	0.493
≥65	-1.456	**	0.301	-1.393	**	0.313	-1.017	**	0.384
Educational level									
Low	-0.568	**	0.511	-0.845	**	0.441	-0.581	**	0.491
Middle	0.127	**	0.677	0.095	**	0.668	0.012		0.636
High	0.441	**	0.741	0.750	**	0.795	0.569	**	0.753
Degree of urbanisation									
Very strong	-0.599	**	0.503	-0.674	**	0.483	-0.582	**	0.491
Strong	-0.299	**	0.577	-0.379	**	0.556	-0.243	**	0.575
Moderate	0.043		0.658	0.065		0.662	0.115	*	0.659
Weak	0.365	**	0.726	0.393	**	0.731	0.291	**	0.698
Rural	0.490	**	0.750	0.595	**	0.769	0.419	**	0.724
Region									
North	0.218	**	0.696	0.115		0.673	0.102		0.657
East	-0.065		0.633	-0.075		0.630	-0.108	*	0.608
West	-0.098	*	0.625	-0.004		0.646	-0.015		0.630
South	-0.055	**	0.636	-0.036		0.639	0.020		0.638
Model information									
n	12585			14886			10899		
Model χ^2	5413	**	df = 22	6142	**	df = 22	3505	**	df = 22
-2 log likelihood	11943			14305			11299		
Nagelkerke R^2	0.467			0.453			0.370		
Hosmer and Lemeshow χ^2	10.106		df = 8	24.379	**	df = 8	39.245	**	df = 8

* $p < 0.05$; ** $p < 0.01$.

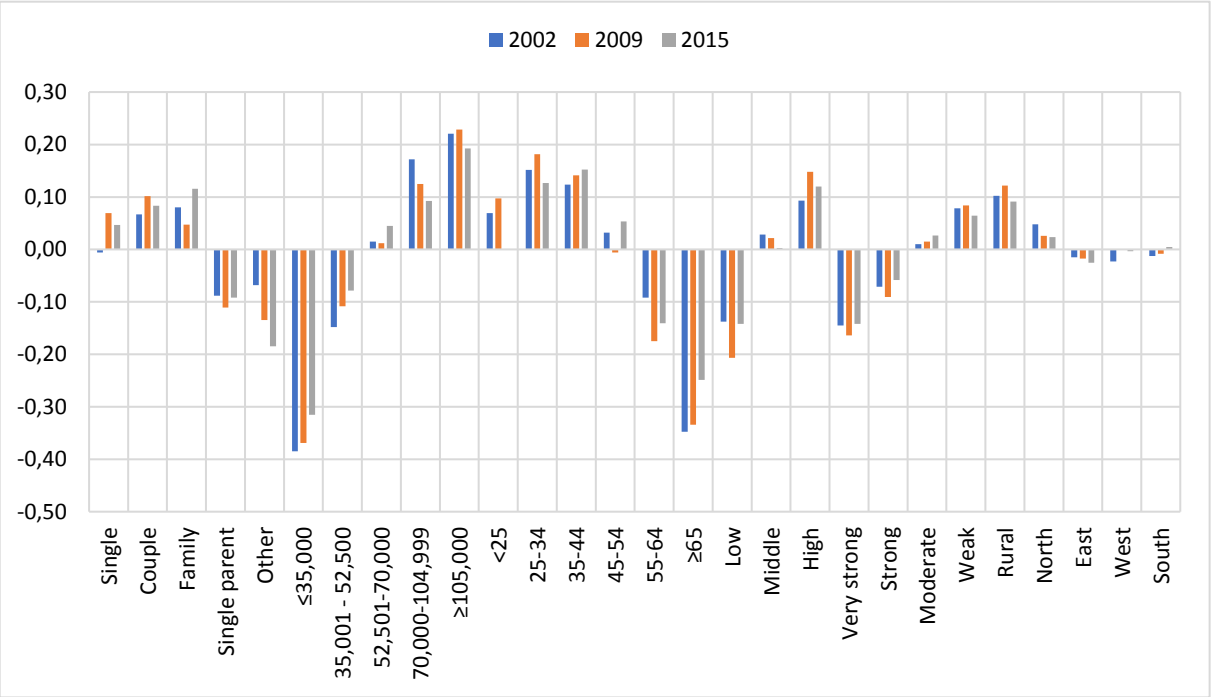

Figure 5.2 Deviations from the average probability per category for the preference for homeownership.

5.3. Preferences within the owner-occupied sector

The previous section strongly suggests that contextual developments primarily affect household mobility in terms of volume, hardly altering how independent variables influence the (probability of) the dependent variables. The changes that were observed show that both the intention to move and preference for homeownership have become less polarised after the crisis, seemingly disproving the expected consequences of the macroeconomic changes and policy reforms. However, a closer examination of the preferences within the owner-occupied sector is required to confirm whether the housing market has indeed become more balanced. This section will therefore cover the preferences with respect to the price, type, and size of owner-occupied housing.

Desired purchase price

Arguably the most important characteristic of owner-occupied housing is the price. Together with the credit conditions and interest rates, house price levels determine the opportunities of households active on the housing market. *Table 5.4* presents the results of the logistic regression analysis regarding the desired purchase price, whereas *figure 5.3* displays the deviations per category. As explained in the previous chapter, price is used as a proxy for the trust in and accessibility of the owner-occupied housing market for different types of households[4]. The performance of the models is comparable to those of preferred tenure. Here too, household characteristics explain a substantial portion of the variance, but appear to lose some of their explanatory power over time.

When comparing these models, the impact of the crisis becomes much more noticeable. The change in the sign of the constant shows that most households, albeit a small majority, have been looking to buy below the average price since the crisis. The steep decline of the average probability between 2002 and 2009 has two plausible causes. First, decreasing house prices rendered the innovative mortgage products practically useless, resulting in an initial reduction of the borrowing capacity.

[4] Considering that house prices are generally rising, households that are capable and willing to spend more than the average price tend to have a better chance of realising their intention to move.

Second, a part of the households may have anticipated further price decreases and adjusted their preferences in advance. Needless to say, the stricter credit conditions implemented from 2011 and onwards prevented a full recovery.

It is interesting to note that the crisis reduced the probabilities across the board yet left the differences between categories within the independent variables largely intact. That is not to say that every household was affected equally. Single parents and other households, households aged 55 and older, and households living in either very strongly urbanised or rural areas were, on average, worse off than others. Furthermore, two remarkable observations can be made concerning regional variances, the first being that the preference for expensive owner-occupied housing is negatively related to the degree of urbanisation. As such, the relatively high prices in the major cities in the Netherlands (e.g. Amsterdam and Utrecht) appear purely due to their location. Second, the northern region was virtually unaffected compared to the others, although the preference for expensive owner-occupied housing was already relatively low there prior to the crisis.

If there was one dependent variable for stated preference in which polarisation after the crisis was expected to be visible, it is the purchase price. Once again, the results suggest the exact opposite to have occurred. Household composition, age, and degree of urbanisation have become virtually irrelevant. Even more surprising is that this convergence is also visible across the various income categories and regions following the crisis: the differences between the extremes shrinking from approximately 51% and 22% in 2002 to respectively 45% and 18% in 2015.

Table 5.4 Results logistic regression analysis on the desired purchase price (price level 2015). *Source*: WBO 2002, WoON 2009, WoON 2015.

	2002			**2009**			**2015**		
	B	Sign	P	B	Sign	P	B	Sign	P
Constant	0.111		0.528	-0.227	**	0.444	-0.143	*	0.464
Household composition									
Single	-0.356	**	0.439	-0.182	**	0.399	-0.050		0.452
Couple	-0.063		0.512	0.104		0.469	0.042		0.475
Family	0.311	**	0.604	0.325	**	0.524	0.280	**	0.534
Single parent	-0.136		0.494	-0.282	**	0.375	0.054		0.478
Other	0.243	**	0.588	0.036	**	0.452	-0.326	**	0.385
Household income									
≤34,999	-0.864	**	0.320	-0.916	**	0.242	-0.787	**	0.283
35,000 - 52,499	-0.804	**	0.333	-0.791	**	0.266	-0.730	**	0.295
52,500 - 69,999	-0.320	**	0.448	-0.208	**	0.393	-0.125	*	0.434
70,000 - 104,999	0.504	**	0.649	0.573	**	0.586	0.478	**	0.583
≥105,000	1.483	**	0.831	1.342	**	0.753	1.164	**	0.735
Age head of household									
≤24	-0.972	**	0.297	-0.828	**	0.258	-0.184		0.419
25-34	-0.630	**	0.373	-0.391	**	0.350	-0.123	*	0.434
35-44	0.078		0.547	0.091		0.466	0.063		0.480
45-54	0.201	**	0.577	0.190	**	0.491	0.026		0.471
55-64	0.630	**	0.677	0.352	**	0.531	-0.154	*	0.426
≥65	0.693	**	0.691	0.586	**	0.589	0.372	**	0.557
Educational level									
Low	-0.389	**	0.431	-0.289	**	0.374	-0.448	**	0.357
Middle	-0.076		0.509	-0.156	**	0.405	-0.200	**	0.415
High	0.465	**	0.640	0.445	**	0.554	0.648	**	0.624

Table 5.4 (continued)

Degree of urbanisation									
Very strong	-0.282	**	0.457	-0.409	**	0.346	-0.124		0.434
Strong	-0.237	**	0.469	-0.204	**	0.394	-0.155	**	0.426
Moderate	0.016		0.532	0.076		0.462	0.042		0.475
Weak	0.192	**	0.575	0.304	**	0.519	0.059		0.479
Rural	0.310	**	0.604	0.233	**	0.501	0.178	*	0.509
Region									
North	-0.638	**	0.371	-0.379	**	0.353	-0.511	**	0.342
East	0.228	**	0.584	0.047		0.455	0.099		0.489
West	0.233	**	0.585	0.223	**	0.499	0.240	**	0.524
South	0.178	**	0.572	0.109	**	0.470	0.172	**	0.507
Model information									
n	6826			8280			6123		
Model χ^2	1837	**	df = 22	2175	**	df = 22	1227	**	df = 22
-2 log likelihood	7625			9242			7231		
Nagelkerke R^2	0.315			0.309			0.242		
Hosmer and Lemeshow χ^2	11.238		df = 8	8.958		df = 8	23.912	**	df = 8

* $p < 0.05$; ** $p < 0.01$.

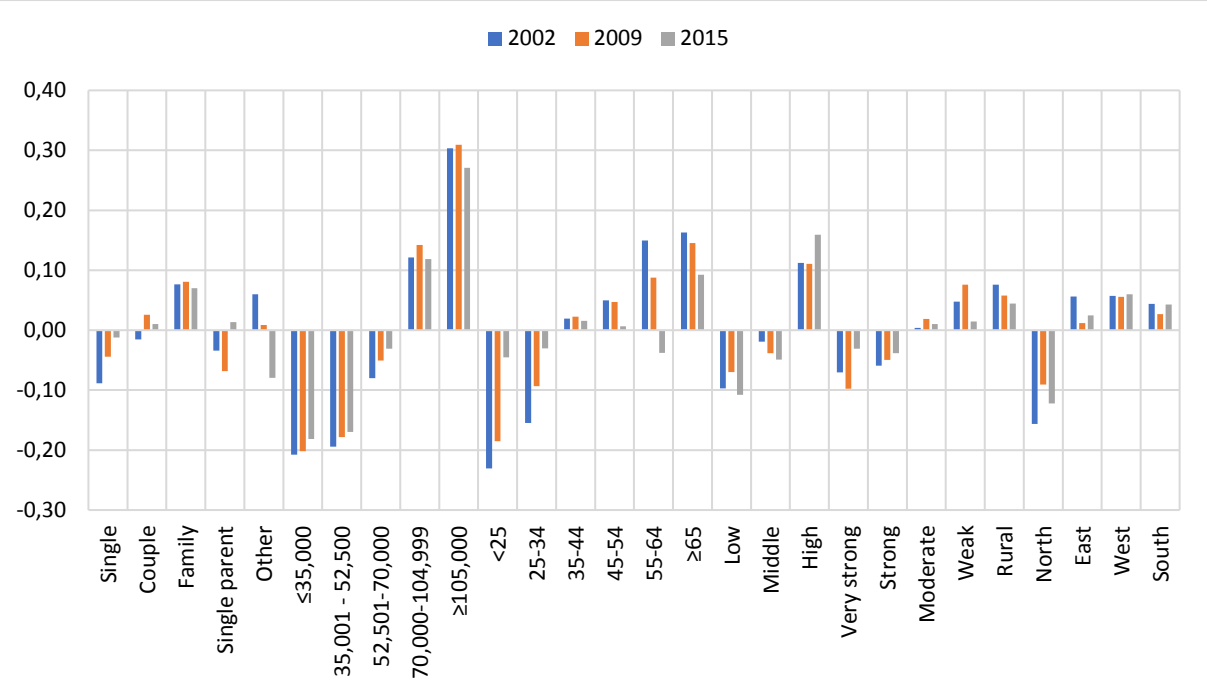

Figure 5.3 Deviations from the average probability per category for the desired purchase price.

