In a perfect market a government needs not to intervene. For several reasons the housing market is not a perfect market and, thus, governments generally tend to intervene. The Dutch government, however, intervenes mainly by subsidies to such an extent that the housing market has become strongly dysfunctional. The problematic functioning of the Dutch housing market makes one wonder to what extent the theoretical reasons to intervene in the housing market still relate to the actual practice. This dissertation covers four empirical essays on different aspects of housing subsidies.
In four chapters we investigate the outcome of housing subsidization, both in the owner-occupied and the rented sector, on the value of social landlords' portfolios, housing consumption, tenure choice and households' investment behavior in housing. The reader is first introduced in the basics and (a-)typicalities of the Dutch housing market in an introductory chapter.

Frans Schilder holds master's degrees in Economic Psychology and Investment Analysis, both obtained at Tilburg University. Thereafter he started his PhD in Finance at the University of Amsterdam and the Amsterdam School of Real Estate. In 2009 Frans has won Best Paper on Housing presented at the PhD sessions of the ERES 16th Annual Conference in Stockholm. He currently continues his research on economic effects of housing subsidies and the functioning of the Dutch housing market in general at the Amsterdam School of Real Estate.

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Essays on the Economics of Housing Subsidies Frans Schilder

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Frans Schilder

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Essays on the economics of housing subsidies.

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad van doctor
aan de Universiteit van Amsterdam
op gezag van de Rector Magnicus
prof. dr. D.C. van den Boom
ten overstaan van een door het college van promoties
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A more applied debate on the housing market I have found throughout the entire period of my Ph-D-life at the Amsterdam School of Real Estate. I owe this institution many thanks, firstly for making my position available to me, but foremost for the warm welcome with which I have been received all this time. The positive atmosphere and genuine interest in the built environment and my housing market research in particular has been very stimulating.

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I have learned over the past few years that it is tremendously helpful to have good support staff around you; without the help of these people many a Ph-D-student would simply get lost in the maze of politics and bureaucracy that surrounds a naïve and well-willing PhD-student. I have been blessed with the best people in these matters that I can possibly imagine. I would therefore explicitly like to thank Yolanda Carrasco Moure, Jolinda Gompel (both UvA), and Maudi Groot-Kieft (ASRE) for their help in finding my way through office life without violating too many rules and regulations.

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Frans Schilder
January 2012

Contents

Chapter 1: A short introduction to the Dutch housing market

1 Introduction

The title of this thesis is "Essays on the economics of housing subsidies.". In this thesis we will study the impact of housing subsidies on the functioning of the housing market. Obviously, the institutional set-up of the housing market differs in each country. The Dutch housing market contains some features that are unique in the world and have an impact on the functioning of the market that is not easily comprehended. In order to prepare the reader somewhat for this different playing field that constitutes the Dutch housing market we shall present a short introduction. In this introduction we shall present the various subsidies and policies that are in play. We will furthermore address the, by international standards, unusual large share of social housing (e.g. Scanlon & Whitehead, 2007) and the, from an international viewpoint unfamiliar, key players in this social sector. The focus of this introductory chapter and the following empirical chapters, however, is the Dutch housing market.

This thesis consists of four bundled papers; each paper representing a chapter. Each paper deals with a topic on the Dutch housing market, the red thread throughout the thesis being the impact of subsidization on the functioning of the housing market. Since this thesis consists of four bundled papers that were written to be published in an academic journal, none of the chapters contains a somewhat complete review of the most important housing policies and subsidization instruments in the Dutch housing market. This introductory chapter will therefore contain some overlap with each of the following chapters, however, shall contain a brief, but still more in depth, review of all policies, instruments and actors than any of those following chapters. In line with the papers that make up the core of the thesis we shall focus on “normal” residential dwellings only; we thus exclude institutional dwellings (e.g. within a nursery), students’ housing and dwellings with exceptionally high or low values from our Figures and Tables. We do not update or add to the Figures of other authors; the use of other authors’ materials is solely for indication of main developments in the Dutch housing market.

This first chapter is further structured as follows: first we shall review the main institutions that make up the Dutch owner-occupied housing sector. This section will focus primarily on the subsidies and taxes on home ownership and provide little information on the players in the market. This is done since ownership is dispersed and each of the individual players can not affect the functioning of the market. The opposite holds in the rented sector: this sector is owned by a relatively small number of very large landlords with high market power. The third section therefore starts with a description of the owners of rented property. The third section then reviews the main subsidies that are granted to consumers in the rented sector. The fourth section of the paper will shortly describe some of the main consequences of the institutional set-up and describe how this set-up contributes to the recent developments in the housing market. The final section of this chapter shall contain the traditional look forward onto the upcoming four chapters that form the core of this thesis.

2 The owner-occupied sector

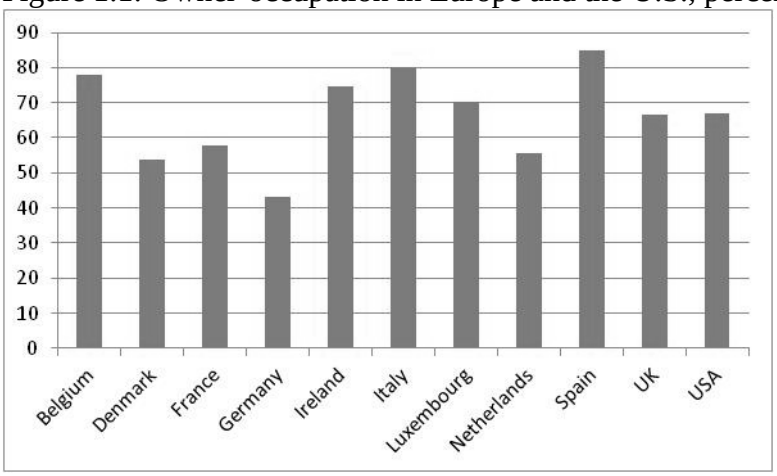
A discussion of the Dutch owner-occupied sector inevitably covers the fiscal subsidization of owner-occupied property. The fiscal system in the Netherlands belongs to the most generous in the world with respect to the treatment of owner-occupied housing and includes, among other things, (almost) unlimited interest deductibility of mortgage interest from income tax. There are, however, also other factors, both institutional and non-institutional, that are of importance for understanding the functioning of the owner-occupied market.

In the following section we shall discuss some of the key details in understanding the Dutch owner-occupied sector. The remainder of this paragraph is organized as follows: first we will present some statistics on the owner-occupied sector and its development in size and price over time. Then we will present a few economic fundamentals that are generally believed to relate to house price dynamics (see e.g. De Wit *et al.* (2010) and Tsatsaronis & Zhu (2004)). Thereafter we discuss some recent policy changes that, in line with the results of Fisher and Jaffe (2003), help explain the development of the owner-occupied sector. After that, we will describe two important non-fiscal housing finance issues: mortgage supply and home equity and some recent regulatory changes. We shall conclude this paragraph with a description of the fiscal treatment of owner-occupied housing.

2.1 Size and development over time

The Dutch owner-occupied sector is of average size from an international perspective (Scanlon & Whitehead, 2007). In 2009 roughly 55% of all housing in the Netherlands is owner-occupied. This can be seen in Figure 1.1, which has been taken from the European Mortgage Federation.

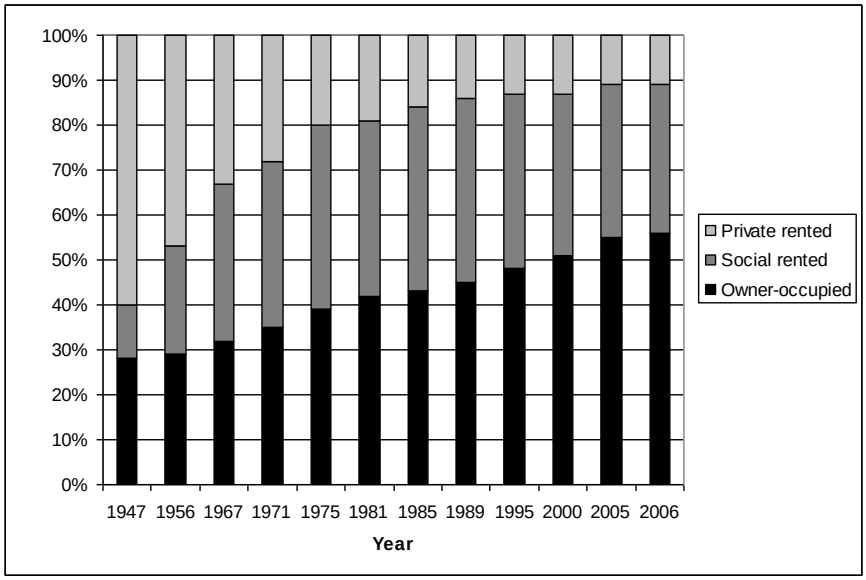
Figure 1.1: Owner-occupation in Europe and the U.S., percentage of housing stock



Note: Year of presented figures differs per country and ranges from 2007 to 2010
Source: Hypostat, European Mortgage Federation, 2011

The relatively average size of the owner-occupied sector is, however, the result of a steady development that has been going on for decades, as can be seen in Figure 1.2.

Figure 1.2: Development housing sectors over time, 1947 - 2006

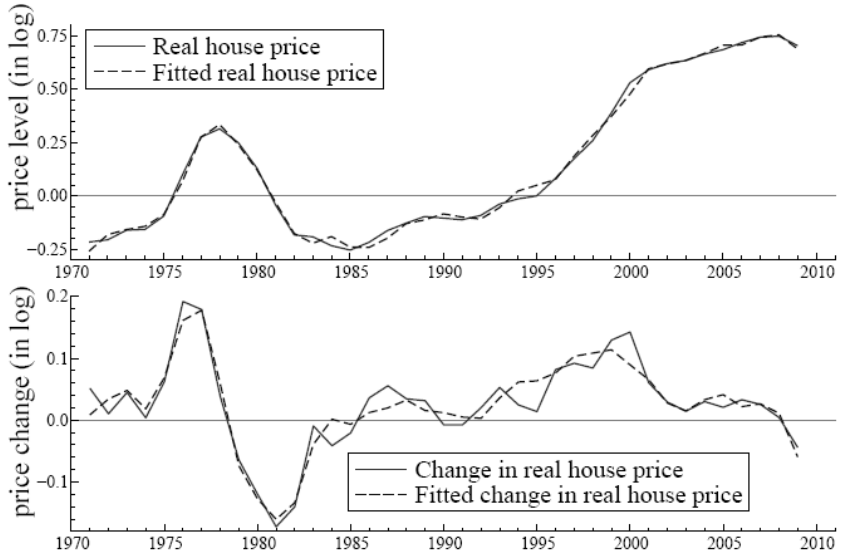


Source: Haffner *et al.* (2009)

Figure 1.2 shows that the rented sector dominated the Dutch housing market after World War II, and the owner-occupied sector played a minor role. Until the late 1990's, around the turn of the millennium, the rented sector continued being the largest housing sector in the Netherlands. The private rented sector represented some 60% of the rented sector right after World War II; its market share after the turn of the millennium diminished to just over 10%. Although the absolute size of the rented sector continued to increase until the turn of the millennium (it has slightly decreased since), its relative size has been decreasing for decades. This is obviously the result of the owner-occupied sector growing at a faster pace than the rented sector. The relative size of the owner-occupied sector increased over time for several reasons we shall discuss further on in this chapter, including favorable economic conditions for owner-occupancy combined with unfavorable conditions for private landlords.