Preferred type and size of the dwelling

As was explained in chapter 4, the distinction made for the preferred size of a dwelling was based on the average floor area of a house in 2015. Considering that single-family dwellings are typically larger than multi-family dwellings, it is assumed that the results for the remaining two characteristics display great similarities. Type and size will therefore be discussed concurrently, the results of which are shown in *table 5.5* and *table 5.6*. The statistics show that the models concerning the type of dwelling perform significantly better, reporting Nagelkerke R^2-values that are roughly twice as high. Although the datasets are substantially smaller than those used for the intention to move, it is suspected that

they are still too large for accurate Hosmer and Lemeshow tests. Supporting this suspicion is the fact that, upon closer examination, the models for type of dwelling actually perform better in predicting choices (e.g. 80% versus 65% in 2015; see *Appendix B*).

An overwhelming majority of households prefer single- over multi-family dwellings, regardless of the observed decline of the average probability. Regarding the size, preferences appear to be stable with approximately 60% of the households indicating to want a large dwelling. Granted that the preference for more expensive owner-occupied housing has decreased, the gradually increasing popularity of multi-family dwellings is nothing extraordinary. Another contributing factor is the ongoing migration of households towards the western part of the Netherlands in which there is, relatively speaking, a much larger supply of this type available: 47% compared to roughly 25% in the other regions (Nederlandse Omroep Stichting, 2017; ABF Research, n.d.). Due to the lack of data about the region a household wants to move to, this might not be clearly visible in the results of the analyses.

Aside from the differences in absolute terms, the effects of most independent variables on the dependent variables are indeed similar. For example, singles and other households both display negative deviations. Yet where singles are converging towards the average probability, other households are increasingly designated to smaller multi-family dwellings (see *figures 5.4* and *5.5*). Prior to the crisis, comparable relations also existed for household income (proportional), age head of the household (inverted U relation), educational level (proportional), and degree of urbanisation (inversely proportional). While the crisis and reforms did cause some disturbances in these relations, most were either temporary or marginal. Finally, even though the coefficients are probably underestimated, the models do confirm that smaller multi-family dwellings are in relatively high demand in the western part of the Netherlands after the crisis.

There are some minor signs of polarisation when comparing the changes in coefficients over time, especially regarding the preferred type of dwelling (see *figure 5.4*). This is mainly evident for the variables household composition, age head of the household, and educational level. Rising inequalities can be observed between families and other compositions (except singles), younger and older households, and all levels of education. Considering that the preference for size has been a lot more stable, the changes over time are obviously much subtler. As shown in *figure 5.5*, the one notable development is the relatively sharp decline in the probability for households aged 55 and older. Regional variances have increased very slightly, both in terms of degree of urbanisation as well as the regions themselves, but the changes are considered far too minor and volatile to indicate polarisation.

Having explored how housing preferences within the owner-occupied sector changed in response to the crisis, can it be argued that the housing market has become more balanced? At first sight it may appear so. After all, a lot of the differences in housing preferences between households have been either reduced or almost completely eliminated. The truth, however, is a little more complicated. The decrease in the average probability regarding the desired purchase price could indicate that competition in the lower segments is increasing (i.e. assuming that the adjusted preferences are the result of the reduced borrowing capacity). Considering that this segment is also one of the few affordable alternatives for the middle incomes that are worn from or pushed out of the social rental sector, the affordability of owner-occupancy could be seriously at risk. On the other hand, it could also be related to the increased popularity of multi-family dwellings which are typically smaller and cheaper. Admittedly, using the average for the entire housing stock to create the choices in terms of price and size has probably obscured several changes in housing preferences. Selecting the averages depending on the preferred type of dwelling would resolve this issue and more accurately portray the changes following the crisis.

Table 5.5 Results logistic regression analysis on preferred type of dwelling. *Source*: WBO 2002, WoON 2009, WoON 2015.

	2002			2009			2015		
	B	Sign	P	B	Sign	P	B	Sign	P
Constant	1.844	**	0.863	1.384	**	0.800	1.152	**	0.760
Household composition									
Single	-0.958	**	0.708	-0.757	**	0.652	-0.437	**	0.671
Couple	0.169		0.882	0.197	**	0.829	0.197	**	0.794
Family	1.141	**	0.952	1.457	**	0.945	1.113	**	0.906
Single parent	0.269		0.892	-0.124		0.779	0.274	*	0.806
Other	-0.621	**	0.772	-0.773	**	0.648	-1.147	**	0.501
Household income									
≤34,999	-0.142		0.846	-0.054		0.791	-0.090		0.743
35,000 - 52,499	-0.115		0.849	-0.043		0.793	0.064		0.771
52,500 - 69,999	-0.082		0.853	0.126		0.819	-0.037		0.753
70,000 - 104,999	0.097		0.874	0.107		0.816	0.019		0.763
≥105,000	0.241		0.889	-0.136		0.777	0.045		0.768
Age head of household									
≤24	0.455	**	0.909	0.500	**	0.868	0.801	**	0.876
25-34	0.899	**	0.940	0.798	**	0.899	1.001	**	0.896
35-44	0.949	**	0.942	0.886	**	0.906	1.078	**	0.903
45-54	0.077		0.872	0.151	*	0.823	0.165	*	0.789
55-64	-0.593	**	0.777	-0.818	**	0.638	-0.993	**	0.540
≥65	-1.787	**	0.514	-1.517	**	0.467	-2.052	**	0.289
Educational level									
Low	-0.025		0.860	-0.135	*	0.777	-0.210	**	0.719
Middle	0.025		0.866	-0.051		0.791	0.020		0.763
High	0.000		0.863	0.186	**	0.828	0.190	**	0.793
Degree of urbanisation									
Very strong	-1.080	**	0.682	-0.819	**	0.638	-0.957	**	0.549
Strong	-0.200	*	0.838	-0.088		0.785	-0.062		0.748
Moderate	0.058		0.870	0.127		0.819	0.192	*	0.793
Weak	0.525	**	0.914	0.131		0.820	0.449	**	0.832
Rural	0.697	**	0.927	0.649	**	0.884	0.378	**	0.822
Region									
North	0.385	**	0.903	0.227		0.833	0.341	**	0.816
East	-0.072		0.855	0.004		0.800	-0.054		0.750
West	-0.295	**	0.825	-0.325	**	0.743	-0.273	**	0.707
South	-0.017	**	0.861	0.094	**	0.814	-0.014	**	0.757
Model information									
n	6826			8280			6359		
Model χ^2	1050	**	df = 22	1681	**	df = 22	1640	**	df = 22
-2 log likelihood	4212			6721			5331		
Nagelkerke R^2	0.265			0.288			0.341		
Hosmer and Lemeshow χ^2	21.482	**	df = 8	38.250	**	df = 8	38.633	**	df = 8

* $p < 0.05$; ** $p < 0.01$.

Table 5.6 Results logistic regression analysis on preferred size of dwelling. *Source*: WBO 2002, WoON 2009, WoON 2015.

	2002			2009			2015		
	B	Sign	P	B	Sign	P	B	Sign	P
Constant	0.439	**	0.608	0.341	**	0.584	0.369	**	0.591
Household composition									
Single	-0.447	**	0.498	-0.282	**	0.515	-0.258	**	0.528
Couple	-0.024		0.602	0.058		0.598	0.092		0.613
Family	0.539	**	0.727	0.644	**	0.728	0.647	**	0.734
Single parent	0.009		0.610	-0.114		0.556	-0.106		0.565
Other	-0.078	**	0.589	-0.306	**	0.509	-0.375	**	0.498
Household income									
≤34,999	-0.312	**	0.532	-0.393	**	0.487	-0.281	**	0.522
35,000 - 52,499	-0.326	**	0.528	-0.337	**	0.501	-0.335	**	0.508
52,500 - 69,999	-0.295	**	0.536	-0.161	**	0.545	-0.133	*	0.559
70,000 - 104,999	0.196	**	0.654	0.253	**	0.644	0.147	*	0.626
≥105,000	0.737	**	0.764	0.637	**	0.727	0.602	**	0.725
Age head of household									
≤24	-0.028		0.601	0.102		0.609	0.174		0.633
25-34	0.189	**	0.652	0.014		0.588	0.117	*	0.619
35-44	0.325	**	0.682	0.228	**	0.638	0.317	**	0.665
45-54	-0.074		0.590	0.086		0.605	0.269	**	0.654
55-64	-0.100		0.584	-0.252	**	0.522	-0.379	**	0.497
≥65	-0.311	**	0.532	-0.177	**	0.541	-0.499	**	0.467
Educational level									
Low	-0.095		0.585	-0.113	*	0.557	-0.128	*	0.560
Middle	-0.013		0.605	0.002		0.585	-0.019		0.586
High	0.108	*	0.633	0.110	*	0.611	0.147	**	0.626
Degree of urbanisation									
Very strong	-0.580	**	0.465	-0.598	**	0.436	-0.601	**	0.442
Strong	-0.111	*	0.581	0.003		0.585	-0.044		0.580
Moderate	0.168	**	0.647	0.166	**	0.624	0.173	**	0.632
Weak	0.299	**	0.677	0.180	**	0.627	0.195	**	0.637
Rural	0.225	**	0.660	0.250	**	0.643	0.278	**	0.656
Region									
North	-0.067		0.592	0.123		0.614	0.087		0.612
East	-0.064		0.593	-0.135	*	0.551	0.052		0.604
West	-0.005		0.607	-0.066		0.568	-0.165	**	0.551
South	0.136		0.640	0.078	*	0.603	0.026	*	0.597
Model information									
n	6826			8280			6359		
Model χ^2	692	**	df = 22	1043	**	df = 22	770	**	df = 22
-2 log likelihood	8313			10279			7821		
Nagelkerke R^2	0.132			0.159			0.154		
Hosmer and Lemeshow χ^2	12.664		df = 8	10.619		df = 8	9.910		df = 8

* $p < 0.05$; ** $p < 0.01$.

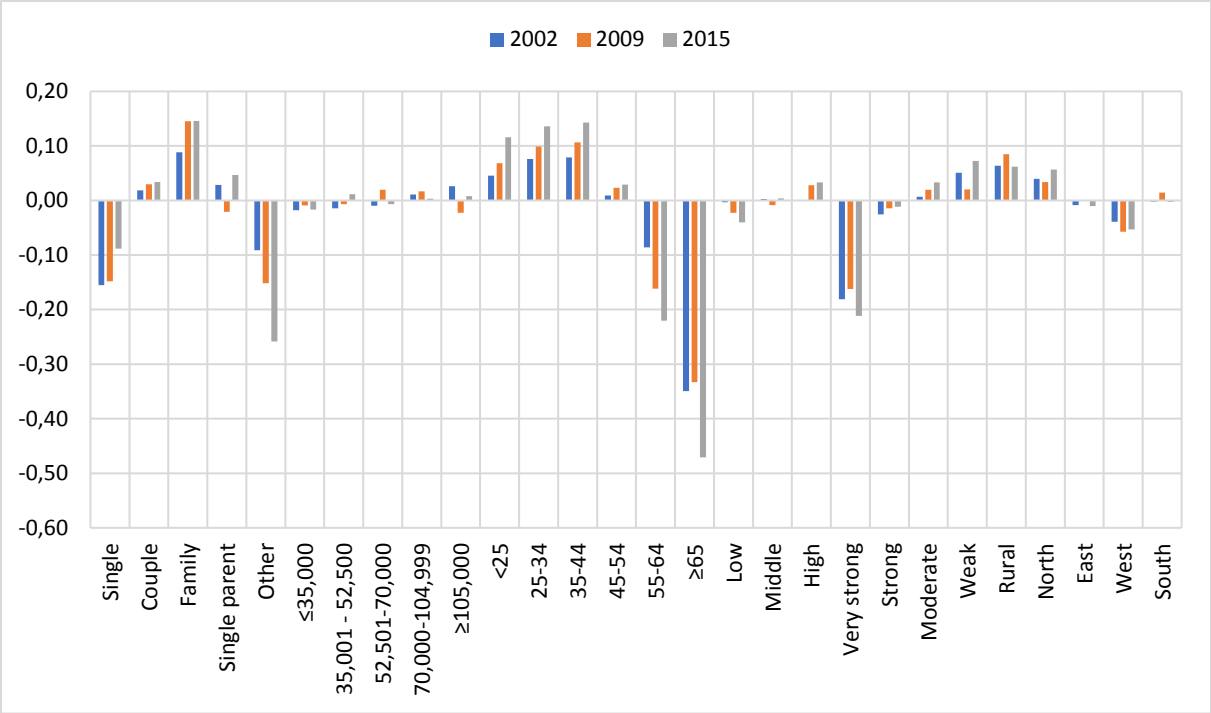

Figure 5.4 Deviations from the average probability per category for the preferred type of dwelling.

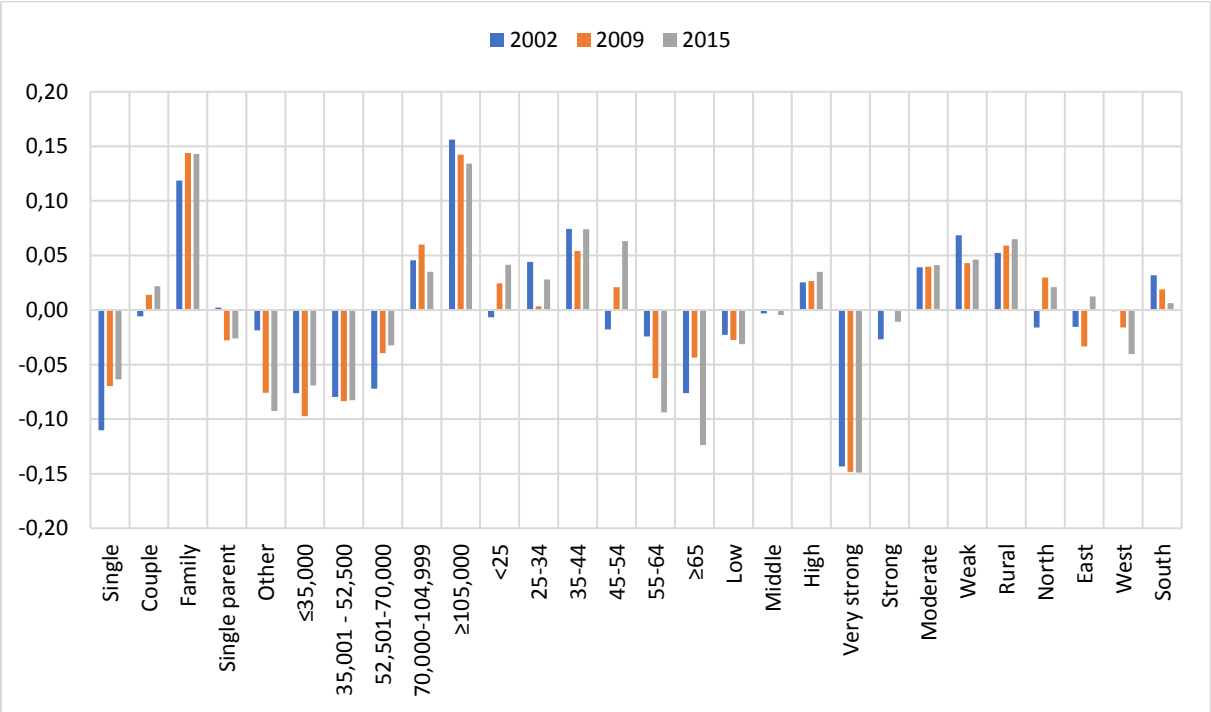

Figure 5.5 Deviations from the average probability per category for the preferred size of the dwelling.

5.4. Conclusions

This chapter set out to examine changes in the housing preferences of households in response to the macroeconomic and institutional developments following the crisis. Based on the results of the analyses, it appears that the contextual developments have primarily affected housing preferences in quantitative terms. While there have been significant changes in the average probabilities (i.e. intention to move, price, and type), the relations between the independent and dependent variables remained practically unaltered. That is not to say that there were no qualitative changes at all, the

most notable being the convergence of income categories for basically every dependent variable in spite of the tighter lending criteria. Furthermore, households aged 55 and older appear to be affected worst by the crisis and subsequent reforms, displaying the lowest intention to move, a substantial decline in the preference for more expensive owner-occupied housing, and a relatively high preference for smaller multi-family dwellings. Regarding the expected polarisation as a result of the contextual developments, there are some minor signs visible between the different household compositions, age groups, and educational levels. Compared to the other developments, however, these minor signs are not deemed sufficient to truly confirm that changes in the context have polarised households active in the housing market.

6. Analysing household mobility – revealed preferences

Although housing preferences are believed to reflect the true demand for housing, households are largely free from constraints when formulating them. Naturally, most households will attempt to adjust their preferences to what is reasonably attainable now or based on expectations of the near future. In overheated markets in which supply is limited and competition is high, however, preferences might prove unrealisable nonetheless. This chapter will therefore analyse the actual movements made between 2015 and 2017 in order to determine to what extent preferences can be realised within the Dutch owner-occupied housing market after the crisis. Section 6.1 will start with explaining the changes that were made to the models to accommodate the data supplied by the NVM. Subsequently, section 6.2 will discuss the results of the analyses. The final section summarises the main conclusions of the analyses presented in this chapter.

6.1. Changes compared to the models of housing preferences

Back in chapter 4, it was explained that data about the household characteristics in the NVM dataset were aggregated into household profiles. Based on the most prevalent characteristic(s) among the sub groups (see *Appendix A*), a value or range was assigned to each profile as shown in *table 6.1*. During this process, single outliers were ignored at times as long as the other groups displayed great similarities. If there were too many differences, no value was assigned. There is no denying that this is far from ideal for performing analyses. For one, manually assigning values is inherently arbitrary and inevitably results in the loss of information. In addition, the effects of individual characteristics are impossible to discern due to them being combined in a single profile. This unfortunately means that it is only possible to compare the average probabilities of stated and revealed preferences and examine how the profiles relate to each other. Based on the number of cases per profile, the only parameter potentially prone to inaccuracies is that of urban balancers.

Table 6.1 Number of cases and characteristics per household profile

Profile	n	Household size	Income	Age	Education
Young digitals	2514	1 - 2	≤ 34,999	≤ 35	Low to middle
Urban balancers	90	1 - 2	≤ 34,999	≤ 45	-
Starting together	1701	-	≤ 34,999	25 – 45	Low
Good city life	4204	1 - 2	-	≤ 40	High
Modal buyers	2038	≥ 3	≥ 35,000	25 – 55	Middle
Child and career	2728	≥ 3	≥ 52,500	25 – 55	High
Social renters	1075	-	≤ 34,999	45 – 65	Low
Mature middle class	2002	-	-	45 – 75	Middle
Freedom & space	3960	≥ 2	≥ 35,000	35 – 65	Middle to high
Golden edge	2101	≥ 2	≥ 52,500	45 – 75	High
Elitist upper class	1830	≥ 2	≥ 70,000	≥ 45	High
Country life	2919	≥ 2	≥ 35,000	45 – 75	-
Deserved pleasure	2038	1 - 2	≥ 35,000	≥ 55	Middle to high
Aged simplicity	708	1 - 2	≤ 34,999	≥ 65	Low

There was one alteration mentioned in chapter 4 that could actually shed more light on one aspect of household mobility: the use of smaller regions selected based on the housing market conditions. While the adoption of the four larger regions for the models of stated preference was necessary to guarantee

a sufficiently large sample size, it simultaneously diluted potential regional variances not related to the degree of urbanisation. If there are any differences caused purely by local market conditions, they are bound to be visible in the models of revealed preferences.

6.2. Movements within the owner-occupied sector

This section is structured similar to its preference counterpart in that it first discusses the results of the model regarding the price of the dwelling, followed by the type and size of the dwelling. In contrast to section 5.3, however, type and size will not be addressed concurrently as there are some notable differences worth elaborating on. Considering that the results no longer have to reflect three models for each period, the change in probability (i.e. the effect of a household characteristic relative to the average probability) was added for the sake of convenience. The original output of the analyses can be found in *Appendix C*.

Actual purchase price

The results of the logistic regression analysis on the actual purchase price are presented in *table 6.2*. Judging by the statistics, the models perform almost as well as those for the housing preferences. The significant model Chi-square indicates that the independent variables contribute to predicting the purchase price and the Nagelkerke R^2 is only fractionally lower. Once more, the significance of the Hosmer and Lemeshow Chi-square is ascribed to the sample size. Provided that the rest of the models in this section are based on the same dataset, it will not be mentioned anymore hereafter.

Table 6.2 Results logistic regression analysis on the actual purchase price (price level 2015). *Source:* NVM.

	2015 - 2017			
	B	Sign	P	dP/dx
Constant	-0.194	**	0.452	-
Household profile				
Young digitals	-0.401	**	0.355	-0.096
Urban balancers	-0.057		0.438	-0.014
Starting together	-0.600	**	0.311	-0.140
Good city life	0.541	**	0.586	0.134
Modal buyers	0.104	*	0.477	0.026
Child and career	0.510	**	0.578	0.127
Social renters	-0.334	**	0.371	-0.081
Mature middle class	-0.314	**	0.376	-0.076
Freedom and space	-0.083	*	0.431	-0.021
Golden edge	0.351	**	0.539	0.087
Elitist upper class	0.776	**	0.641	0.190
Country life	-0.053		0.438	-0.013
Deserved pleasure	0.007		0.453	0.002
Aged simplicity	-0.446	**	0.345	-0.106
Degree of urbanisation				
Very strong	-0.782	**	0.274	-0.178
Strong	-0.399	**	0.356	-0.096
Moderate	-0.305	**	0.378	-0.074
Weak	0.468	**	0.568	0.116
Rural	1.018	**	0.695	0.243

Table 6.2 (continued)

Region				
Haarlem	0.959	**	0.682	0.231
Den Bosch	0.261	**	0.517	0.065
SE-Drenthe	-1.221	**	0.195	-0.256
Model information				
n	29908			
Model χ^2	5331	**	df = 19	
-2 log likelihood	35940			
Nagelkerke R^2	0.218			
Hosmer and Lemeshow χ^2	28.008	**	df = 8	

* $p < 0.05$; ** $p < 0.01$.

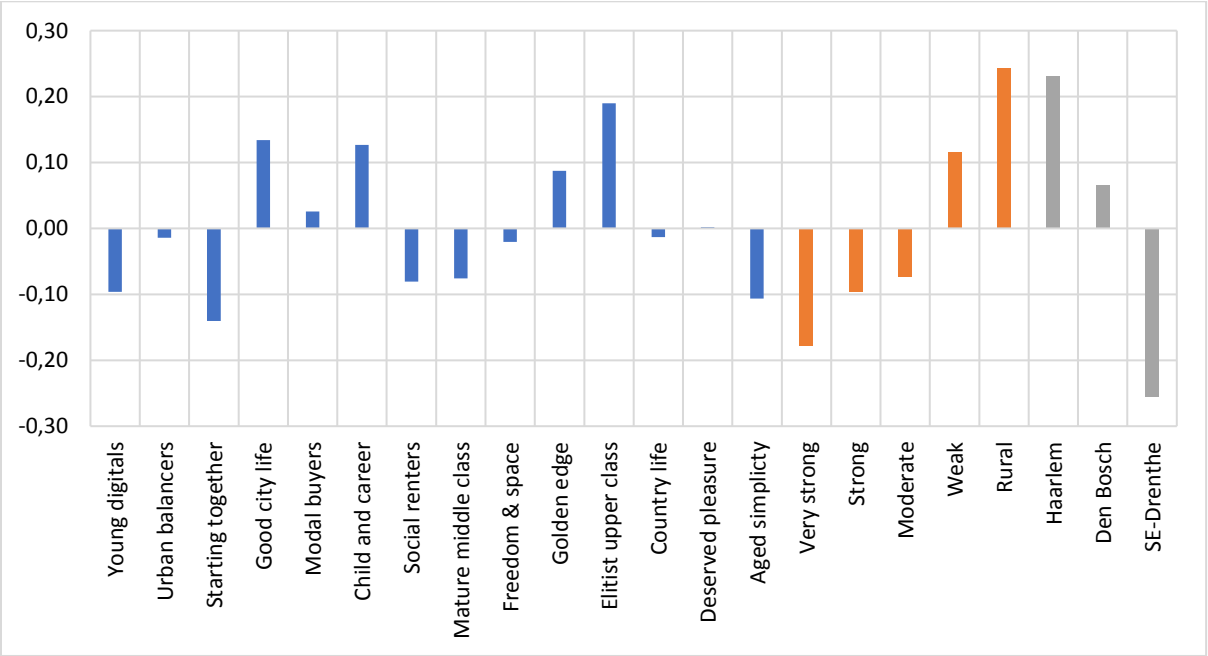

Figure 6.1 Deviations from the average probability per category regarding a purchase above the average price.

There is a remarkably small difference between the average probabilities of stated and revealed preference with regards to the price of a dwelling: 46.4% versus 45.2%. At first glance, it thus seems that housing preferences are an adequate representation of the collective choice behaviour of households on the housing market. Upon closer inspection of the individual household profiles and regional variances, however, some discrepancies can be identified.

Starting with the regional variances, being the easiest to compare after all, there are much greater disparities visible between the categories. Whereas the inversely proportional relation between degree of urbanisation and desired purchase price had virtually disappeared after the crisis, it is still clearly present for the actual purchase price as shown in *figure 6.1*. Moreover, the effect of urbanisation on the latter is much stronger and even surpasses that of the household profiles. The same can be said about the regions given that the direction of the deviations and relative order are identical to those observed for housing preferences, yet the impact is much more noticeable (Haarlem being in the west, Den Bosch in the south, and Southeast-Drenthe in the north). This confirms that regional variances are still prevalent and that local housing market conditions do significantly affect

the purchase price. That said, differences are presumably smaller in reality as the coefficients partially cancel each other out. The agglomeration Haarlem, for example, is also the region that features the highest degree of urbanisation of the three.

The largest deviations are observed for the profiles starting together (-14%) and elitist upper class (+19%) with the remaining profiles falling in line as would be expected. Smaller, lower income, and lesser educated households generally have a significantly lower chance of purchasing a home for an above average price as opposed to the larger, higher income, and highly educated. There is one major exception to this: the urban balancers. Despite having all the characteristics associated with a low preference as well as having access to the social rental sector, their probability is close to the average of the entire sample. On the other hand, households that fit this profile are a rarity in the owner-occupied sector to begin with. Any low-income household, for that matter, that manages to purchase a home above the average price level probably does so with some form of support (e.g. financial backing from parents, inheritance) not captured by the variables included in the model.

Choice of dwelling type

Similar to the models regarding price, the performance of the models for preferred and chosen dwelling type is nearly identical with the Nagelkerke R^2 again being fractionally lower for actual choice behaviour (0.323 compared to 0.341) as shown in *table 6.3*.