The price of owner-occupied housing in the Netherlands has known a remarkably long period of continuous price increases from the mid-1980's until roughly 2007. Before the mid-1980's the prices had dropped strongly after a peak in the late 1970's. After the global credit crisis prices of owner-occupied housing have started to drop again, albeit at a much slower pace than in the late 1970's:

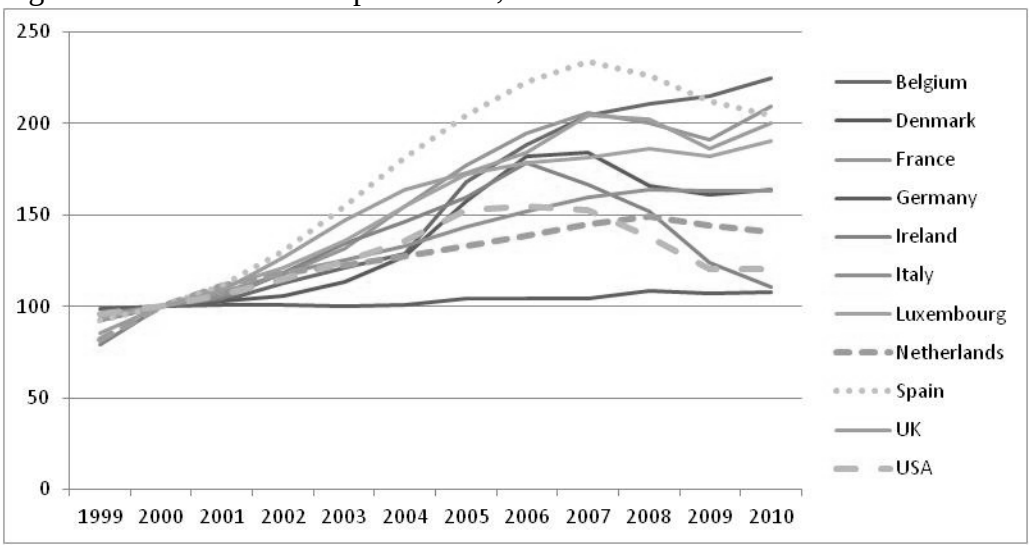
Figure 1.3: House price development in the Netherlands, 1970 - 2010



Source: Francke (2010)

The data from the European Mortgage Federation do not show decreases in house prices throughout the entire European Union. In fact, for some countries such as Poland and Sweden price increases are reported. There are also countries where significant price decreases have been reported, of which Spain and the United States are the best known examples:

Figure 1.4: Nominal house price index, 1999 - 2010



Source: Hypostat, European Mortgage Federation, 2011

In Table 1.1 some descriptive statistics are summarized for owner-occupied housing in The Netherlands to present a picture of what the sector looks like. These statistics are for the year 2008. A similar overview, but over the rented sector, may be found in Table 1.5. Comparing both tables will show the reader that the average quality of housing in the owner-occupied sector is much higher than in the rented sector.

Table 1.1: Descriptive statistics owner-occupied housing, 2008

	Single-family	Multi-family	
Type of dwelling			
Detached	25%	8%	Maisonette
Semi-detached	23%	14%	Split-level (ground)
Corner	16%	78%	Other appartment
Row / back-to-back	33%		
Other house	2%		
Value (*1.000, €)	295	216	
Floor size (m^2)	152	96	
Rooms	5	3	
Construction year	1968	1969	
Number of dwellings (*1.000)	3.235	542	
Market share	86%	14%	

Source: WoON 2009

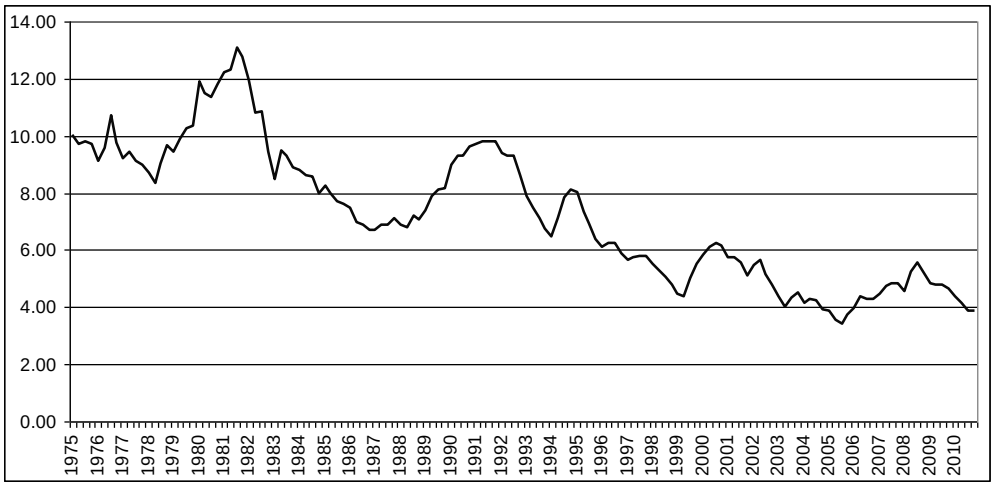
It follows from Table 1.1 that the majority of housing in the owner-occupied sector is single-family: 86% of all owner-occupied housing, 3.2 million units, is a single-family dwelling. The share of multi-family units in the owner-occupied sector has increased over time and is still increasing. In total the owner-occupied sector comprises almost 3.8 million dwellings. The single-family dwellings are on average not older than the multi-family dwellings; they are, however, importantly larger. Single-family dwellings are more expensive then multi-family housing; the square meter price of multi-family dwellings is higher, though. Owner-occupied housing in The Netherlands are most often single-family units in a row. None of these statistics show anything out of the ordinary. Multi-family units are often found in areas where the land prices are high (e.g. city centers) and are therefore relatively expensive. Single-family dwellings are more often found outside of the city center and are generally larger and, given their size, more expensive.

2.2 Factors stimulating development over time

Figure 1.2 shows the continuously increasing share of the owner-occupied sector in the Dutch housing market. There are several reasons for the rapid increase of owner-occupancy: these reasons include factors that stimulate owner-occupancy as well as reasons that give landlords a disincentive to invest. In this section we will only deal with the factors that have stimulated owner-occupancy. These factors include a general increase in welfare, decreasing mortgage interest rates, improved employment, and financial innovation.

The mortgage rates in the Netherlands have declined considerably over the period 1975 – 2010, as can be seen in Figure 1.5. Decreasing mortgage interest rates result in lower user cost of owning and are thus a stimulating factor for owner-occupancy.

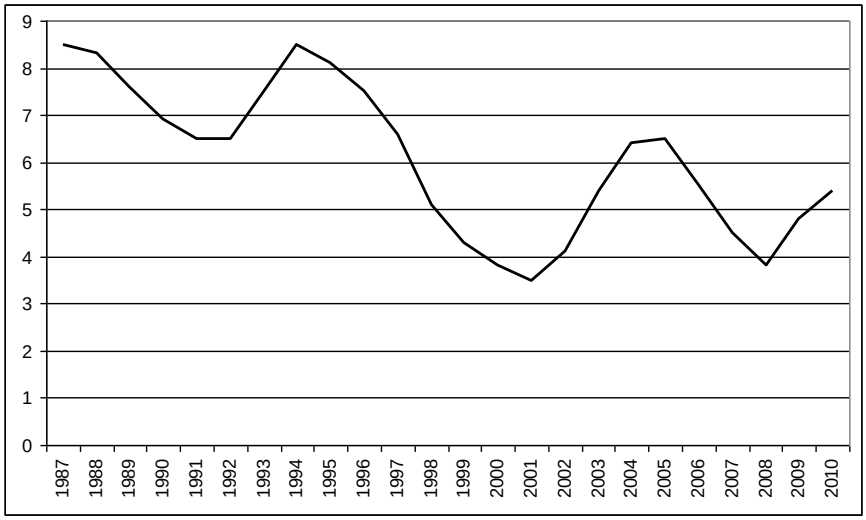
Figure 1.5: Nominal mortgage interest rate, 1975 - 2010



Source: De Hypotheekshop

Demand for owner-occupied housing also depends on employment. Decreasing unemployment is therefore good for the owner-occupied sector. Figure 1.6 displays the change in unemployment over the period 1987 – 2010:

Figure 1.6: Unemployment in the Netherlands, percentage of work force, 1987 - 2010



Source: Statistics Netherlands

Finally, owner-occupied housing in the Netherlands has benefitted from significant financial innovation and changes in mortgage lending criteria in the 1990's (e.g. De Wit & Van der Klaauw, 2010). One important driver for the demand for owner-occupied housing has been the change in mortgage lending criteria that occurred in 1990. Before the change, mortgage lending was restricted to the main income in the household. The change entailed that households were allowed to use a share of other household members' income as a basis for obtaining mortgage credit. In essence this change in regulation increased debt capacity. Another major change that increased debt capacity was the introduction of new mortgage products during the 1990's which