Table 6.3 Results logistic regression analysis on chosen dwelling type. *Source:* NVM.

	2015 - 2017			
	B	Sig.	P	dP/dx
Constant	1.533	**	0.822	
Household profile				
Young digitals	0.509	**	0.885	0.063
Urban balancers	0.335		0.866	0.044
Starting together	0.592	**	0.893	0.071
Good city life	0.627	**	0.897	0.074
Modal buyers	0.472	**	0.881	0.059
Child and career	0.009		0.824	0.001
Social renters	0.299	**	0.862	0.040
Mature middle class	0.005		0.823	0.001
Freedom & space	-0.453	**	0.746	-0.076
Golden edge	-0.395	**	0.757	-0.065
Elitist upper class	-0.299	**	0.774	-0.048
Country life	-0.896	**	0.654	-0.168
Deserved pleasure	-0.633	**	0.711	-0.111
Aged simplicity	-0.172	**	0.796	-0.027
Degree of urbanisation				
Very strong	-1.773	**	0.440	-0.382
Strong	-0.937	**	0.645	-0.178
Moderate	-0.236	**	0.785	-0.037
Weak	0.917	**	0.921	0.098
Rural	2.029	**	0.972	0.150
Region				
Haarlem	-0.113	**	0.805	-0.017
Den Bosch	-0.124	**	0.804	-0.019
SE-Drenthe	0.237	**	0.854	0.032

Table 6.3 (continued)

Model information			
n	29908		
Model χ^2	7083	**	df = 19
-2 log likelihood	24519		
Nagelkerke R^2	0.323		
Hosmer and Lemeshow χ^2	40.052	**	df = 8

* $p < 0.05$; ** $p < 0.01$.

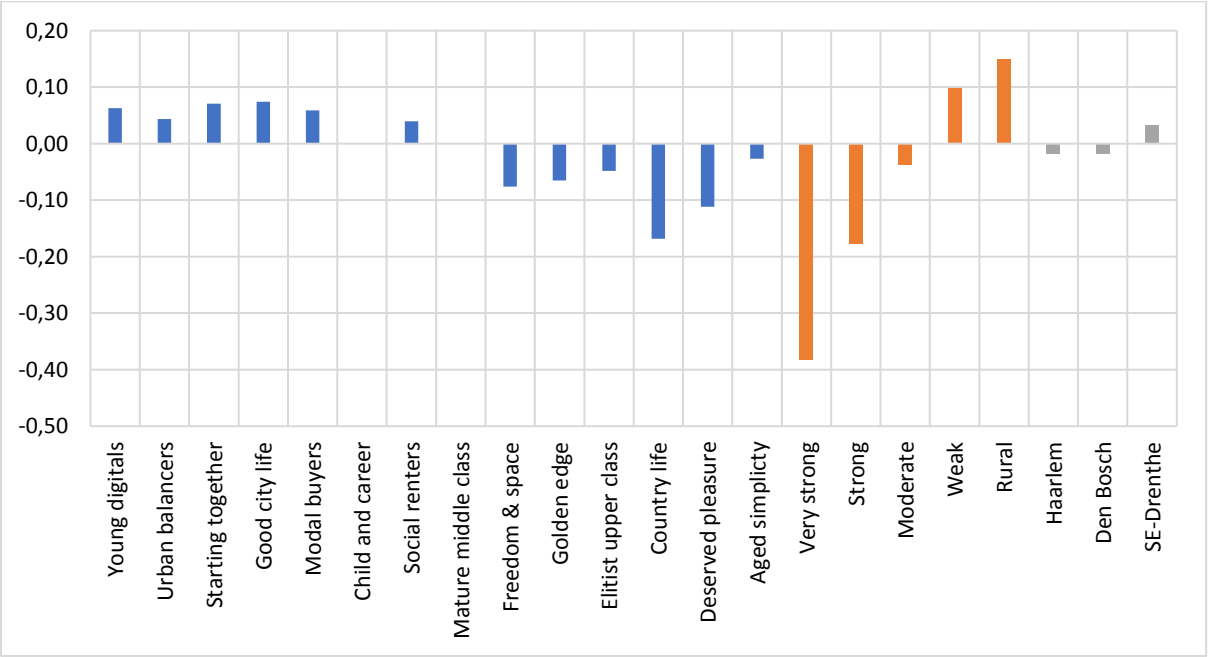

Figure 6.2 Deviations from the average probability per category regarding the choice for a single-family dwelling.

The average probability of purchasing a single-family dwelling (82%) after the crisis is slightly higher than the preferences (76%) initially suggest. However, provided that the models are constructed using different levels of aggregation, this minor discrepancy is essentially negligible. Especially considering that the available supply imposes serious constraints on actual choice behaviour, stated preferences appear to provide a relatively good approximation of the demand for the type of housing.

When examining the influence of urbanisation, another parallel with the models of price is revealed. Both the maximum deviations as well as the differences between the degrees are substantially larger. Furthermore, the inversely proportional relation between degree of urbanisation and type is much more apparent in the actual choice behaviour. The impact of the regions themselves, on the other hand, is surprisingly smaller. This is mainly evident for the agglomeration Haarlem for which the probability of purchasing a single-family dwelling is notably higher compared to the preference of this type in the western part of the Netherlands (approximately 81% versus 71%), almost equal to the average for the entire sample.

Households in the profile country life are least likely to purchase a single-family dwelling (65%), whereas those belonging to good city life display the highest probability (90%). At first sight, this seems to be exactly opposite to what their names imply (considering the associated urban environment). More contradictions can be found when examining the underlying household characteristics. Larger households typically feature a greater preference for single-family dwellings yet smaller households

regularly 'outperform' them according to *table 6.3*. Another possibility is that age is the strongest predictor of dwelling type choice with younger households (< 45) expected to feature the highest probabilities. While this does better match the results, it fails to explain the relatively high probabilities of both the social renters and aged simplicity profiles. This leads to believe that the influence of regional variances is far greater than that of household characteristics in terms of actual choice behaviour regarding the type of dwelling.

Choice of dwelling size

The final dwelling choice to be discussed concerns size, the results of which are presented in *table 6.4*. In terms of explanatory power, the model is once again marginally worse than its stated preference counterpart.

The major difference between preferred and chosen size is clearly illustrated by the average probability. Compared to the 59% preference rate, the 39% choice probability is deemed to be more realistic considering that only 45% of the purchases featured an above average price. As such, this is the first tangible example of housing preferences poorly reflecting the general behaviour of households in the housing market.

A recurring observation that also applies to the chosen size of dwelling is that the effect of urbanisation on the probability of the dependent variable is noticeably stronger. The only degree of urbanisation for which the deviation is smaller being moderately urbanised areas: rather than positively deviating from the average, it is now equal to it. That said, the inversely proportional relation between urbanisation and size remained unchanged. Regarding the differences between the regions, the amplitude of the deviations is almost identical, but the directions are not. For both Haarlem and Southeast-Drenthe, the signs of the coefficients have changed in comparison to the larger regions they are situated in. While the changes are in an order of magnitude of 5% or less and could also be related to specific properties of these regions, further research is still recommended to clarify this development.

Table 6.4 Results logistic regression analysis on chosen dwelling size. *Source:* NVM.

	2015 - 2017			
	B	Sig.	P	dP/dx
Constant	-0.458	**	0.387	
Household profile				
Young digitals	-0.210	*	0.339	-0.049
Urban balancers	-0.783	**	0.224	-0.163
Starting together	-0.135	*	0.356	-0.031
Good city life	0.306	**	0.462	0.075
Modal buyers	0.307	**	0.462	0.075
Child and career	0.504	**	0.512	0.124
Social renters	-0.151	*	0.352	-0.035
Mature middle class	-0.057		0.374	-0.013
Freedom & space	-0.013		0.384	-0.003
Golden edge	0.183	**	0.432	0.044
Elitist upper class	0.751	**	0.573	0.185
Country life	-0.150	**	0.352	-0.035
Deserved pleasure	-0.076		0.370	-0.018
Aged simplicty	-0.476	**	0.282	-0.105

Table 6.4 (continued)

Degree of urbanisation				
Very strong	-1.126	**	0.170	-0.217
Strong	-0.442	**	0.289	-0.098
Moderate	-0.004		0.386	-0.001
Weak	0.619	**	0.540	0.153
Rural	0.953	**	0.621	0.234
Region				
Haarlem	0.030		0.395	0.007
Den Bosch	0.105	**	0.413	0.025
SE-Drenthe	-0.136	**	0.356	-0.032
Model information				
n	29908			
Model χ^2	3309	**	df = 19	
-2 log likelihood	37749			
Nagelkerke R^2	0.140			
Hosmer and Lemeshow χ^2	9.154		df = 8	

* $p < 0.05$; ** $p < 0.01$.

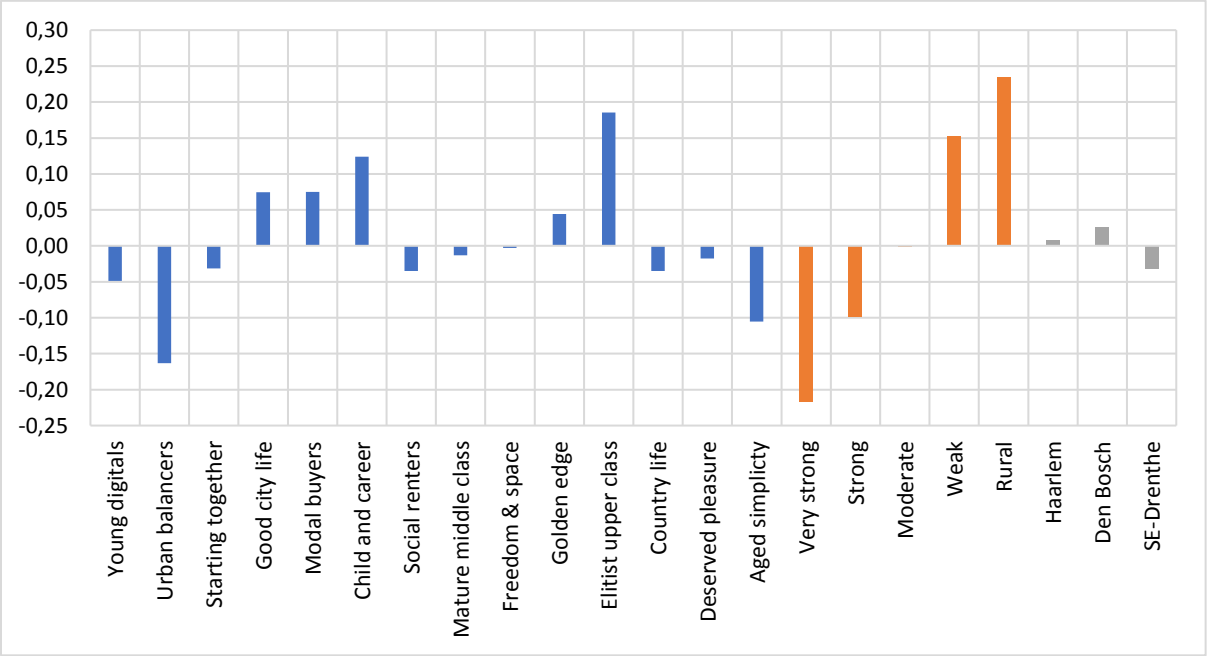

Figure 6.3 Deviations from the average probability per category regarding the choice for a large dwelling (> 120 m²).

As shown in *figure 6.3*, urban balancers (-16%) and the elitist upper class (+19%) again deviate the most from the average. On top of that, it is interesting to note that the amplitude of the deviations is very similar to those observed for the purchase price of a dwelling, suggesting a strong correlation between the two. This is further supported by the fact that here too household income appears to play an important role in the choice of size, illustrated by the clear distinction between profiles with a below modal income and those with an income of one and a half times modal or higher. It is unfortunately impossible to discern the effects of the remaining household characteristics.

6.3. Conclusions

In this chapter, analyses were conducted to determine to what extent the actual moving behaviour as observed in the owner-occupied housing market corresponds with the preferences expressed by households prior to moving. Judging by the model results, stated and revealed preferences appear to be relatively similar on average when it comes to the purchase price and type of dwelling. Conversely, the model of preferred size completely missed the mark on the average choice probability, suggesting that households' preferences may be unrealistic given the contextual and/or market conditions at the time. There also appears to be a consistent underestimation of regional variances in the models of stated preference, especially with regards to the degree of urbanisation, signifying that local housing market conditions do greatly impact dwelling choices. While it was not possible to compare the influence of individual household characteristics, the profiles do behave according to expectations in terms of price and, to a lesser extent, size of the dwelling (i.e. assuming that income is the primary determinant of the latter). This is not the case for the type of dwelling, indicating that this choice primarily depends on the available supply. However, it cannot be emphasised enough that the comparison is imperfect due to the aggregation of household characteristics into profiles as well as change in scope. As such, the empirical evidence is weak and should be perceived as exploratory rather than definitive proof.

7. Conclusions, shortcomings, and recommendations

The goal of this research was to examine whether household mobility changed following the crisis in order to obtain a better understanding of the astounding recovery and subsequent overheating of the Dutch housing market. In addition, it attempted to position these changes within the context of institutional and economic developments, resulting in the research question:

What are the impacts of macroeconomic developments and policy reforms following the crisis of 2008 on household mobility in the Dutch owner-occupied sector?

As answering this question required the examination of multiple different aspects, five additional sub questions were formulated:

(1) *What are the main determinants of household mobility?*
(2) *To what extent has the macroeconomic and institutional context of the Dutch housing market changed during and after the crisis?*
(3) *What are the expected impacts of contextual developments on household mobility?*
(4) *How did the stated preferences of households change during and after the crisis?*
(5) *To what extent do the revealed preferences of households match the stated preferences in general during the post-crisis period?*

Section 7.1 presents the main conclusions of this research. Subsequently, the shortcomings of the research are addressed in section 7.2. To conclude both the chapter and research, recommendations are provided in section 7.3 based on both the conclusions and shortcomings.

7.1. Conclusions

This section presents the main conclusions of the research. It first answers the sub questions individually before combining the results into a comprehensive answer to the main research question.

Answering the sub questions

Based on the literature, three main categories of determinants were distinguished: demographic and socio-economic characteristics of households, policies, and (macro)economic developments. Throughout mobility research, changes in the characteristics of a household are closely associated with changing housing preferences, ultimately triggering the household to move. Relevant household characteristics are age, household composition, income, employment status, education, and previous tenure. The impact of macroeconomic and institutional developments mainly lies in framing the opportunities and constraints in the housing market. Economic growth, inflation, and interest rates constitute the main macroeconomic determinants, whereas the institutional determinants are housing policy, credit conditions, and taxes and subsidies. Due to the interdependencies between the categories, a change in any of these determinants can resonate both within its own category and through the others, unfolding in structural changes.

Examination of the macroeconomic and institutional developments reveal that the context within which households formulate preferences and make dwelling choices has changed drastically. The turn of the century was characterised by rapidly decelerating economic growth and asset price inflation, followed by a period of steady growth (partially) fuelled by financial and mortgage product innovation. In the Netherlands, the crisis caused a strong contraction of the economy in 2009 and prolonged decline of house prices (2009 – 2013), initiating a wave of policy measures and reforms. Besides several temporary stimulatory measures, more structural reforms involved reverting mortgage

product innovations, reducing the transfer tax, tightening lending criteria, and linking mortgage interest deductibility to annual repayments. The main purpose behind these reforms was to reduce the systemic risk within the housing finance system by removing the incentive for maximum debt financing that had stimulated the house price increases prior to the crisis.

While the increased cost of financing is believed to translate in relatively lower price levels, stricter credit conditions potentially exclude households that do not meet the equity requirements, nor have intergenerational support available, from the owner-occupied sector. Furthermore, the reformation of the social rental sector that introduced, amongst others, a new allocation procedure and income-dependent rent increases stimulates households not belonging to the target group to search for alternatives. As this is mainly expected to increase competition in the lower segments of the owner-occupied housing market, it is expected to further diminish the chances of households with little equity (i.e. starters, low incomes, and younger households) to achieve homeownership. Over time, the policy changes are therefore expected to work polarising. An initially cautious recovery of both the economy and housing market in 2014 marked the end of the crisis. Relatively low house prices combined with a significant decrease in the average mortgage interest rates created the ideal conditions to enter the housing market shortly after the crisis. More importantly, this compensated for the negative effects of the tighter lending criteria on household mobility by decreasing the costs of financing. Although this greatly improved the affordability of homeownership at first, it is also believed that it will further widen the gap between the owner-occupied and rental sector.

The empirical models of stated preferences show that the crisis mainly affected the overall demand for owner-occupied housing quantitatively. The probability that a household is intended to move nearly doubled from 21% in 2002 to 39% in 2015. Remarkably, this increase was already visible at the beginning of the crisis (26% in 2009). The preference for homeownership, on the other hand, was virtually unaffected. In terms of qualitative changes of the housing demand within the owner-occupied sector, the crisis caused a significant decrease in the preference for more expensive dwellings which only partially recovered after. As such, there was a small majority of households (54%) searching for housing below the average price level in 2015. Despite single-family dwellings still being favoured by most households, multi-family dwellings have rapidly gained popularity as illustrated by the shift in respective probabilities from 86% and 14% in 2002 to 76% and 24% in 2015. Oddly enough, the preferred size of the dwelling hardly changed accordingly with roughly 60% of households wanting a relatively large (> 120 m^2) house before, during, and after the crisis. The most surprising development over time, however, is the convergence of households from different income categories with respect to the intention to move, the preferred tenure, and desired purchase price. Based on the qualitative analyses of the contextual developments, the opposite was expected to occur. Granted that this research does not cover the true escalation of house prices as is observed currently, it is possible that the combination of relatively cheap housing and low interest rates compensated for the polarising effects of the policy reforms. In addition, these reforms likely placed more emphasis on the importance of own equity and previous tenure, both of which were not included as independent variables due to data limitations.

As far as a comparison was possible, the actual choice behaviour of households appears to correspond with what the models of housing preferences suggest with respect to the price and type of housing. Regarding size, there is a notable difference between the average probability between the models of stated and revealed preference (59% compared to 39%). Taking into account that only 45% of the purchases was above the average price level, this seems to be a clear example of households formulating unrealistic preferences. Closer examination of the models reveals that households appear to consistently underestimate the regional variances when formulating preferences, although this might be partially due to the change in level of aggregation. Given the many contradictions, household characteristics are assumed to have little impact on the chosen dwelling type. Instead, regional

variances appear decisive, suggesting that this choice is mostly dependent on the available supply. With respect to the actual purchasing price and size of the dwelling, household income seems to be the most important determinant.

The impacts of macroeconomic developments and policy reforms on household mobility

Aside from the strong increase in the intention to move, presumably due to households postponing movements during the crisis, the observed changes in housing preferences appear relatively weak in light of the macroeconomic developments and policy reforms. This could suggest that households formulate their preferences largely independent from the context, which seems to be supported by the consistent underestimation of regional variances. Alternatively, it is also highly probable that the favourable conditions shortly after the crisis temporarily ameliorated the negative effects of the institutional changes. For example, the reduced borrowing capacity being more than compensated for by the lowered transfer tax, low mortgage interest rates, and relatively low house price levels. This simultaneously explains the convergence of income categories. Granted that a household can meet the equity requirements and moving itself does not result in large residual debts (mainly referring to households that purchased a home shortly before the crisis), the owner-occupied sector was extremely affordable in 2014 – 2015. The crisis thus seemingly improved the (perceived) chances of lower income households to obtain homeownership. However, similar to the surge of the intention to move, this is assumed to be only temporary. Because house prices did not truly escalate until 2016 and afterwards, the tightened lending criteria did not yet impose serious constraints at the time the survey was conducted for the WoON 2015. With only some minor signs visible in the empirical models featured in this research, further analysis based on more recent data is required to verify whether or not the policy reforms caused polarisation amongst households active in the owner-occupied housing market.

7.2. Shortcomings

It must be acknowledged that this research features several shortcomings. Starting with the demarcation, the inclusion of both macroeconomic developments and policy reforms made it very difficult to link changes in housing preferences to contextual developments due to the many conflicting potential effects. Secondly, the absence of (detailed) information regarding some of the important household characteristics, most notably employment status and previous tenure, has probably been detrimental for the accuracy of the models. Thirdly, the necessity to expand the scope of the analyses of housing preferences from three specific regions to national is believed to have diluted the influence of regional variances, thereby contributing to its consistent underestimation in the models, and created a major discrepancy with respect to the analyses of actual moving behaviour. This discrepancy was further exacerbated by differences between the datasets themselves. The lack of information about household characteristics for the periods 2002 – 2004 as well as 2009 – 2011 eliminated the possibility to examine changes in moving behaviour over time. For the period 2015 – 2017, the aggregation of household data into profiles completely obscured the impact of individual characteristics. These differences rendered a one-by-one comparison impossible. Another problem caused by the use of the NVM dataset is that it, unlike the WBO and WoON, does not contain a scaling factor that can be applied to approximate the choice behaviour of all households intended to move. While the sample size was more than sufficient to estimate robust models, the lack of a scaling factor prevents the computation of success rates (i.e. even when the analyses would be conducted on the same level of aggregation). Consequently, comparing the models of stated and revealed preferences only revealed to what extent the choices match the preferences for those households that succeeded in purchasing a home.

7.3. Recommendations

Finally, several recommendations regarding future research were formulated based on the outcomes and shortcomings discussed above. With the increase in the intention to move potentially indicating a growing mismatch between the housing demand and existing stock, it is strongly advised to investigate whether this was only a temporary effect of the crisis that was reinforced by the favourable macroeconomic conditions or an actual trend. If the latter is true, it could be necessary to re-evaluate (re)development projects as well as urban planning in general. Naturally, this would require additional research to determine exactly how housing demand has changed as the results of this study only reveal a growing interest in multi-family dwellings and, to a lesser extent, relatively affordable housing. To check whether households do underestimate regional variances when formulating preferences, specifically those unrelated to the degree of urbanisation, the analyses could either be repeated at a significantly lower level of aggregation (e.g. municipal) or by incorporating a more specific regional variable. The former approach implicitly assumes that the influence of household characteristics does vary between regions, whereas the latter perceives them as equal.

Arguably the most important recommendation concerns the collection of data. The national housing surveys provide extensive information about household mobility, but also feature an inherent misalignment between stated and revealed preferences due to the datasets being cross-sectional. Unfortunately, this cannot be compensated for by using consecutive editions as the surveys are conducted every three years while the questions only cover two, thus only partially overlapping. The NVM dataset initially seemed to be a perfect substitute for comparing preferences with choices in the owner-occupied sector. However, it did not originally include household characteristics and could only be supplemented with the aforementioned profiles. Based hereon, the following two recommendations are believed to significantly improve the quality of future research. First, the time between the national housing surveys should correspond with the time span used in the questions to avoid ‘gaps’ in the data. Given that both the circumstances of households as well as the housing market can drastically change in three years, it is considered best to conduct the surveys every two years rather than alter the questions. The added benefit thereof is that it reduces the delay between the publication of new data and housing market developments, thereby decreasing potential discrepancies between models and reality. Secondly, the documentation of household characteristics when transactions are made (e.g. by real estate agents) would enable near real-time monitoring of moving behaviour.

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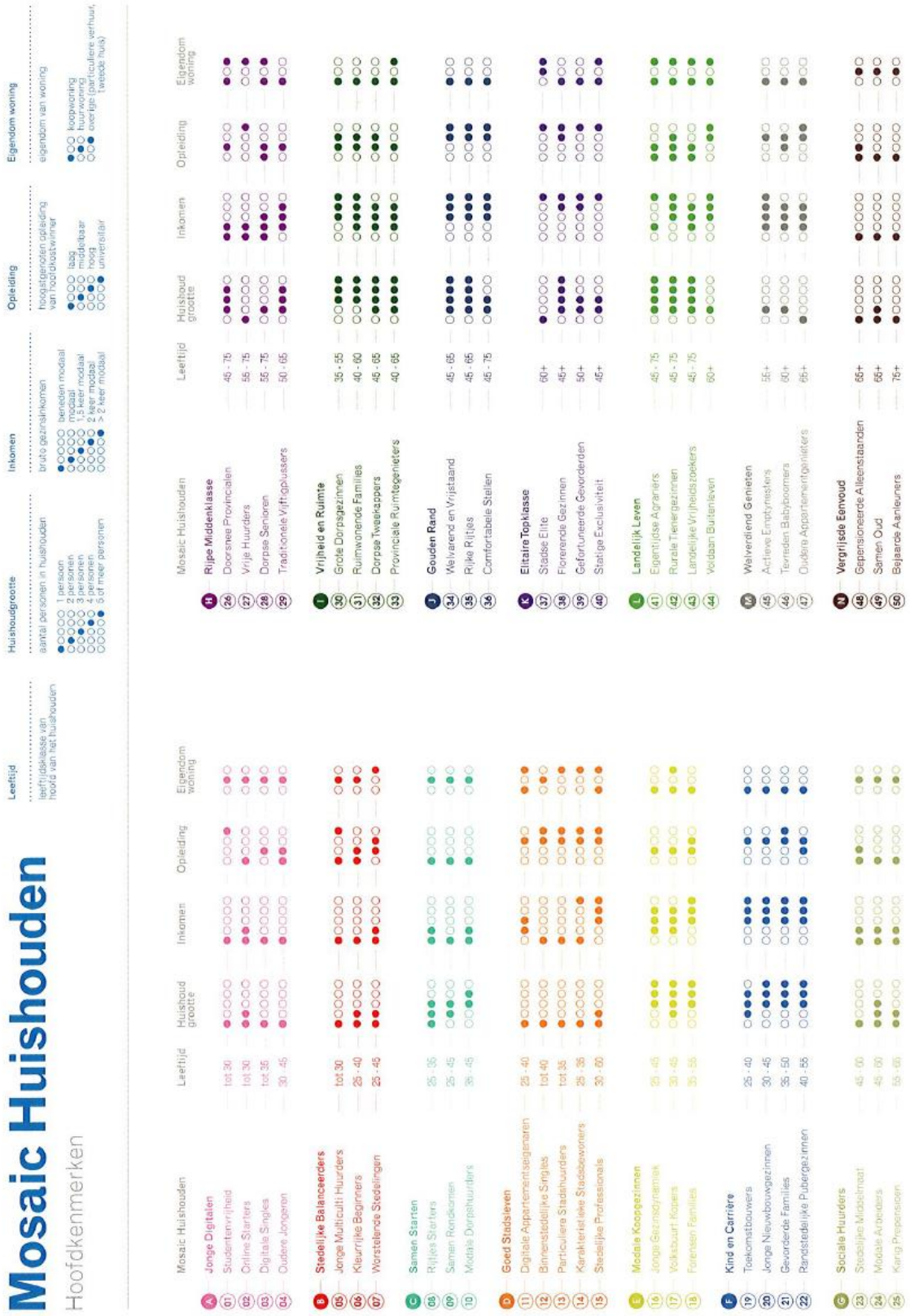
Appendix A: Overview household profiles