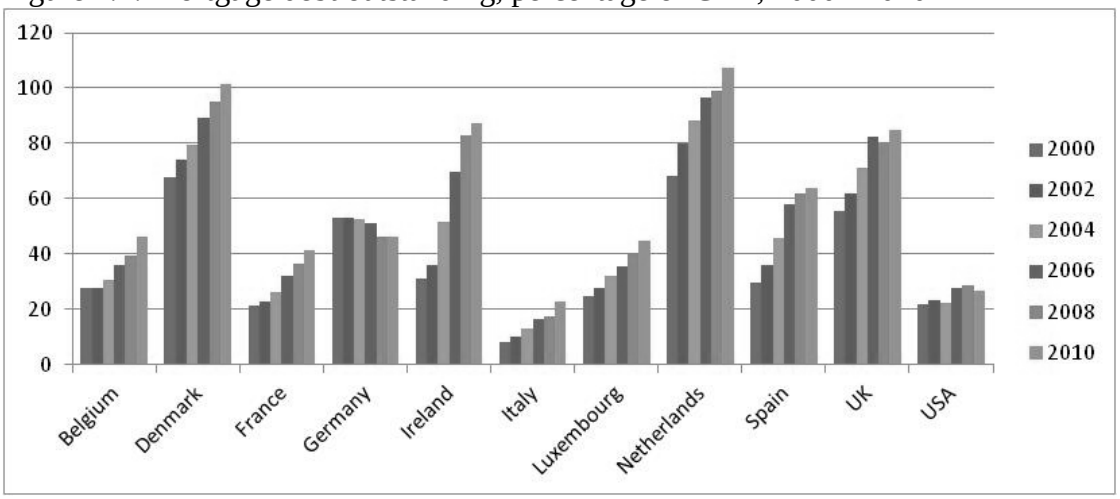
were aimed at reducing the monthly repayment of the mortgage principle. Non-amortizing loans in various forms (e.g. conjoined with savings or investment accounts) reduced the payments that form the basis of credit lending criteria. The reduction of monthly payments thus increased debt capacity and stimulated demand. Increased demand through financial innovation has also lead to increased household leverage, as can be seen in Chapter 3. In recent years changes to lending criteria have been introduced to prevent excess credit lending to households and reduce the increasing outstanding mortgage debt. Lending criteria include a strict loan-to-income ratio and a maximum loan-to-value ratio of new mortgages. In 2011 these criteria have been set stricter and a new restriction has been added to lending criteria to further decrease debt capacity of households. A maximum share of 50% of newly issued mortgages may be issued in non-amortizing mortgages.

2.3 Housing finance: mortgages and home equity

Next to the fiscal treatment of owner-occupied housing there are other important factors on the Dutch housing market that have been subject to recent regulatory changes. In this section we will discuss two of these factors: mortgage supply and home equity.

The Netherlands is internationally famous for its high levels of outstanding mortgage debt. In 2010 the level of outstanding mortgage debt in the Netherlands surpassed GDP. Figure 1.7, taken from the European Mortgage Federation's Hypostat, illustrates the extraordinarily position of the Netherlands clearly. Only Denmark also has a mortage debt outstanding of roughly 100% GDP. Other western countries with well developed credit markets, such as the United Kingdom and the United States, have much lower mortgage debt-to-GDP ratios. Compared to other countries the increase of mortgage debt in the Netherlands is also relatively high.

Figure 1.7: Mortgage debt outstanding, percentage of GDP, 2000 - 2010

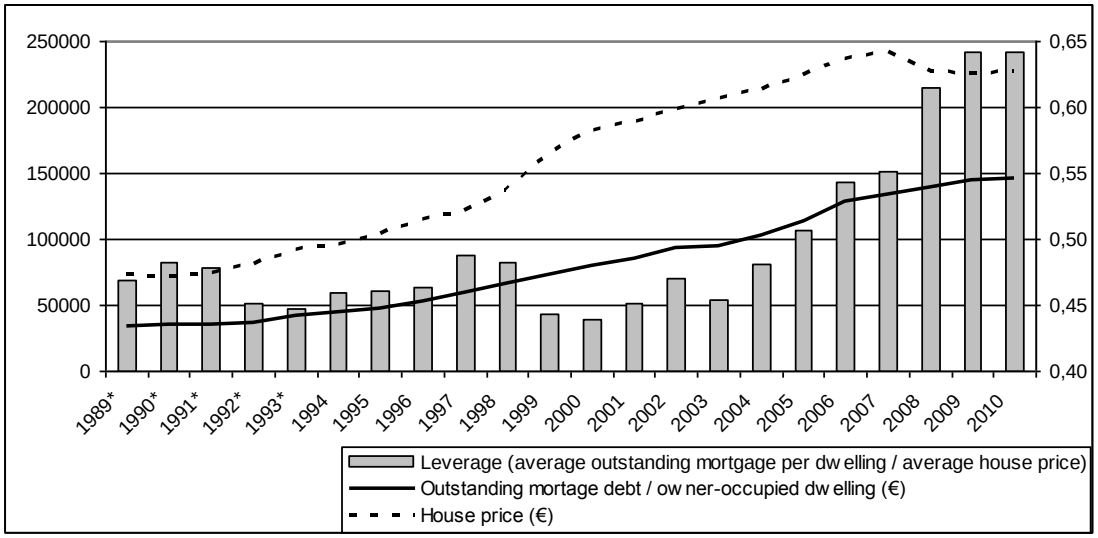


Source: Hypostat, European Mortgage Federation, 2011

The extensive increase of mortgage debt occurred gradually over 1989 – 2010, with a clear acceleration after the mid 1990's, as can be seen in Figure 1.8. The strong increase in average mortgage debt outstanding per owner-occupied dwelling stopped around 2006, when the Dutch housing market started to cool off. After the global

credit crunch the average mortgage debt outstanding did not increase significantly anymore. Due to the increase of the size of the owner-occupied sector, the total amount of outstanding mortgage debt did increase, however.

Figure 1.8: Outstanding mortgage debt per owner-occupied dwelling (€), inflation adjusted, 1989 - 2010



Note: 1989-1993 = ultimo year, 1994 – 2010 = Q4
Sources: Mortgage debt: CBS (1989 – 2002) DNB (2003 – 2010), Inflation: CBS,
Owner-occupied dwellings, total number: Syswov, prices: NVM.

Households have clearly increased their mortgage debt over the period 1989 – 2010. Since the house price in some years within this period increased very strongly, average leverage decreased at the end of the 1990's. Ever since, however, house prices have increased less rapidly and after 2006 even started to slightly decrease. Combined with the increasing mortgage debt this implies that households have become, on average, more leveraged over time. Especially younger households, many of whom had not been active on the housing market during the price boom in the late 1990's, have experienced a strong increase in leverage, as can be seen in Table 1.2, which is in slightly altered form also in Chapter 3.

Table 1.2: Average share of home equity in owner-occupied housing, 2001 - 2008

Age	2002	2006	2009
<=25	11%	6%	3%
26 - 35	22%	16%	7%
36 - 45	42%	39%	28%
46 - 60	58%	57%	51%
>60	83%	80%	78%

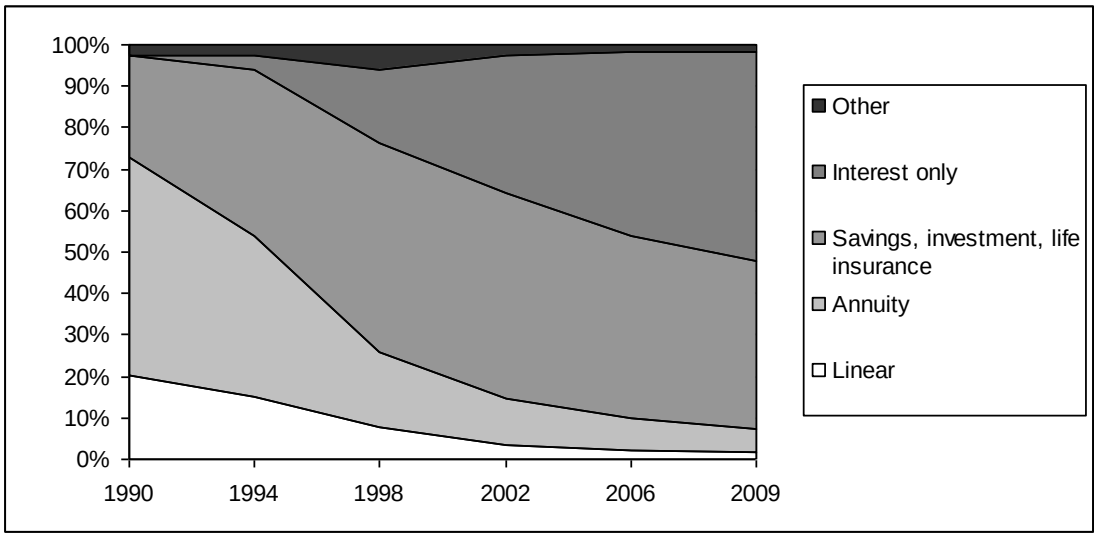
Note: Presented years refer to waves of housing needs survey
Source: WBO 2002, WoON 2006, WoON 2009

It is especially remarkable how high young households are leveraged. In fact, most young households are even overleveraged compared to house value; i.e. these households have negative home equity. Schilder and Conijn (2012) estimate the total number of households "underwater" at around 500.000 in 2011. The high occurrence of negative equity is the result of an important characteristic of the Dutch mortgage lending system: the absence of a down payment requirement. Since households are

not required to bring in any equity into the home upon purchase, owner-occupied housing is accessible to more households. Moreover, credit lenders are allowed to lend more than 100% of the value of the house, thus enabling households to finance purchasing costs with the mortgage.

Another factor that has lead to the increasing leverage of households in the Netherlands is the introduction of new mortgage products. Non-amortizing loans result in larger fiscal benefits from interest deductions and have gotten very popular over time. Generally, non-amortizing loans are combined with other financial products, such as investment or savings accounts or insurance products. The return on capital of financial accounts tied to the mortgage of the primary residential dwelling is untaxed. Households thus started to buy different mortgage products given the fiscal incentive from the interest deductibility. This is graphically shown in Figure 1.9.

Figure 1.9: Market shares of mortgage types, percentage, 1990 - 2009



Source: WBO1990, WBO1994, WBO1998, WBO2002, WoON2006, WoON2009

Over time the share of non-amortizing mortgages increased strongly. Households not only increased leverage this way, but also took increasing levels of risk. Where in the late 1990's and the first few years after the turn of the millennium, a period of prolonged house price increases, the risk involved in housing seemed small, that perception changed with the global financial crisis. As a result new regulation has been proposed to reduce the share of non-amortizing mortgages in the total mortgage holdings of a household.

Many households have also built up considerable amounts of home equity. Especially households that have been on the housing market before the enormous price increases in the late 1990's have seen their home equity increase considerably. The sudden increase in household wealth in combination with financial innovation spurred the use of home equity withdrawal. A survey by the Dutch National Bank reported that the majority of all withdrawn equity was used for home improvement or household portfolio rebalancing; just a minor share was used for consumption (DNB, 2003). Despite this fact restrictions were imposed on home equity withdrawal. These restrictions made home equity withdrawal fiscally less attractive.

There are two main restrictions on the deductibility of mortgage interest. First, the period over which mortgage interest is deductible from income taxes was reduced to 30 years. Second, restrictions were imposed on the eligibility of mortgages for interest deductibility. Only those loans that were used to extract equity from the dwelling for home improvement were left eligible for interest deductibility. Households as of that moment were still able to withdraw home equity for consumption or rebalancing purposes, however, not with the fiscal benefit for regular mortgages. Moreover, when households move house, they are expected to roll over all built-up home equity. Mortgage interest is only deductible over the difference between the price of the new house minus the built-up home equity from previous dwelling(s). Mortgage interest over the surplus debt is not eligible for deductibility.

2.4 Subsidies

In this paragraph we will discuss the main subsidies for owner-occupiers in the Netherlands. This paragraph shall therefore include a review on main points of the interest deductibility, imputed rent, transfer taxes and the fiscal treatment of home equity.

The Netherlands is one of the few countries in the world with full interest deductibility (Rouwendal, 2007). The current fiscal treatment dates back to the first part of the 20th century when all costs incurred to generate income were deductible: housing was seen as an investment to generate income in kind to the owner. Later the deductibility was used as an instrument to stimulate home ownership. Currently the deductibility is subject to discussion again as a result of, among other things, the increasing burden on the governmental budget (e.g. Boelhouwer & Hoekstra, 2009).

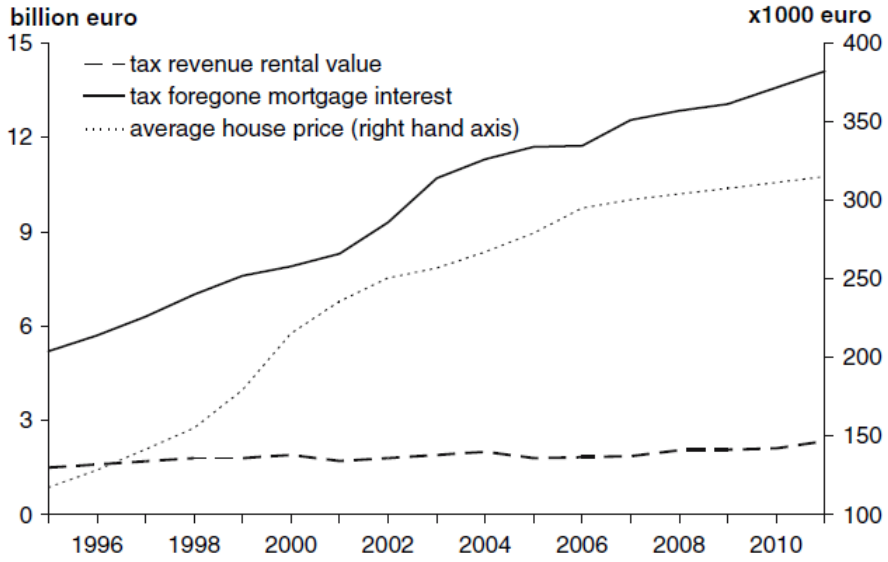
Income in the Netherlands is taxed in three "boxes": box 1 contains all income from labor and the primary residence, box 2 contains all income from the ownership of shares of a private limited company, and box 3 contains all income from savings and investments. Important to note here is that the investment of the owner-occupied dwellings is not situated in box 3, as other investments are, but in box 1. The consequence of the position of the owner-occupied dwelling in box 1 is that the costs associated with ownership (i.e. the mortgage interest) may be deducted as expenses for generating income. Income from ownership of the dwelling (i.e. imputed rent) is added to the income in box 1; the imputed rent in the Netherlands, however, is very low. The imputed rent, 0.55% for all housing up to € 1 million[1], is the result of netting all revenues and costs associated with ownership in the past.

The tax rate in box 1 is progressive; i.e. higher tax rates with higher levels of income. There are roughly three rates: the lowest rate of 34%, a middle rate of 42% and a high rate of 52%[2]. The progression of the tax rates results in larger benefits from box 1 costs, such as mortgage interest. Households with a high income therefore benefit more from the option of mortgage interest deductibility than low income households;

[1] For dwellings over € 1,02 million the rate is 1.05% for the value over € 1,02 million; 0,55% for all value below.
[2] For elderly households, aged over 65, there are four rates: low 16%, middle low 24%, middle high 42%, and high 52%.

since lower income households generally benefit more from subsidies in the rented sector (of which we present more evidence later). The result of this process, however, is that owner-occupation has become the dominant tenure for high income households (this can also be seen in Figure 1.14 in paragraph 4). The increasing concentration of high income households in the owner-occupied sector combined with the increasing levels of mortgage debt results in increasing levels of mortgage interest deductions from income tax:

Figure 1.10: Government expenditures on mortgage interest deductions after imputed rent (in € * billion), 1996 - 2010



Source: Van Ewijk *et al.* (2007)

Another source of subsidization to owner-occupiers is the fiscal treatment of home equity. The return on capital gains on home equity is, unlike the return on other equity, tax exempt. This is the result of the placement of the owner-occupied dwelling in box 1. Other equity, which is placed in box 3, is taxed at 30% over an attributed return of 4%: effectively this results in a tax of 1.2% over the total equity amount. In the beginning of 2008 the average dwelling in the owner-occupied sector had a value of € 285,000 and the average owner had roughly 45% home equity. This implies an average annual tax benefit of € 1,540 compared to the treatment of other equity. This benefit grows with house value and decreases with leverage; therefore, older and wealthier households benefit more than younger and less wealthy households. At the same time, under decreasing house prices this benefit decreases in value. The breakdown of total subsidization in the owner-occupied sector is given in Table 1.3:

Table 1.3: Breakdown of subsidization of home ownership, billion € / yr, 2010

Mortgage interest deductions	11.4
Deferred taxes on equity returns	7.7
Deferred taxes on investment products	0.7
Imputed rents	-2.2
Transfer taxes	-2.4
Net subsidization	15.2

Source: Ministry of Finance (Rapport Brede Heroverwegingen)

Table 1.3 shows that the mortgage interest deductions make up the largest share of subsidization to owner-occupiers. Tax exemptions on home equity also form a large share of total subsidization with 7.7 billion euro in 2010. A final subsidy to owner-occupiers is given through tax exemption of savings and investment products held for closing out the mortgage at maturity: returns on these financial products are tax exempt and this generates another 0.7 billion euro of subsidy. Owner-occupiers are taxed via imputed rents (2.2 billion euro per year) and transfer taxes upon the purchase of a house (2.4 billion euro in 2010). This fiscal set-up gives households the incentive to hold high levels of debt in the dwelling.

We estimate the user cost of ownership in several of the papers in this thesis; in the following chapters the net user cost are used for input in applied econometric models for the housing market. In order to show the impact of subsidization of home ownership we estimate the gross user cost in this chapter. For this we use the same procedure as for estimating the net user cost described in the later chapters, however, we do not deduct the subsidies. The subsidization of owner-occupiers is given in Table 1.4. The specification of user cost can be found in appendix A to Chapter 4 of this thesis.

Table 1.4: Subsidization in of user cost in the owner-occupied sector, 2008

Income decile	Gross user cost	Net user cost	Subsidization (% of gross user cost)
1	6.2%	4.8%	23%
2	6.3%	4.7%	25%
3	6.3%	4.7%	25%
4	6.3%	4.7%	26%
5	6.3%	4.6%	26%
6	6.3%	4.6%	27%
7	6.3%	4.5%	28%
8	6.3%	4.5%	29%
9	6.3%	4.4%	30%
10	6.4%	4.5%	30%
Age			
<=25	6.6%	4.8%	27%
26 - 35	6.5%	4.6%	29%
36 - 45	6.4%	4.6%	29%
46 - 60	6.3%	4.6%	27%
>60	6.1%	4.7%	24%
Overall	6.3%	4.6%	27%

Source: WoON 2009

The gross user cost increase with income. This is caused for an important extent by a higher interest rate that households in the higher income deciles pay on their mortgage: this is simply an empirical issue, there is no economic reason for higher income households to pay higher interest rates. In terms of net user cost the pattern over income is the exact opposite: higher income households have lower net user costs than low income households. Subsidization thus favors high income households, or more precisely: households with higher marginal income tax rates. In the age groups we see a different pattern: younger households both have higher gross user costs and, marginally, higher net user costs. Since required return on equity is lower than the cost of debt, gross user cost increases with leverage. Younger households

therefore have higher gross user cost than older households on average. Overall subsidization in the owner-occupied appears to be of strong economic significance: user cost is on average decreased by 1.7 percentage point. Despite the important subsidization of user cost of owner-occupation, the cost of owning are still higher than in the rented sector. This is shown in Chapter 5 of this thesis: the average user cost for renters is about 3%. The growth of the owner-occupied sector can therefore not be explained by the relative cost. A combination of the institutional set-up of the rented sector, discussed in the next paragraph, and the differences between both sectors in terms of supply as shown in Tables 1.1 and 1.5 give a more likely explanation. This apparent discrepancy in tenure choice is further explored in Chapter 4.

Subsidization of housing in the owner-occupied sector does not only affect the owners, it also affects landlords. This is one of the main consequences of the low price elasticity of supply of housing (Vermeulen & Rouwendal, 2007). The mortgage interest deductions increase demand for housing services; supply of housing services, however, is very inelastic. As a consequence, house prices are higher than they would have been in the absence of subsidies. The increased price level in the owner-occupied sector has consequently driven up the price level in the rented sector as well. This has far reaching consequences for both landlords and renters as will be discussed in paragraph 4. First, however, we will discuss the subsidization of the rented sector.

3 The rented sector

The subsidization in the rented sector is rather straightforward: it comprises a housing allowance which is income tested and supplied by the government to eligible households, and it comprises an implicit subsidy to all renters that exists of a below-market level rent. Understanding why and how these subsidies got to exist in the first place and remain to exist today, however, is far from straightforward. There have been several publications on the organization of (parts of) the Dutch rented sector; we shall give a relatively short introduction in this paragraph.

The remainder of this section is structured as follows: first we will discuss the size and development of the rented sector over time. Then we give a description of the main players in the rented market, with special attention to housing associations. We will then describe the typical dwellings rented out in the rented sector. This section is concluded with a brief description of the key housing policies and subsidies in the Dutch rented sector.