Appendix B: SPSS output stated preference (WBO & WoON)

Intention to move, WBO 2002

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	5004.779	22	0.000
Block	5004.779	22	0.000
Model	5004.779	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
60300.420	0.118

Hosmer and Lemeshow Test

Chi-square	df	Sig.
41.623	8	0.000

Classification Table

		Predicted		
		Intention to move		Percentage correct
	Observed	Not intended	Intended	
Intention to move	Not intended	49119	937	98.1
	Intended	12339	1023	7.7
Overall Percentage				79.1

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	.042	.022	3.531	1	.060	1.043
	Couple	-.069	.023	8.846	1	.003	.933
	Family	-.309	.023	174.993	1	.000	.734
	Single parent	.126	.036	12.498	1	.000	1.134
	Other (*ref.*)			184.580	4	.000	
Income	≤34,999	.241	.023	109.536	1	.000	1.273
	35,000 - 52,499	.087	.021	17.172	1	.000	1.091
	52,500 - 69,999	-.155	.024	23.257	1	.000	.891
	70,000 - 104,999	-.117	.026	20.998	1	.000	.890
	≥105,000 (*ref.*)			129.309	4	.000	
Age	≤24	1.011	.039	667.609	1	.000	2.749
	25-34	.670	.020	1097.375	1	.000	1.954
	35-44	.125	.022	31.145	1	.000	1.133
	45-54	-.321	.024	172.179	1	.000	.726
	55-64	-.596	.028	462.268	1	.000	.551
	≥65 (*ref.*)			2908.668	5	.000	
Education	Low	-.060	.017	13.180	1	.000	.941
	Middle	-.068	.015	20.082	1	.000	.934
	High (*ref.*)			64.013	2	.000	
Urbanisation	Very strong	.396	.023	296.906	1	.000	1.486
	Strong	.181	.019	89.923	1	.000	1.198
	Moderate	.033	.020	2.601	1	.107	1.033
	Weak	-.233	.024	87.398	1	.000	.800
	Rural (*ref.*)			443.472	4	.000	
Region	North	.040	.027	2.201	1	.138	1.040
	East	.031	.021	2.255	1	.133	1.031
	West	.015	.019	.620	1	.431	1.015
	South (*ref.*)			16.889	3	.001	
Constant		-1.319	.021	3879.059	1	.000	.267

Intention to move, WoON 2009

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	6414.863	22	0.000
Block	6414.863	22	0.000
Model	6414.863	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
67642.920	0.137

Hosmer and Lemeshow Test

Chi-square	df	Sig.
74.376	8	0.000

Classification Table

		Predicted		
		Intention to move		Percentage correct
	Observed	Not intended	Intended	
Intention to move	Not intended	48145	1977	96.1
	Intended	13454	2858	17.5
Overall Percentage				76.8

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.012	.022	.305	1	.581	.988
	Couple	-.100	.022	20.716	1	.000	.905
	Family	-.367	.023	254.475	1	.000	.693
	Single parent	.145	.032	20.840	1	.000	1.156
	Other (*ref.*)			266.119	4	.000	
Income	≤34,999	.235	.021	120.335	1	.000	1.265
	35,000 - 52,499	.090	.019	21.587	1	.000	1.094
	52,500 - 69,999	-.070	.021	10.595	1	.001	.933
	70,000 - 104,999	-.109	.023	23.040	1	.000	.897
	≥105,000 (*ref.*)			135.063	4	.000	
Age	≤24	.983	.043	533.829	1	.000	2.673
	25-34	.731	.022	1152.236	1	.000	2.076
	35-44	.152	.021	50.400	1	.000	1.164
	45-54	-.202	.022	84.126	1	.000	.817
	55-64	-.593	.023	660.566	1	.000	.552
	≥65 (*ref.*)			3640.640	5	.000	
Education	Low	-.067	.016	17.288	1	.000	.936
	Middle	-.027	.014	3.761	1	.052	.973
	High (*ref.*)			41.365	2	.000	
Urbanisation	Very strong	.339	.021	254.881	1	.000	1.403
	Strong	.104	.019	28.737	1	.000	1.109
	Moderate	-.005	.020	.060	1	.807	.995
	Weak	-.217	.026	68.460	1	.000	.805
	Rural (*ref.*)			288.222	4	.000	
Region	North	-.092	.033	7.619	1	.006	.913
	East	.115	.022	27.434	1	.000	1.122
	West	.083	.020	17.746	1	.000	1.086
	South (*ref.*)			53.431	3	.000	
Constant		-1.047	.021	2472.689	1	.000	.351

Intention to move, WoON 2015

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	5103.333	22	0.000
Block	5103.333	22	0.000
Model	5103.333	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
61592.637	0.129

Hosmer and Lemeshow Test

Chi-square	df	Sig.
135.901	8	0.000

Classification Table

		Predicted		
		Intention to move		Percentage correct
	Observed	Not intended	Intended	
Intention to move	Not intended	32393	2899	91.8
	Intended	12436	4895	28.2
Overall Percentage				70.9

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	.087	.023	14.734	1	.000	1.091
	Couple	-.080	.023	12.243	1	.000	.923
	Family	-.512	.024	441.775	1	.000	.599
	Single parent	.068	.035	3.827	1	.050	1.070
	Other (*ref.*)			472.800	4	.000	
Income	≤34,999	.051	.022	5.273	1	.022	1.053
	35,000 - 52,499	.062	.020	9.811	1	.002	1.064
	52,500 - 69,999	-.020	.022	.844	1	.358	.980
	70,000 - 104,999	-.063	.023	7.463	1	.006	.939
	≥105,000 (*ref.*)			16.353	4	.003	
Age	≤24	.864	.050	303.458	1	.000	2.372
	25-34	.638	.024	685.789	1	.000	1.893
	35-44	.140	.024	33.381	1	.000	1.150
	45-54	-.205	.023	79.990	1	.000	.815
	55-64	-.507	.023	484.027	1	.000	.602
	≥65 (*ref.*)			2578.026	5	.000	
Education	Low	-.173	.017	102.042	1	.000	.841
	Middle	-.035	.015	5.740	1	.017	.966
	High (*ref.*)			197.580	2	.000	
Urbanisation	Very strong	.263	.022	139.054	1	.000	1.301
	Strong	.115	.018	40.019	1	.000	1.122
	Moderate	-.059	.021	8.188	1	.004	.943
	Weak	-.139	.022	41.359	1	.000	.870
	Rural (*ref.*)			196.304	4	.000	
Region	North	.086	.030	8.296	1	.004	1.090
	East	-.012	.021	.331	1	.565	.988
	West	.009	.018	.250	1	.617	1.009
	South (*ref.*)			19.927	3	.000	
Constant		-.430	.021	424.342	1	.000	.650

Preferred tenure, WBO 2002

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	5412.740	22	0.000
Block	5412.740	22	0.000
Model	5412.740	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
11943.202	0.467

Hosmer and Lemeshow Test

Chi-square	df	Sig.
10.106	8	0.258

Classification Table

		Predicted		
		Preferred tenure		Percentage correct
Observed		Rent	Own	
Preferred tenure	Rent	4351	1408	75.6
	Own	1447	5379	78.8
Overall Percentage				77.3

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.027	.044	.362	1	.547	.974
	Couple	.309	.051	37.165	1	.000	1.363
	Family	.374	.047	62.198	1	.000	1.454
	Single parent	-.369	.074	25.149	1	.000	.691
	Other (*ref.*)			97.350	4	.000	
Income	≤34,999	-1.640	.051	1051.719	1	.000	.194
	35,000 - 52,499	-.612	.048	161.574	1	.000	.542
	52,500 - 69,999	.066	.058	1.264	1	.261	1.068
	70,000 - 104,999	.904	.075	147.091	1	.000	2.471
	≥105,000 (*ref.*)			1098.558	4	.000	
Age	≤24	.319	.070	21.021	1	.000	1.376
	25-34	.774	.042	335.262	1	.000	2.169
	35-44	.606	.049	150.822	1	.000	1.833
	45-54	.143	.056	6.395	1	.011	1.153
	55-64	-.386	.066	34.342	1	.000	.680
	≥65 (*ref.*)			566.942	5	.000	
Education	Low	-.568	.035	261.854	1	.000	.567
	Middle	.127	.032	15.856	1	.000	1.135
	High (*ref.*)			280.099	2	.000	
Urbanisation	Very strong	-.599	.050	142.329	1	.000	.549
	Strong	-.299	.043	49.466	1	.000	.741
	Moderate	.043	.047	.854	1	.355	1.044
	Weak	.365	.057	41.212	1	.000	1.441
	Rural (*ref.*)			193.068	4	.000	
Region	North	.218	.060	13.315	1	.000	1.244
	East	-.065	.047	1.893	1	.169	.938
	West	-.098	.042	5.513	1	.019	.906
	South (*ref.*)			14.447	3	.002	
Constant		.611	.049	152.886	1	.000	1.843

Preferred tenure, WoON 2009

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	6142.417	22	0.000
Block	6142.417	22	0.000
Model	6142.417	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
14305.313	0.453

Hosmer and Lemeshow Test

Chi-square	df	Sig.
24.379	8	0.002

Classification Table

		Predicted		
		Preferred tenure		Percentage correct
Observed		Rent	Own	
Preferred tenure	Rent	4730	1876	71.6
	Own	1600	6880	80.7
Overall Percentage				76.6

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	.318	.041	59.005	1	.000	1.375
	Couple	.485	.047	107.938	1	.000	1.624
	Family	.215	.046	21.735	1	.000	1.239
	Single parent	-.462	.061	57.545	1	.000	.630
	Other (*ref.*)			194.090	4	.000	
Income	≤34,999	-1.560	.047	1106.425	1	.000	.210
	35,000 - 52,499	-.451	.044	105.617	1	.000	.637
	52,500 - 69,999	.051	.051	1.029	1	.310	1.053
	70,000 - 104,999	.614	.058	111.188	1	.000	1.847
	≥105,000 (*ref.*)			1152.350	4	.000	
Age	≤24	.461	.067	47.170	1	.000	1.586
	25-34	.967	.041	545.093	1	.000	2.631
	35-44	.709	.045	249.457	1	.000	2.032
	45-54	-.026	.047	.302	1	.583	.974
	55-64	-.718	.053	181.458	1	.000	.488
	≥65 (*ref.*)			1063.390	5	.000	
Education	Low	-.845	.035	596.690	1	.000	.430
	Middle	.095	.029	10.883	1	.001	1.100
	High (*ref.*)			751.736	2	.000	
Urbanisation	Very strong	-.674	.048	196.280	1	.000	.510
	Strong	-.379	.044	74.033	1	.000	.684
	Moderate	.065	.048	1.833	1	.176	1.067
	Weak	.393	.064	37.398	1	.000	1.482
	Rural (*ref.*)			252.702	4	.000	
Region	North	.115	.072	2.534	1	.111	1.122
	East	-.075	.049	2.363	1	.124	.928
	West	-.004	.043	.009	1	.924	.996
	South (*ref.*)			3.386	3	.336	
Constant		.606	.047	169.136	1	.000	1.834

Preferred tenure, WoON 2015

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	3504.956	22	0.000
Block	3504.956	22	0.000
Model	3504.956	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
11299.257	0.370

Hosmer and Lemeshow Test

Chi-square	df	Sig.
39.245	8	0.000

Classification Table

		Predicted		
		Preferred tenure		Percentage correct
Observed		Rent	Own	
Preferred tenure	Rent	2928	1612	64.5
	Own	1236	5123	80.6
Overall Percentage				73.9

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	.206	.046	20.399	1	.000	1.228
	Couple	.382	.051	55.194	1	.000	1.465
	Family	.547	.055	97.815	1	.000	1.727
	Single parent	-.381	.070	29.864	1	.000	.683
	Other (*ref.*)			177.284	4	.000	
Income	≤34,999	-1.309	.052	639.005	1	.000	.270
	35,000 - 52,499	-.326	.049	44.903	1	.000	.722
	52,500 - 69,999	.200	.058	11.974	1	.001	1.221
	70,000 - 104,999	.427	.064	45.065	1	.000	1.533
	≥105,000 (*ref.*)			659.005	4	.000	
Age	≤24	.001	.084	.000	1	.986	1.001
	25-34	.604	.046	169.369	1	.000	1.830
	35-44	.750	.054	190.155	1	.000	2.118
	45-54	.237	.054	18.938	1	.000	1.268
	55-64	-.576	.056	107.505	1	.000	.562
	≥65 (*ref.*)			598.745	5	.000	
Education	Low	-.581	.042	195.492	1	.000	.559
	Middle	.012	.033	.134	1	.715	1.012
	High (*ref.*)			300.593	2	.000	
Urbanisation	Very strong	-.582	.052	124.008	1	.000	.559
	Strong	-.243	.044	30.442	1	.000	.784
	Moderate	.115	.052	4.863	1	.027	1.122
	Weak	.291	.057	26.292	1	.000	1.337
	Rural (*ref.*)			156.484	4	.000	
Region	North	.102	.069	2.181	1	.140	1.108
	East	-.108	.052	4.257	1	.039	.898
	West	-.015	.043	.123	1	.726	.985
	South (*ref.*)			4.687	3	.196	
Constant		.546	.049	126.514	1	.000	1.726