3.1 Size and development over time

The total rented sector in the Netherlands has decreased significantly as we have shown in Figure 1.2, especially in relative terms. The share of the private rented sector has decreased even more. Moreover, this development continues today and will, as we will discuss in section 4, continue even further in the future. The main driver for the decreasing private rented sector is the low returns on investment landlords can realize. Despite the relative decrease of the rented sector, the social sector has remained a large sector in the Dutch housing market comprising 2.3 million dwellings in 2008. The rented sector in the Netherlands in 2008 can be described as follows:

Table 1.5: Housing characteristics per type of landlord, 2008

Private rented sector				Social rented sector				Overall			
	Single-family	Multi-family			Single-family	Multi-family			Single-family	Multi-family	
Type of dwelling				Type of dwelling				Type of dwelling			
Detached	19%	4%	Maisonette	Detached	1%	5%	Maisonette	Detached	26%	5%	Maisonette
Semi-detached	15%	21%	Split-level	Semi-detached	7%	15%	Split-level	Semi-detached	23%	8%	Split-level
Corner	18%	75%	Other apartment	Corner	29%	80%	Other apartment	Corner	16%	87%	Other apartment
Row / back-to-back	46%			Row / back-to-back	62%			Row / back-to-back	33%		
Other house	3%			Other house	1%			Other house	2%		
Value (vacant possession, *1.000, €)	252	192		Value (vacant possession, *1.000, €)	182	149		Value (vacant possession, *1.000, €)	192	157	
Rent level (€ / jaar)	6900	6250		Rent level (€ / jaar)	5150	4680		Rent level (€ / jaar)	5410	4990	
Floor size (m^2)	122	76		Floor size (m^2)	96	69		Floor size (m^2)	99	71	
Rooms	4	3		Rooms	4	3		Rooms	4	3	
Construction year	1956	1950		Construction year	1968	1970		Construction year	1966	1966	
Number of dwellings (*1.000)	183	316		Number of dwellings (*1.000)	1.063	1.295		Number of dwellings (*1.000)	1.246	1.611	
Share of market	37%	63%		Share of market	45%	55%		Share of market	44%	56%	

Source: WoON 2009

The larger share of housing in the rented sector consists of multi-family housing; 1.6 million dwellings. However, it is not at all the case that there are no single-family units in the rented sector; about 1.25 million rented dwellings are single-family dwellings. In fact, other than the class of "other apartments", the most common type of dwelling available in the rented sector is a row house. The difference in value between the single-family and multi-family units is significant. It is therefore, from a standard economic point of view, surprising that the average rent level hardly differs. The "inefficient" pricing of housing by landlords is a red thread through the thesis and studied in Chapter 2, but also plays an important role in e.g. Chapter 5. The average value of rented housing is significantly lower than in the owner-occupied sector. Housing, especially single-family units are notably smaller than the single-family units in the owner-occupied sector.

The results in Table 1.5 in reference to those presented earlier in Table 1.1 make clear that there is an important difference in housing quality between the owner-occupied and the rented sector. The difference between both sectors plays an important role in several chapters in this thesis: because of the significant difference between the owner-occupied and the rented sector one may not simply assume that households are randomly distributed over both sectors. Moreover, the different characteristics of both sectors may seriously affect households' housing careers (see Chapter 4). The summary statistics in Table 1.5 also make clear the difference between the private and social rented sector. The difference between the private and social rented sector will be further discussed in the next section.

3.2 Description of key players: housing associations and institutional investors

The Dutch rented sector knows three key players: individual private landlords (individuals owning a small number of dwellings), institutional investors and housing associations. Housing associations are the most important social landlords, institutional investors are the larger private landlords in the Netherlands. There are important differences, but also important similarities between both types of landlords. In the following paragraphs we will describe each type of landlord shortly. We will give some more attention to the housing associations because of their internationally unique position in the housing market.

The social rented sector in the Netherlands is quite different from its equivalents in other European countries: e.g. the Dutch social rented sector is unusually large, as can be seen in Table 1.6 taken from Scanlon & Whitehead (2007).

Table 1.6: Size of social rented sector in Europe

	Owner-occupation	Private rented	Social rented	Number of social units
Netherlands	54	11	35	2.400.000
Austria	55	20	25	800.000
Denmark	52	17	21	530.000
Sweden	59*	21	20	780.000
England	70	11	18	3.983.000
France**	56	20	17	4.230.000
Ireland	80	11	8	124.000
Germany	46***	49	6	1.800.000
Hungary	92	4	4	167.000

Note: *Sweden: owner-occupation includes cooperatives, **France: does not include 6,1% other, ***Germany: owner occupation includes shared ownership/equity 'Genossenschaften'
Source: Scanlon & Whitehead (2007)

Besides being very large from an international viewpoint, the average quality of housing in the social rented sector is also quite high (Ouwehand & Van Daalen, 2002). In the Netherlands social rented housing has traditionally not just been the only housing option for deprived households, but also a genuine alternative to owning for middle income households. Partly because of the wide scope of the social sector, the private rented sector has been unable to compete with the social rented sector and investors chose to benefit from the arbitrage opportunities that occurred (and are described in paragraph 4 and Chapter 2 of this thesis).

Within the private rented sector there are several types of landlords, the largest being the institutional investors and private persons. The market shares per type of landlord are given in Table 1.7. Given the large size of the social rented sector, the total market shares of the larger private landlords are still small.

Table 1.7: Market shares of landlords, 2008

	Private	Social	Overall
Housing association	-	99.8%	82.4%
Government	-	0.2%	0.2%
Pension fund, investor or broker	37.7%	-	6.6%
Private person	43.2%	-	7.5%
Relative	7.8%	-	1.4%
Other	11.3%	-	2.0%

Source: WoON 2009

The overall characteristics of the rented sector have been presented and discussed earlier in Table 1.5. A first look at Table 1.5 shows that social landlords have a large number of single-family dwellings; almost half of the total social housing stock is single-family. Private landlords own slightly more apartments. The most common dwellings of social landlords are single-family row houses and "regular" apartments. In terms of average floor size or number of rooms the dwellings of both types of landlords also differ little.

In Table 1.7 we can compare the different types of landlords. Social landlords are the dominant type of landlord in the housing market. More than 2.3 million, i.e. 82.4% of all rented dwellings are owned by housing associations. A major difference between

social and private landlords is the value of the housing stock: private landlords own importantly more valuable housing than do social landlords. This translates in a significantly higher rent level. However, if we would compare the rent levels as percentages of the house value we observe no difference in the rent setting of either type of landlord: the rent level as a percent of vacant possession value is 2.74% and 3.26% for private landlords and 2.83% and 3.14% for social landlords (single family and multi-family dwellings respectively).The higher rent level is therefore purely the result of much higher quality of housing.

The cost of capital expresses the cost of a company's funds, including both debt and equity, and reflects the minimal return on investments required by investors. Social landlords have a low required return on their equity since they do not have shareholders' value to maximize. The weighted average cost of capital (WACC) of social landlords is therefore lower than the WACC of private, profit driven landlords who need to satisfy a required return for their investors. Moreover, the Dutch rented sector is overmaturated (Conijn, 2011). This means that, in terms of the theory of Kemeny, the social rented sector cannot only compete with the private landlords, but in fact is dominating the market. Because of the dominant position of social landlords private landlords cannot realize a market return on their investment. The situation of overmaturation has been one the main characteristics of the rented sector for a significant period of time. The lack of market returns on rented housing has caused profit driven landlords to exit the market for a prolonged period of time as could already be seen in Figure 1.2. This is further discussed in section 4 of this chapter and studied in detail in Chapter 2. We will discuss the organization of these landlords in more detail in the following paragraph.

Institutional context of housing associations

There are a few key aspects of housing associations that help explain their dominant position in the rented sector. In this paragraph we shortly describe the most important regulation housing associations are confronted with (e.g. restricted use of social capital) as well as the major benefits they enjoy (cheaper external capital).

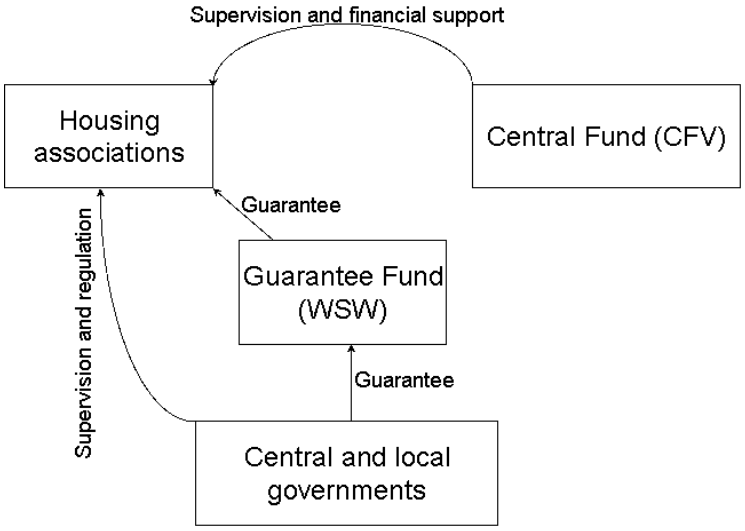
Housing associations are a special type of landlord in the Dutch rented sector. The focus of these landlords is generally the lower income classes; housing associations have a governmentally enforced task to provide good and affordable housing for the lower income households. At the same time, housing associations are independent organizations on which the government exerts mostly regulatory influence. This is the result of a long history of social housing in the Netherlands that started with the Housing Act of 1901, and really spurred into a rapid development after the Second World War. The Housing Act was designed to increase and improve housing for lower income households. The factor in this act that attributed to the spur of housing associations was the fact that it enabled the government to recognize associations that were created in the interest of social housing only. The associations which sole purpose was to provide social housing became so-called "authorized institutions". Once an authorized institution, housing associations could apply for governmental subsidies. Authorized institutions are regulated to be non-profit organizations (i.e. profits need to be used for social interests). Moreover, institutions that have become authorized institutions cannot exit the system to become a private landlord.

Until the mid 1990's both private landlords and housing associations have received large amounts of subsidy to construct new housing. Housing associations hardly sell their property in the owner-occupied sector and have thus built up a large sum of equity in residential dwellings. Since the vacant possession value of dwellings moves with the value of owner-occupied dwellings, the value of housing associations' dwellings increased strongly since the mid 1980's (see the previous section on owner-occupied sector). In Chapter 2 we estimate the vacant possession value of the total stock of all housing associations to be 340 billion euro (price of 2007).

In 1995 the government settled all outstanding debt of housing associations and future subsidy payments to housing associations in one large transaction ("brutering"). This officially ended the direct connection between the government and housing associations. Nonetheless, today the government still exerts influence on housing associations via law. One of the most important decrees, already effective before the settlement, is the Decree on Management of the Social Rental Sector (BBSH). This decree originally stated six main tasks that any housing association should realize that include the supply of decent quality housing to the main target group of households and to guarantee the financial continuity of the housing association.

Supply subsidies have been one of the main subsidies to housing associations until around 1980, after when the government's focus of subsidization shifted more towards demand subsidization. Retrenchment of the government from the housing market has become a policy objective since then. Subsidizing construction, however, has not been the only subsidy of (local) governments to subsidize housing associations. Municipalities have also subsidized housing associations by supplying land at reduced prices. A final, and very important, indirect subsidy of the government exists of providing guarantees to credit lenders. As a result of state-backed guarantees Dutch housing associations can obtain credit at below market rates. Guarantees for credit of associations are organized through a private non-profit organization: Guarantee Fund for Social Housing (WSW). Participation in the fund implies an entry fee and a liability of a percentage of the loan. Because of the security structure the fund has a triple-A status with S&P and Moody's; the security structure is displayed in Figure 1.11:

Figure 1.11: Security structure for authorized institutions



Source: Guarantee Fund for Social Housing

Figure 1.11 displays housing associations receiving financial guarantees from the Guarantee Fund for Social Housing (WSW). In their turn, the solvency of the WSW is guaranteed for by the central and local governments. Credit lenders thus have three levels of security for their loans: first, the solvency of the housing associations obtaining the loans (i.e. their assets and equity). The solvency of housing associations is strongly supervised by the Central Fund for Social Housing (CFV). In case of potential insolvency the CFV intervenes with the management of the housing association and forces reorganizations to prevent insolvency. Second, if any housing association should still default, the WSW finances the guaranteed for debt. Third, in the very end, the central and local governments have agreed to supply interest-free loans to cover potential defaults. Housing associations can therefore technically go bankrupt; however, the credit lender will not loose his investment to the extent that the credit had been guaranteed by the WSW.

The financial guarantees are available only to housing associations. The supervision is provided by the Central Fund for Social Housing (CFV) which is an independent governmental organization. The CFV supervises the housing associations to prevent defaults and in case of need might provide financial support. In cases of intervention of the CFV the management of the housing association becomes very strongly controlled or even taken over completely. So far, none of the housing associations had to make use of the guarantees provided by the WSW (second security layer) as a result of the effective supervision by the CFV and good housing market conditions.

Summarizing we have shown that the social rented sector is dominated by housing associations. These housing associations have built up capital in dwellings worth more than 240 billion euro (CFV, 2010; p.113, table 10.1). Given the status of housing associations and the way this capital has been built up housing associations' capital is considered social capital. Legally, however, these housing associations are independent entities; the government cannot take e.g. profits away from housing associations. The government can influence housing associations via law (e.g. BBSH) and strict supervision (via CFV). The institutional set-up of the rented sector as well as the non-profit foundation of housing associations have, especially from an international perspective, lead to a large and stable sector with, on average, high quality housing available to a wide target group that includes lower and middle income groups.

3.3 Rent regulation and tenant protection

The rented sector in the Netherlands is strongly regulated. Regulation can be described by addressing two instruments: the regulation of rent on the one hand, and tenant protection on the other. In this paragraph we shortly describe both instruments.

Regulation of rent levels and development
In principle, rents in the Netherlands are regulated when the rent level in the contract is below a threshold (€ 631.73 monthly in 2008, adjusted to € 652.52 as of January 1st 2011). Thus, regardless of the characteristics of the dwelling or of the household occupying it, if the agreed rent level is below the threshold, the rent is regulated for the entire occupation period of the household. The majority of rented dwellings are

regulated, even when owned by a private landlord, as can be seen in Table 1.8 (also in Chapter 5):

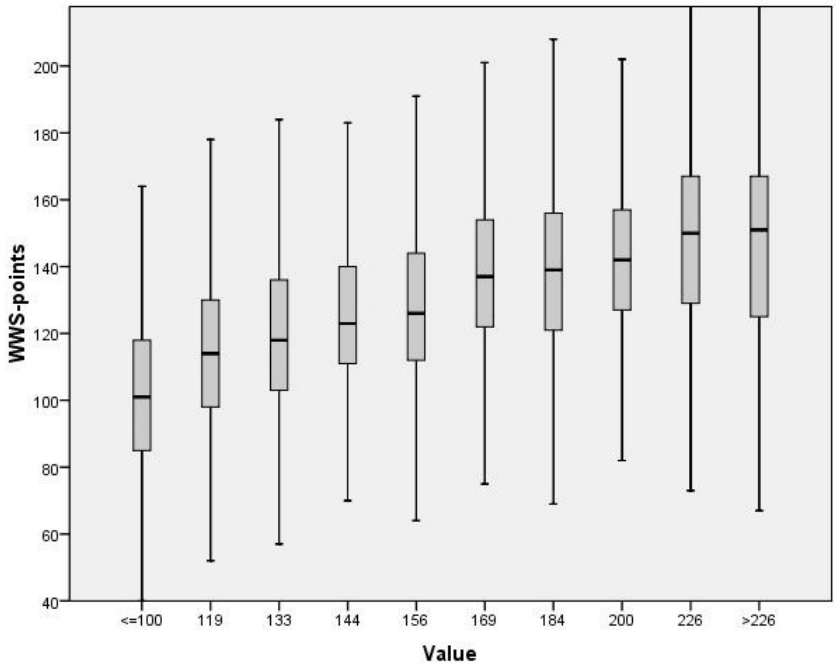
Table 1.8: Regulated dwellings in the Netherlands, 2008

	Landlord		
	Social	Private	Total
Regulated	2,2 (97%)	0,3 (73%)	2,5 (93%)
Liberalized	0,1 (3%)	0,1 (27%)	0,2 (7%)
Total	2,3 (100%)	0,4 (100%)	2,7 (100%)

Note: Figures in millions; percentages calculated over type of landlord
Source: WoON 2009

Regulation of rents can be either mandatory or voluntary. Mandatory regulation occurs with dwellings that have less than or equal to 142 WWS-points. WWS-points are administrative quality points that are attributed to a dwelling based on its dwelling characteristics such as (but not limited to) floor surface, type of dwelling, and type of heating. Market characteristics never were part of the assessment for WWS-points: an identical dwelling in a high-demand area as the city center of Amsterdam scores the same number of points as when it had been situated on the outskirts of a low-demand area as Heerlen. Recently attempts have been made to make adjustments towards a more market oriented points-system: in ten geographical regions with scarcity the number of WWS-points is increased with 15 or 25 points based on the vacant possession value per square meter of housing surface. As of yet the quality points are still fairly independent of value:

Figure 1.12: Relationship WWS-points and vacant possession value, 2008, chapter 5
Low-end of box = 25th percentile, intersection = median, upper-end of box = 75th percentile



Source: WoON 2009

The relative independence of WWS-points and value is one of two important drivers behind the development of the rented sector as displayed in Figure 1.2. After all, as studied in Chapter 2, landlords not being able to realize market rents have, especially

when profit driven, an incentive to sell vacant rented dwellings in the owner-occupied sector. The other driver is the "voluntary" rent regulation: landlords may rent their dwellings at below-market level rents, or even below the regulation boundary, without a regulatory requirement. For social landlords this is generally in line with their social mission statement; for private landlords this is often influenced by the overmaturated rented sector causing the rent levels to be competed downwards by social landlords.

A second instrument to regulate rents is the maximum annual rent increase; landlords may not increase rents beyond a governmentally prescribed percentage. That percentage has been set at or around inflation in recent years. This instrument only affects regulated rents; renters in liberalized dwellings may be confronted with higher annual rent increases.

Tenant protection
Tenants in the Netherlands are well protected against expropriation by landlords. Protection comes in several forms including rent level protection, prescribed rent adjustments, and regulation with respect to (adjustments of) contracts.

Rent regulation is in itself an instrument to protect tenants from expropriation by landlords. We described earlier how rents can be prescribed if the dwelling does not surpass a certain administrative level of quality. This is not only an instrument to control rents, it furthermore protects tenants in the lesser quality housing from expropriation as the rent level of lawfully regulated dwellings is enforceable. Moreover, liberalized rent contracts can, even after signing, be adjusted if the administrative quality system does not allow a liberalized rent level based on the number of WWS-points of the dwelling.

Other instruments that protect tenants are the fact that rental contracts are in principle contracts without a fixed end date and that landlords are not allowed to alter the contract during the occupation. Landlords may not liberalize regulated contracts during as long as the tenant does not make the property vacant. This implies that if households would want to stay in their regulated dwelling for several decades, this dwelling will remain regulated for decades. This regulation also applies to private rented dwellings.

3.4 Subsidies in the rented sector

In the paragraph on owner-occupied housing we have shown that housing, at least in the owner-occupied sector, in the Netherlands is strongly subsidized. In the rented sector we can distinguish two different subsidies: on the one hand renters pay a lower rent than they would given a free market, on the other hand needy households are given a housing allowance. These subsidies and their economic consequences are the subject of Chapter 5. In this chapter we shortly discuss these subsidies and provide some key statistics to give an overview of subsidization in the rented sector.

In Chapter 2 we estimate the market rent in the Netherlands to be around 4.5% of the vacant possession value of the dwelling. Francke (2010) reports similar values for market rents using different methods to arrive at these figures. Conijn and Schilder (2011) furthermore report that the average rent in the liberalized rented sector is also around 4.5%. The average actual rent level in the Netherlands is much lower than

that: roughly 3%. The difference between the market rent and the actual rent charged can be considered a subsidy to the renter. This subsidy, however, is independent of the characteristics of the household. We therefore compare this subsidy to a supply subsidy in Chapter 5; in other literature on the Dutch housing market this subsidy is also referred to as implicit subsidy (e.g. Schilder & Conijn, 2009). The implicit subsidy is large for private and social landlords. The main difference is that in case of social landlords the subsidy is granted resulting the policy of the landlord. Private landlords have such limited market power that they need to follow social landlords in below market level rents. This phenomenon is also described in Conijn (2011) and referred to, in terms of Kemeny theory, as a result of overmaturation of the Dutch rented sector.

The share of subsidization a household receives in supply and demand subsidies differs by income. High income households receive all of their subsidization via lower rents; lower income households receive a significant share of their subsidies in housing allowances. The distribution of subsidies over households is summarized per income decile in Table 1.9, taken from Chapter 5:

Table 1.9: Rental subsidies per income decile, 2008

	Hybrid subsidization of housing services in rented sector			
Income decile	Demand subsidy (€/yr)	Supply subsidy (€/yr)	Total (€/yr)	Total (overall; bln € /yr)
1	1316	2663	3979	1.16
2	1451	2657	4108	1.17
3	1063	2355	3418	0.97
4	779	2396	3174	0.90
5	758	2428	3187	0.91
6	614	2438	3052	0.87
7	391	2653	3044	0.87
8	132	2570	2702	0.77
9	39	2695	2735	0.78
10	29	3144	3173	0.90
Total	549	2601	3150	9.31

Source: WoON 2009

Table 1.9 shows that lower income households receive a larger share of their subsidization in demand subsidies (i.e. in housing allowances). In the higher income deciles households receive very little housing allowance[3], yet they receive large amounts of supply subsidies. In fact, since households with higher income live in more expensive dwellings, they even receive larger amounts of supply subsidization than low and middle income households. In total, the subsidization of housing services in the rented sector adds up to 9 billion euro annually.