Preferred purchase price, WBO 2002

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	1836.998	22	0.000
Block	1836.998	22	0.000
Model	1836.998	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
7624.814	0.315

Hosmer and Lemeshow Test

Chi-square	df	Sig.
11.238	8	0.189

Classification Table

		Predicted		
		Preferred purchase price		Percentage correct
	Observed	≤ 230,000	> 230,000	
Preferred purchase price	≤ 230,000	2595	860	75.1
	> 230,000	1043	2328	69.1
Overall Percentage				72.1

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.356	.071	24.900	1	.000	.700
	Couple	-.063	.067	.865	1	.352	.939
	Family	.311	.064	23.354	1	.000	1.365
	Single parent	-.136	.126	1.163	1	.281	.873
	Other (*ref.*)			70.032	4	.000	
Income	≤34,999	-.864	.067	167.519	1	.000	.421
	35,000 - 52,499	-.804	.054	220.775	1	.000	.448
	52,500 - 69,999	-.320	.054	34.833	1	.000	.726
	70,000 - 104,999	.504	.058	76.508	1	.000	1.656
	≥105,000 (*ref.*)			509.752	4	.000	
Age	≤24	-.972	.120	66.100	1	.000	.378
	25-34	-.630	.058	118.182	1	.000	.532
	35-44	.078	.065	1.433	1	.231	1.081
	45-54	.201	.077	6.831	1	.009	1.223
	55-64	.630	.099	40.352	1	.000	1.878
	≥65 (*ref.*)			251.961	5	.000	
Education	Low	-.389	.054	51.666	1	.000	.677
	Middle	-.076	.042	3.243	1	.072	.927
	High (*ref.*)			120.866	2	.000	
Urbanisation	Very strong	-.282	.064	19.390	1	.000	.754
	Strong	-.237	.052	20.396	1	.000	.789
	Moderate	.016	.055	.088	1	.767	1.017
	Weak	.192	.064	9.119	1	.003	1.212
	Rural (*ref.*)			44.074	4	.000	
Region	North	-.638	.073	75.442	1	.000	.528
	East	.228	.055	17.120	1	.000	1.256
	West	.233	.052	20.255	1	.000	1.262
	South (*ref.*)			77.155	3	.000	
Constant		.111	.068	2.652	1	.103	1.117

Preferred purchase price, WoON 2009

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	2175.045	22	0.000
Block	2175.045	22	0.000
Model	2175.045	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
9242.171	0.309

Hosmer and Lemeshow Test

Chi-square	df	Sig.
8.958	8	0.346

Classification Table

		Predicted		
		Preferred purchase price		Percentage correct
	Observed	≤ 230,000	> 230,000	
Preferred purchase price	≤ 230,000	3550	946	79.0
	> 230,000	1339	2445	64.6
Overall Percentage				72.4

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.182	.061	8.812	1	.003	.834
	Couple	.104	.058	3.164	1	.075	1.109
	Family	.325	.057	32.027	1	.000	1.384
	Single parent	-.282	.101	7.793	1	.005	.754
	Other (*ref.*)			55.755	4	.000	
Income	≤34,999	-.916	.060	229.498	1	.000	.400
	35,000 - 52,499	-.791	.049	257.081	1	.000	.454
	52,500 - 69,999	-.208	.049	18.236	1	.000	.813
	70,000 - 104,999	.573	.052	122.371	1	.000	1.773
	≥105,000 (*ref.*)			590.587	4	.000	
Age	≤24	-.828	.125	43.887	1	.000	.437
	25-34	-.391	.052	55.504	1	.000	.677
	35-44	.091	.056	2.631	1	.105	1.095
	45-54	.190	.064	8.741	1	.003	1.209
	55-64	.352	.075	21.938	1	.000	1.422
	≥65 (*ref.*)			153.496	5	.000	
Education	Low	-.289	.059	24.255	1	.000	.749
	Middle	-.156	.042	13.968	1	.000	.856
	High (*ref.*)			138.732	2	.000	
Urbanisation	Very strong	-.409	.057	51.461	1	.000	.664
	Strong	-.204	.052	15.611	1	.000	.816
	Moderate	.076	.053	2.055	1	.152	1.079
	Weak	.304	.068	19.865	1	.000	1.355
	Rural (*ref.*)			72.680	4	.000	
Region	North	-.379	.092	16.928	1	.000	.685
	East	.047	.058	.658	1	.417	1.048
	West	.223	.053	17.609	1	.000	1.249
	South (*ref.*)			24.171	3	.000	
Constant		-.227	.062	13.466	1	.000	.797

Preferred purchase price, WoON 2015

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	1226.817	22	0.000
Block	1226.817	22	0.000
Model	1226.817	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
7231.381	0.242

Hosmer and Lemeshow Test

Chi-square	df	Sig.
23.912	8	0.002

Classification Table

		Predicted		
		Preferred purchase price		Percentage correct
	Observed	≤ 230,000	> 230,000	
Preferred purchase price	≤ 230,000	1926	921	67.7
	> 230,000	982	2294	70.0
Overall Percentage				68.9

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.050	.067	.544	1	.461	.952
	Couple	.042	.066	.402	1	.526	1.043
	Family	.280	.066	17.686	1	.000	1.323
	Single parent	.054	.110	.241	1	.623	1.056
	Other (*ref.*)			21.176	4	.000	
Income	≤34,999	-.787	.068	135.381	1	.000	.455
	35,000 - 52,499	-.730	.055	173.876	1	.000	.482
	52,500 - 69,999	-.125	.056	4.892	1	.027	.883
	70,000 - 104,999	.478	.061	60.856	1	.000	1.614
	≥105,000 (*ref.*)			322.023	4	.000	
Age	≤24	-.184	.145	1.623	1	.203	.832
	25-34	-.123	.058	4.469	1	.035	.884
	35-44	.063	.064	.950	1	.330	1.064
	45-54	.026	.069	.145	1	.704	1.027
	55-64	-.154	.077	4.001	1	.045	.858
	≥65 (*ref.*)			27.883	5	.000	
Education	Low	-.448	.069	42.220	1	.000	.639
	Middle	-.200	.048	17.052	1	.000	.819
	High (*ref.*)			222.155	2	.000	
Urbanisation	Very strong	-.124	.064	3.718	1	.054	.883
	Strong	-.155	.054	8.326	1	.004	.857
	Moderate	.042	.061	.479	1	.489	1.043
	Weak	.059	.065	.832	1	.362	1.061
	Rural (*ref.*)			12.195	4	.016	
Region	North	-.511	.089	33.264	1	.000	.600
	East	.099	.064	2.421	1	.120	1.104
	West	.240	.053	20.671	1	.000	1.271
	South (*ref.*)			38.557	3	.000	
Constant		-.143	.067	4.588	1	.032	.867

Preferred type of dwelling, WBO 2002

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	1049.914	22	0.000
Block	1049.914	22	0.000
Model	1049.914	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
4212.172	0.265

Hosmer and Lemeshow Test

Chi-square	df	Sig.
21.482	8	0.006

Classification Table

		Predicted		
		Preferred type of dwelling		Percentage correct
	Observed	Multi-family	Single-family	
Preferred type of dwelling	Multi-family	109	775	12.3
	Single-family	110	5832	98.1
Overall Percentage				87.0

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.958	.082	135.003	1	.000	.384
	Couple	.169	.090	3.513	1	.061	1.184
	Family	1.141	.106	115.475	1	.000	3.130
	Single parent	.269	.174	2.400	1	.121	1.309
	Other (*ref.*)			284.846	4	.000	
Income	≤34,999	-.142	.089	2.568	1	.109	.868
	35,000 - 52,499	-.115	.077	2.241	1	.134	.892
	52,500 - 69,999	-.082	.085	.915	1	.339	.922
	70,000 - 104,999	.097	.090	1.147	1	.284	1.102
	≥105,000 (*ref.*)			7.184	4	.126	
Age	≤24	.455	.129	12.362	1	.000	1.577
	25-34	.899	.075	145.426	1	.000	2.458
	35-44	.949	.094	102.102	1	.000	2.583
	45-54	.077	.100	.595	1	.441	1.080
	55-64	-.593	.109	29.648	1	.000	.552
	≥65 (*ref.*)			296.090	5	.000	
Education	Low	-.025	.077	.110	1	.740	.975
	Middle	.025	.062	.163	1	.687	1.025
	High (*ref.*)			.172	2	.917	
Urbanisation	Very strong	-1.080	.089	146.515	1	.000	.340
	Strong	-.200	.081	6.038	1	.014	.819
	Moderate	.058	.089	.424	1	.515	1.060
	Weak	.525	.118	19.943	1	.000	1.691
	Rural (*ref.*)			148.081	4	.000	
Region	North	.385	.124	9.622	1	.002	1.469
	East	-.072	.094	.588	1	.443	.930
	West	-.295	.077	14.642	1	.000	.744
	South (*ref.*)			18.061	3	.000	
Constant		1.844	.088	441.601	1	.000	6.319

Preferred type of dwelling, WoON 2009

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	1681.196	22	0.000
Block	1681.196	22	0.000
Model	1681.196	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
6720.594	0.288

Hosmer and Lemeshow Test

Chi-square	df	Sig.
38.250	8	0.000

Classification Table

		Predicted		
		Preferred type of dwelling		Percentage correct
	Observed	Multi-family	Single-family	
Preferred type of dwelling	Multi-family	370	1328	21.8
	Single-family	299	6283	95.5
Overall Percentage				80.4

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.757	.062	149.516	1	.000	.469
	Couple	.197	.065	9.112	1	.003	1.218
	Family	1.457	.084	303.759	1	.000	4.292
	Single parent	-.124	.106	1.357	1	.244	.884
	Other (*ref.*)			448.423	4	.000	
Income	≤34,999	-.054	.067	.644	1	.422	.947
	35,000 - 52,499	-.043	.059	.544	1	.461	.958
	52,500 - 69,999	.126	.067	3.583	1	.058	1.135
	70,000 - 104,999	.107	.070	2.346	1	.126	1.113
	≥105,000 (*ref.*)			7.772	4	.100	
Age	≤24	.500	.108	21.467	1	.000	1.648
	25-34	.798	.059	180.219	1	.000	2.222
	35-44	.886	.070	159.261	1	.000	2.425
	45-54	.151	.074	4.146	1	.042	1.163
	55-64	-.818	.076	115.482	1	.000	.442
	≥65 (*ref.*)			486.174	5	.000	
Education	Low	-.135	.066	4.208	1	.040	.874
	Middle	-.051	.048	1.105	1	.293	.950
	High (*ref.*)			16.107	2	.000	
Urbanisation	Very strong	-.819	.073	126.998	1	.000	.441
	Strong	-.088	.070	1.562	1	.211	.916
	Moderate	.127	.074	2.929	1	.087	1.135
	Weak	.131	.095	1.889	1	.169	1.139
	Rural (*ref.*)			139.964	4	.000	
Region	North	.227	.116	3.796	1	.051	1.254
	East	.004	.079	.003	1	.959	1.004
	West	-.325	.066	24.071	1	.000	.723
	South (*ref.*)			24.110	3	.000	
Constant		1.384	.069	402.532	1	.000	3.990

Preferred type of dwelling, WoON 2015

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	1640.356	22	0.000
Block	1640.356	22	0.000
Model	1640.356	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
5330.798	0.341

Hosmer and Lemeshow Test

Chi-square	df	Sig.
38.633	8	0.000

Classification Table

		Predicted		
		Preferred type of dwelling		Percentage correct
	Observed	Multi-family	Single-family	
Preferred type of dwelling	Multi-family	609	901	40.3
	Single-family	352	4497	92.7
Overall Percentage				80.3

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.437	.073	36.276	1	.000	.646
	Couple	.197	.075	6.798	1	.009	1.217
	Family	1.113	.088	158.497	1	.000	3.043
	Single parent	.274	.129	4.524	1	.033	1.316
	Other (*ref.*)			224.048	4	.000	
Income	≤34,999	-.090	.078	1.347	1	.246	.914
	35,000 - 52,499	.064	.068	.876	1	.349	1.066
	52,500 - 69,999	-.037	.071	.264	1	.607	.964
	70,000 - 104,999	.019	.075	.062	1	.804	1.019
	≥105,000 (*ref.*)			2.742	4	.602	
Age	≤24	.801	.155	26.613	1	.000	2.229
	25-34	1.001	.073	186.404	1	.000	2.721
	35-44	1.078	.085	160.795	1	.000	2.938
	45-54	.165	.080	4.246	1	.039	1.180
	55-64	-.993	.079	157.213	1	.000	.370
	≥65 (*ref.*)			756.277	5	.000	
Education	Low	-.210	.074	7.979	1	.005	.811
	Middle	.020	.056	.123	1	.726	1.020
	High (*ref.*)			12.983	2	.002	
Urbanisation	Very strong	-.957	.079	147.591	1	.000	.384
	Strong	-.062	.068	.844	1	.358	.940
	Moderate	.192	.078	6.080	1	.014	1.212
	Weak	.449	.087	26.739	1	.000	1.566
	Rural (*ref.*)			162.202	4	.000	
Region	North	.341	.115	8.845	1	.003	1.406
	East	-.054	.084	.414	1	.520	.947
	West	-.273	.066	17.091	1	.000	.761
	South (*ref.*)			18.743	3	.000	
Constant		1.152	.074	241.165	1	.000	3.163

Preferred size of dwelling, WBO 2002

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	692.168	22	0.000
Block	692.168	22	0.000
Model	692.168	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
8312.771	0.132

Hosmer and Lemeshow Test

Chi-square	df	Sig.
12.664	8	0.124

Classification Table

		Predicted		
		Preferred size of dwelling		Percentage correct
Observed		≤ 120 m²	> 120 m²	
Preferred size of dwelling	≤ 120 m²	841	1693	33.2
	> 120 m²	615	3677	85.7
Overall Percentage				66.2

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.447	.063	50.022	1	.000	.639
	Couple	-.024	.062	.149	1	.699	.976
	Family	.539	.061	77.838	1	.000	1.715
	Single parent	.009	.116	.007	1	.935	1.010
	Other (*ref.*)			160.768	4	.000	
Income	≤34,999	-.312	.062	25.400	1	.000	.732
	35,000 - 52,499	-.326	.051	41.547	1	.000	.722
	52,500 - 69,999	-.295	.053	31.417	1	.000	.744
	70,000 - 104,999	.196	.056	12.066	1	.001	1.217
	≥105,000 (*ref.*)			130.805	4	.000	
Age	≤24	-.028	.097	.084	1	.771	.972
	25-34	.189	.052	13.082	1	.000	1.208
	35-44	.325	.061	28.182	1	.000	1.384
	45-54	-.074	.072	1.073	1	.300	.928
	55-64	-.100	.090	1.240	1	.265	.905
	≥65 (*ref.*)			38.378	5	.000	
Education	Low	-.095	.050	3.536	1	.060	.910
	Middle	-.013	.040	.107	1	.743	.987
	High (*ref.*)			7.148	2	.028	
Urbanisation	Very strong	-.580	.059	95.331	1	.000	.560
	Strong	-.111	.050	5.039	1	.025	.895
	Moderate	.168	.053	9.897	1	.002	1.183
	Weak	.299	.063	22.570	1	.000	1.348
	Rural (*ref.*)			105.361	4	.000	
Region	North	-.067	.067	1.012	1	.314	.935
	East	-.064	.053	1.473	1	.225	.938
	West	-.005	.049	.009	1	.925	.995
	South (*ref.*)			6.416	3	.093	
Constant		.439	.061	51.889	1	.000	1.552

Preferred size of dwelling, WoON 2009

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	1043.218	22	0.000
Block	1043.218	22	0.000
Model	1043.218	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
10278.950	0.159

Hosmer and Lemeshow Test

Chi-square	df	Sig.
10.619	8	0.224

Classification Table

		Predicted		
		Preferred size of dwelling		Percentage correct
	Observed	≤ 120 m²	> 120 m²	
Preferred size of dwelling	≤ 120 m²	1882	1690	52.7
	> 120 m²	1160	3548	75.4
Overall Percentage				65.6

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.282	.054	27.555	1	.000	.754
	Couple	.058	.053	1.186	1	.276	1.059
	Family	.644	.054	143.630	1	.000	1.905
	Single parent	-.114	.089	1.632	1	.201	.892
	Other (*ref.*)			195.226	4	.000	
Income	≤34,999	-.393	.054	51.919	1	.000	.675
	35,000 - 52,499	-.337	.045	55.048	1	.000	.714
	52,500 - 69,999	-.161	.048	11.442	1	.001	.851
	70,000 - 104,999	.253	.051	24.956	1	.000	1.288
	≥105,000 (*ref.*)			135.421	4	.000	
Age	≤24	.102	.093	1.190	1	.275	1.107
	25-34	.014	.046	.088	1	.767	1.014
	35-44	.228	.052	19.367	1	.000	1.255
	45-54	.086	.060	2.106	1	.147	1.090
	55-64	-.252	.069	13.438	1	.000	.777
	≥65 (*ref.*)			33.142	5	.000	
Education	Low	-.113	.054	4.413	1	.036	.893
	Middle	.002	.038	.004	1	.949	1.002
	High (*ref.*)			8.647	2	.013	
Urbanisation	Very strong	-.598	.053	126.437	1	.000	.550
	Strong	.003	.049	.003	1	.953	1.003
	Moderate	.166	.051	10.437	1	.001	1.180
	Weak	.180	.066	7.465	1	.006	1.197
	Rural (*ref.*)			143.075	4	.000	
Region	North	.123	.083	2.215	1	.137	1.131
	East	-.135	.054	6.181	1	.013	.873
	West	-.066	.049	1.813	1	.178	.936
	South (*ref.*)			8.057	3	.045	
Constant		.341	.054	39.365	1	.000	1.406

Preferred size of dwelling, WoON 2015

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	770.051	22	0.000
Block	770.051	22	0.000
Model	770.051	22	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
7821.006	0.154

Hosmer and Lemeshow Test

Chi-square	df	Sig.
9.910	8	0.271

Classification Table

		Predicted		
		Preferred size of dwelling		Percentage correct
	Observed	≤ 120 m²	> 120 m²	
Preferred size of dwelling	≤ 120 m²	1154	1430	44.7
	> 120 m²	769	3006	79.6
Overall Percentage				65.4

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Compostion	Single	-.258	.061	17.810	1	.000	.773
	Couple	.092	.062	2.182	1	.140	1.096
	Family	.647	.064	103.585	1	.000	1.911
	Single parent	-.106	.100	1.121	1	.290	.899
	Other (*ref.*)			135.393	4	.000	
Income	≤34,999	-.281	.064	19.361	1	.000	.755
	35,000 - 52,499	-.335	.053	40.250	1	.000	.715
	52,500 - 69,999	-.133	.056	5.722	1	.017	.876
	70,000 - 104,999	.147	.059	6.146	1	.013	1.158
	≥105,000 (*ref.*)			73.259	4	.000	
Age	≤24	.174	.128	1.857	1	.173	1.191
	25-34	.117	.054	4.606	1	.032	1.124
	35-44	.317	.061	27.300	1	.000	1.374
	45-54	.269	.066	16.508	1	.000	1.309
	55-64	-.379	.071	28.481	1	.000	.685
	≥65 (*ref.*)			92.631	5	.000	
Education	Low	-.128	.063	4.125	1	.042	.880
	Middle	-.019	.045	.181	1	.671	.981
	High (*ref.*)			11.399	2	.003	
Urbanisation	Very strong	-.601	.061	97.276	1	.000	.548
	Strong	-.044	.051	.748	1	.387	.957
	Moderate	.173	.059	8.623	1	.003	1.189
	Weak	.195	.063	9.489	1	.002	1.216
	Rural (*ref.*)			106.321	4	.000	
Region	North	.087	.082	1.138	1	.286	1.091
	East	.052	.062	.698	1	.403	1.053
	West	-.165	.050	10.832	1	.001	.848
	South (*ref.*)			11.034	3	.012	
Constant		.369	.060	37.189	1	.000	1.446

Appendix C: SPSS output revealed preference (NVM)

Actual purchase price

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	5330.774	19	0.000
Block	5330.774	19	0.000
Model	5330.774	19	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
35939.965	0.218

Hosmer and Lemeshow Test

Chi-square	df	Sig.
28.008	8	0.000

Classification Table

		Predicted		
		Actual purchase price		Percentage correct
	Observed	≤ 230.000	> 230.000	
Actual purchase price	≤ 230.000	11644	4503	72.1
	> 230.000	5443	8318	60.4
Overall Percentage				66.7

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Profile	Young digitals	-.401	.046	75.601	1	.000	.670
	Urban balancers	-.057	.203	.078	1	.780	.945
	Starting together	-.600	.057	112.726	1	.000	.549
	Good city life	.541	.038	201.457	1	.000	1.717
	Modal buyers	.104	.049	4.588	1	.032	1.110
	Child and career	.510	.044	136.350	1	.000	1.665
	Social renters	-.334	.065	26.165	1	.000	.716
	Mature middle class	-.314	.052	36.132	1	.000	.730
	Freedom & space	-.083	.041	4.245	1	.039	.920
	Golden edge	.351	.048	53.028	1	.000	1.420
	Elitist upper class	.776	.055	200.508	1	.000	2.173
	Country life	-.053	.044	1.441	1	.230	.948
	Deserved pleasure	.007	.048	.022	1	.881	1.007
	Aged simplicity (*ref.*)			846.433	13	.000	
Urbanisation	Very strong	-.782	.033	571.872	1	.000	.458
	Strong	-.399	.030	177.038	1	.000	.671
	Moderate	-.305	.028	117.303	1	.000	.737
	Weak	.468	.028	283.529	1	.000	1.597
	Rural			1459.622	4	.000	
Region	Haarlem	.959	.026	1346.036	1	.000	2.610
	‘s-Hertogenbosch	.261	.020	174.544	1	.000	1.299
	Southeast-Drenthe			2506.269	2	.000	
Constant		-.194	.021	88.450	1	.000	.824

Type of dwelling

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	7082.909	19	0.000
Block	7082.909	19	0.000
Model	7082.909	19	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
24518.544	0.323

Hosmer and Lemeshow Test

Chi-square	df	Sig.
40.052	8	0.000

Classification Table

		Predicted		
		Type of dwelling		Percentage correct
Observed		Multi-family	Single-family	
Type of dwelling	Multi-family	1836	4777	27.8
	Single-family	1151	22144	95.1
Overall Percentage				80.2

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Profile	Young digitals	.509	.057	79.802	1	.000	1.664
	Urban balancers	.335	.232	2.077	1	.150	1.398
	Starting together	.592	.083	51.368	1	.000	1.808
	Good city life	.627	.045	192.553	1	.000	1.873
	Modal buyers	.472	.065	53.059	1	.000	1.603
	Child and career	.009	.055	.024	1	.876	1.009
	Social renters	.299	.083	12.909	1	.000	1.348
	Mature middle class	.005	.069	.006	1	.937	1.005
	Freedom & space	-.453	.057	64.192	1	.000	.636
	Golden edge	-.395	.055	50.955	1	.000	.674
	Elitist upper class	-.299	.058	26.884	1	.000	.741
	Country life	-.896	.059	227.641	1	.000	.408
	Deserved pleasure	-.633	.058	119.119	1	.000	.531
	Aged simplicity (*ref.*)			867.662	13	.000	
Urbanisation	Very strong	-1.773	.037	2291.917	1	.000	.170
	Strong	-.937	.032	854.352	1	.000	.392
	Moderate	-.236	.032	53.210	1	.000	.790
	Weak	.917	.041	496.637	1	.000	2.502
	Rural			2964.347	4	.000	
Region	Haarlem	-.113	.029	15.576	1	.000	.893
	’s-Hertogenbosch	-.124	.024	26.010	1	.000	.884
	Southeast-Drenthe			61.705	2	.000	
Constant		1.533	.027	3221.478	1	.000	4.632

Size of dwelling

Omnibus Tests of Model Coefficients

	Chi-square	df	Sig.
Step	3309.131	19	0.000
Block	3309.131	19	0.000
Model	3309.131	19	0.000

Model Summary

-2 Log likelihood	Nagelkerke R square
37748.655	0.140

Hosmer and Lemeshow Test

Chi-square	df	Sig.
9.154	8	0.329

Classification Table

		Predicted		
		Size of dwelling		Percentage correct
	Observed	≤ 120 m²	> 120 m²	
Size of dwelling	≤ 120 m²	11530	5159	69.1
	> 120 m²	5581	7638	57.8
Overall Percentage				64.1

Variables in the Equation

Variable	Category	B	S.E.	Wald	df	Sig.	Exp(B)
Profile	Young digitals	-.210	.048	19.536	1	.000	.810
	Urban balancers	-.783	.265	8.770	1	.003	.457
	Starting together	-.135	.053	6.378	1	.012	.874
	Good city life	.306	.041	55.715	1	.000	1.358
	Modal buyers	.307	.050	38.278	1	.000	1.360
	Child and career	.504	.045	126.098	1	.000	1.655
	Social renters	-.151	.066	5.260	1	.022	.860
	Mature middle class	-.057	.050	1.268	1	.260	.945
	Freedom & space	-.013	.040	.100	1	.751	.987
	Golden edge	.183	.050	13.424	1	.000	1.201
	Elitist upper class	.751	.054	194.566	1	.000	2.119
	Country life	-.150	.044	11.578	1	.001	.860
	Deserved pleasure	-.076	.050	2.299	1	.129	.927
	Aged simplicity (*ref.*)			471.954	13	.000	
Urbanisation	Very strong	-1.126	.035	1056.402	1	.000	.324
	Strong	-.442	.029	238.412	1	.000	.643
	Moderate	-.004	.025	.028	1	.868	.996
	Weak	.619	.025	603.520	1	.000	1.858
	Rural			1923.183	4	.000	
Region	Haarlem	.030	.025	1.468	1	.226	1.031
	's-Hertogenbosch	.105	.019	29.522	1	.000	1.111
	Southeast-Drenthe			54.577	2	.000	
Constant		-.458	.024	353.427	1	.000	.633