[3] We observe housing allowances in the higher income deciles. This is the result of the fact that the income deciles are based on disposable income, not on taxable income. In the data there is some discrepancy between taxable and disposable income; this, however, does not affect the (interpretation) of the results.

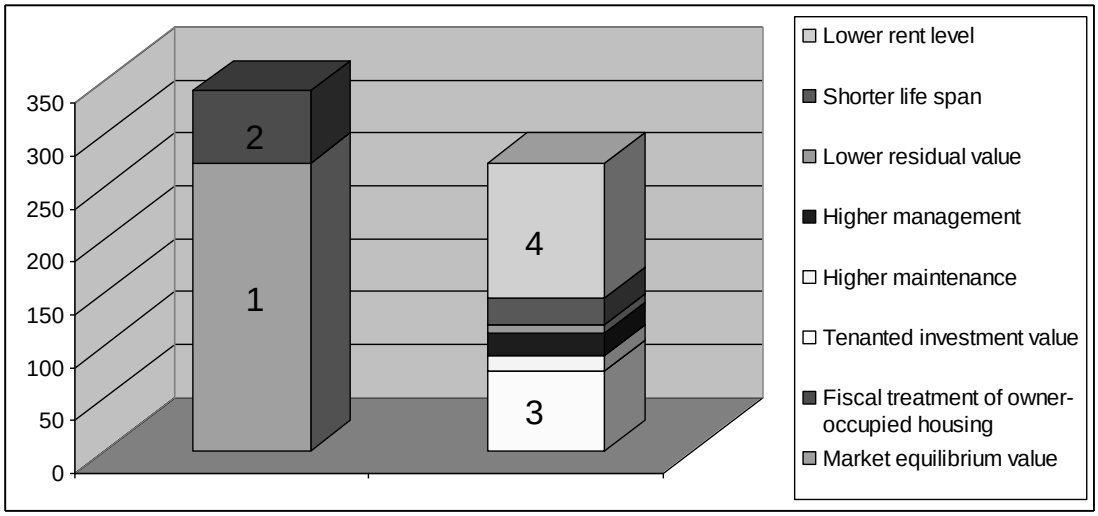
4 Main consequences

We have seen in the previous sections of this chapter that the owner-occupied sector developed strongly over time, mainly at the expense of the private rented sector. This is the result of on the one hand the increased demand for owner-occupied housing as described earlier, and of the disincentive to invest in rented housing as a result of the low return. Apart from the large shift in market shares, the sectors have grown apart in other terms as well. Schilder and Conijn (2009) describe this as the double gap between owning and renting: a gap between the owner-occupied sector and the rented sector in terms of the user cost, from the perspective of the user, and a gap in terms of value, from the perspective of the owner. There is a large gap between the price of the consumption good in both sectors: renters pay on average roughly 3% while owner-occupiers pay about double. Moreover, the gap in value of the dwellings, the value gap as described in Conijn and Schilder (2011), is also large.

So far we focused on one side of the coin at the time; in this section we will put both sectors into one perspective and show how the institutional set-up of the Dutch housing market (re)enforces the coming into existence and widening of the gap between owning and renting.

Value gap: investment incentives
The value of a rented dwelling is equal to the net discounted cash flows of the dwelling. In Chapter 2 we show that the value of rented dwellings in the social rented sector is far below the value it would generate in the owner-occupied sector. This creates an arbitrage opportunity for landlords; instead of renting housing out, they can sell housing, because of the higher value in the owner-occupied sector. In fact, that is as we have seen exactly what private landlords have been doing over the last few decades. Figure 1.13 displays the large difference in value of the rented dwelling (right bar) and the same dwelling had it been sold in the owner-occupied sector (left bar). Figure 1.13 is based on data from all Dutch housing associations only.

Figure 1.13: Value gap from investment perspective, 2008

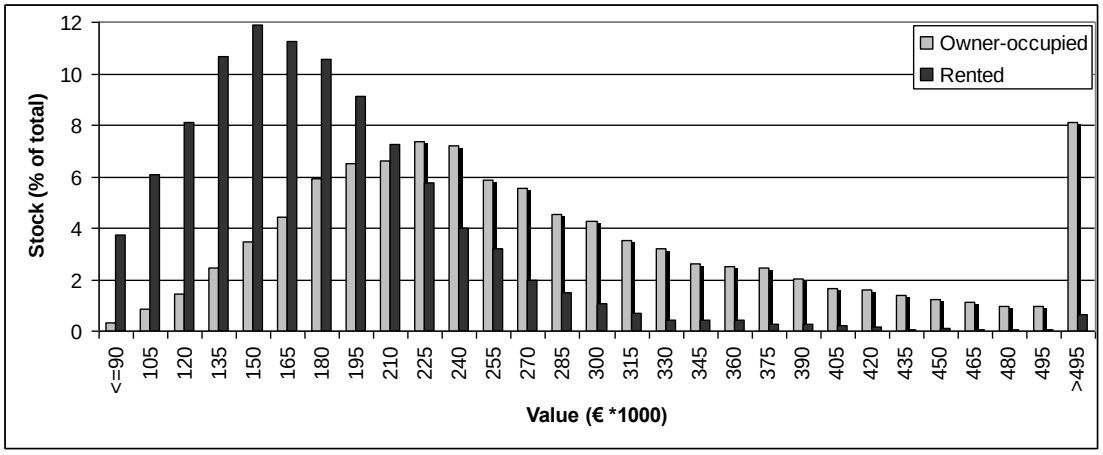


Source: CFV (2008), own calculations.

The bars with the numbers 1 and 2 in the left-hand are the total vacant possession value of the rented stock in billions of euro: this is the value of the rented sector had the properties been sold in the owner-occupied sector. Prices in the owner-occupied sector, however, have been forced up by the mortgage interest deductibility and very low price elasticity of supply; several authors estimate the price increase to be around 20% of the value (see Schilder & Conijn, 2009). The bar with the number 1 thus represents the market equilibrium value of the total social rented stock. This equals the value had the rented property been sold in an owner-occupied market without fiscal subsidization of ownership. On the right-hand side the bar has been divided in several smaller bars, the total of which add up to the market equilibrium value. The box with the number 3 represents the value of the rented stock under the current regime. The other boxes represent the value lost resulting from each of the landlord's rent policy decisions. Figure 1.13 is based on housing associations only; the benchmark for e.g. maintenance and management costs are the costs as made by private landlords. For private landlords these bars therefore, on average, do not exist. The largest of these items is the bar with number 4 representing the value lost from the below-market level rents; this also applies to private landlords. The difference between the market equilibrium value (bar "1") and the actual tenanted investment value ("3") is the value gap. The value gap is, as stated earlier, the result of the policy (e.g. rent setting, maintenance *et cetera*) of the housing associations. The derivation and exact numbers from Figure 1.13 can be found in Chapter 2.

The presented value gap does not only result in an arbitrage opportunity, but also in a disincentive to invest in new rented dwellings. Construction of new dwellings happens mostly in the owner-occupied sector; in the rented sector the largest share of new additions to the stock are done by social landlords. Since it has mainly been the social landlords, with a strong focus on the lower end of the market, that have added new dwellings to the housing stock, there has grown a difference in the average value of the housing stock in the owner-occupied and the rented sector. In 2008 the gap is of such magnitude that a household aspiring a somewhat larger housing consumption is practically forced to buy a dwelling. The distribution of housing in the rented sector is very strongly skewed with the vast majority of dwellings in the lower end of the market. The distribution of housing in the owner-occupied sector is much more evenly distributed as can be seen in Figure 1.14:

Figure 1.14: Distribution of dwellings according to value by sector, 2008



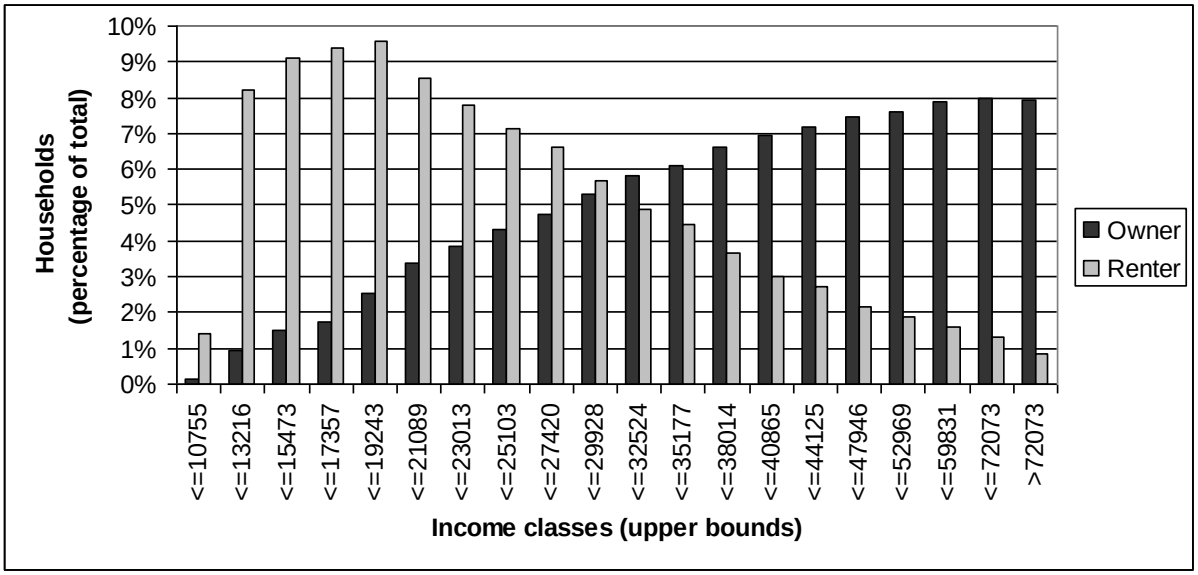
Source: WoON 2009

The owner-occupied and the rented sector thus seem to have adjusted in terms of composition according to the incentives from the gap between owning and renting. Since it are mainly the private landlords taking advantage of the arbitrage opportunity, i.e. selling the more expensive dwellings in the rented sector, and the social landlords who are investing in the rented sector, i.e. adding on average cheaper dwellings to the sector, it is most likely that the distribution of rented housing will become even more skewed in the future.

Double gap: consumption incentives
The price of the consumption good housing is referred to in literature as the user cost of housing. In case of rented housing the user cost is equal to the net rent payments. In the owner-occupied sector user cost are not observed: user cost is then often estimated using formulas as presented in e.g. Conijn and Elsinga (1998) or in Chapter 3.

In equilibrium the price of housing services is equal in the rented and the owner-occupied sector. The institutional arrangements for subsidization of housing services in the Netherlands are such that the price of housing services is not the same in the rented and owner-occupied sector. On average, the price of housing services in the owner-occupied sector is higher than in the rented sector. Dwellings providing higher quantities of housing services are not available in the rented sector as can be seen in Figure 1.14. Meanwhile, the subsidization in the rented sector decreases with income, while in the owner-occupied sector subsidization increases with income; this can be seen in Tables 1.4 and 1.9. Households with higher incomes and a higher demand for housing are virtually forced to choose for owner-occupied housing. This issue is further investigated in Chapter 4. Figure 1.15, taken from Chapter 5, gives a quick descriptive overview of the outcome:

Figure 1.15: Distribution of households over sectors by income, 2008



Source: WoON 2009

Several other authors mention other behavioral consequences of the double gap. Romijn and Besseling (2008) claim that the supply subsidy in the rented sector functions as a tax on moving house: households in the rented sector, especially those that have limited access to renewed supply subsidies, would therefore be less inclined

to move house. Schilder and Conijn (2009) find empirical evidence suggesting that indeed the supply subsidy decreases residential mobility among renter households. Apart from mobility, tenure choice is likely to be influenced as well by the institutional arrangement of subsidization. The interplay between the value gap, adjusting supply and households tenure decisions is studied in Chapter 4 of this thesis.

5 Concluding remarks

In the past sections we have shown that the interplay between institutions and consumers in the Dutch housing market lead to a malfunctioning market. Earlier, in the second section of this chapter, we shortly described the development of the owner-occupied housing sector. The focus in this section lies on the development, as it is the interplay of economic conditions and financial deregulation that have shaped this part of the housing market in the past few decades. In the rented sector, described in the third section of this chapter, the focus was more on the institutional arrangement. After all, it has been the subsidization and regulation from the government that have had the most important impact on the development in the rented sector. Special attention has been given to housing associations for the large impact that they have on the rented sector. Finally, we put everything into one perspective and show very briefly how all institutions, subsidies and governmental regulations relate to one another.

This chapter is meant to give an introductory reading for the following chapters. Each of the chapters, as mentioned earlier, contains brief descriptions of relevant issues and institutions. In this chapter we have brought together the key elements of these issues and gave some additional descriptives. All of the following chapters therefore relate to this first chapter: a short description of each chapter concludes this first chapter.

Chapter 2
How housing associations lose their value: the value gap in the Netherlands

This chapter is based on a published article in Property Management. In this paper we explore why the value gap is a structural phenomenon in The Netherlands and why it is an important factor contributing to the malfunctioning of the housing market. Using the well-known concept of user costs and using market equilibrium as a reference, the model quantifies the influence of six factors that cause the value gap. This is done for The Netherlands in total and for each of the 452 housing associations separately.

Chapter 2 provides the reader with insight into why the private rented sector developed from the largest sector to an almost marginal sector in the housing market. The value gap described and explained in chapter 2 summarizes the key issue that underlies all other problems experienced in the housing market: the fact that user costs are subsidized out of balance.

Chapter 3
Home equity, fiscal policy and the demand for housing

Standard economic theory predicts households to accumulate wealth over time and divest it near the end of life to spread consumption equally over the life cycle. Well-known empirical work suggests that common practice is different. We test some implications of economic theory that relate to home equity: do households divest it towards the end of their lives? And also: does the fiscal regime give households the incentive to maximize housing consumption?

Chapter 4
Time-varying state dependency in tenure choice

Households' tenure choice decision is generally expected to reflect the outcome of a utility maximization of the expected future benefits of owning or renting a dwelling. Within such a framework current tenure can not be an important predictor for future tenure decisions. Empirical results in international literature indicate that, given market frictions from e.g. institutions, past tenure may indeed be a good predictor for tenure decisions. Despite a highly regulated market with institutions that do *not* necessarily lead to such a pattern we report significant state dependency that, moreover, increases over time. We make plausible that home equity is an important driver in creating time-varying state dependency.

The value gap between owning and renting affects residential mobility and other housing related decisions of households. Tenure choice is one of those choices that (might) be affected by the value gap. After all, low income households are often better off renting; high income households often cannot enter the rented sector, and if they can, would be better off buying. In the section describing the value gap we have seen that households are divided over the owner-occupied and the rented sector almost based on income. Schilder and Conijn (2009) furthermore show that this has been going on for quite some time. Does the value gap steer people in their tenure decisions? We find evidence supporting this idea.

Chapter 5
Allocative efficiency of housing subsidy systems

Rented housing is strongly subsidized in the Netherlands. Subsidizing housing may be well argued for given e.g. equity and market failure arguments. Literature, however, does suggest that some forms of subsidization are more efficient than others; in particular, demand subsidies are generally more efficient than supply subsidies. The Dutch rented sector is dominated by supply subsidies. Keeping housing affordability constant we test whether there is room for welfare improvements following more efficient allocation of housing subsidies.

The value gap between owning and renting suggests that dwellings are rented out (well) below their market value. At the same time Conijn and Schilder (2011) show that introducing market rents would result in tremendous affordability issues for the majority of renting households: the gap between owning and renting has thus grown

too large to just quit subsidizing. In addition to the need of subsidization, our results in chapter 5 indicate that switching to a more efficient way of subsidizing leads only to minor gains in economic efficiency.

Chapter 2: How housing associations lose their value: the value gap in The Netherlands

Chapter 2 has been published with Johan Conijn in *Property Management, vol. 29, iss. 1,* pp 103-119.

1. Introduction

The value gap is a concept well known in the literature about gentrification. This concept refers to the difference in value between that of a house under owner-occupation relative to the value of the same house when rented. Hamnett and Randolph (1988) described these values as "vacant possession value" and "tenanted investment value" respectively and noted the existence of a gap between both values. There is also literature on the rent gap (e.g. Smith, 1987). In this case "rent" has the meaning of "Ricardian rent" and can be seen as related to the value gap. The reason behind the value gap lies in part in government policy that generates different values in both sectors. A consequence of this value gap may be that landlords convert rented housing into owner-occupied property in order to cash the difference in value. Such a conversion can be seen as a form of arbitrage between two markets that are not in balance with each other. As a result of this arbitrage this value gap may diminish and ultimately disappear. Hamnett and Randolph view this conversion caused by the value gap as a significant factor triggering the start of the gentrification process. After conversion these houses are occupied specifically by higher income groups. There has been widespread debate about the role played by the value gap in the process of gentrification (e.g. Millard-Ball, 2000). Until now there has been a lack of quantitative analysis about the size of the gap itself and the factors that are contributing to it. Such a quantitative analysis is of great importance in understanding the possible consequences of the value gap. In this paper a quantitative analysis of the value gap of the housing stock of the Dutch housing associations is given. The possible significance that the value gap may have on the process of gentrification is not reviewed.

In The Netherlands the value gap is an inbuilt characteristic of a not properly functioning housing market. In the owner-occupied sector the owner-occupier enjoys a favourable tax treatment that is largely or entirely capitalised in the value of the house. In the rental sector there is rent control as a result of which the value of a rented house is depressed. The non-profit behaviour of the housing associations, who own a major share of the total Dutch housing stock, contributes further to the depth of the value gap. The rental policy adopted by the housing associations results in a rental level that is on average, below that allowed by rent control. Furthermore the costs for management and maintenance which the housing associations make are, in general, above those of commercial landlords. Both factors further lower the value of the association-owned housing and so increase the value gap. Housing associations sell relatively few rented houses as a result of which arbitrage on the Dutch housing market only takes place at a small scale. The value gap is thus an inbuilt characteristic of the housing market.

This chapter will focus on the size of the value gap in the housing stock of housing associations. An equilibrium model is used to make a quantitative analysis of the value gap. Six factors will be distinguished that are jointly responsible for the value gap. The paper will close with a few considerations about the significance the value gap has for the functioning of the housing market and for housing policy. A brief sketch of the Dutch housing market will first be given.

2. Dutch housing market: a brief sketch

If the reasons behind the existence of the value gap are properly to be understood, it is important to understand how the Dutch housing market operates, or, more accurately, how it fails to operate. Significant characteristics of the Dutch housing market are (Conijn, 2006, 2008):

- a substantial level of subsidy in both the owner-occupied and rental sector;
- an inelastic supply in the housing construction market; and
- a relatively large share of the housing stock held by non-profit housing associations.

Recent reports issued by the Netherlands Bureau for Economic Policy Analysis (CPB) have established that the extent of the subsidies in both ownership sectors is considerable (Koning et al., 2006; Romijn and Besseling (2008). Tax subsidies operate in the owner-occupied sector. Mortgage interest payments are 100 per cent deductible from income tax for a 30-year period. Alongside that the net imputed rental value assigned to an owner-occupied house is taxed as part of income. However, the net taxable rental value is relatively low and amounts to only 0.6 per cent of the value of the house. Further, home equity is exempt from taxation. The net value of other assets is taxed at the rate of 30 per cent on a notional 4 per cent yield. The combination of these tax measures favours the owner-occupier. This has also resulted in a very high level of mortgage debt on the owner-occupied housing stock when compared with other developed countries (Yelten, 2006). The CPB concluded that the price of housing services was thus lowered by an average of 20 per cent (Koning et al., 2006).

Subsidy policy in the rental sector operates in two ways. Rent control covers 95 per cent of all rented houses whether those of housing associations or those of commercial landlords. The consequence of rent control is that rents are in general below the market rent level. Actual rents are considerably lower. The difference between the market rent and the actual rent can be seen as an implicit subsidy paid by the landlord. In addition the lower income groups may receive a housing allowance that is paid by the government. Compared with the effect that rent control has in lowering prices, the effect of subsidy policy via housing allowances is relatively limited. Altogether, CPB research shows that rental sector subsidies, both implicit and explicit, have led to an average 50 per cent cut in net rentals compared to market rentals (Romijn and Besseling, 2008).

It is of importance to examine the price elasticity of housing supply so as to understand the effect of tax subsidy policy on the owner-occupied sector and subsequently on the rental sector. Various studies have pointed to rigidity in the Dutch housing construction market. The price elasticity of housing supply in The

Netherlands is exceptionally low (Swank et al., 2002; Vermeulen and Rouwendal, 2007). One of the reasons lies in a stringent spatial planning policy and very long drawn-out planning procedures governing new residential construction. Given this rigidity of supply, the favourable tax treatment leads to an increase in the value of owner occupied houses. The tax subsidy is capitalised in the price level of the house. This causes much of the reduction in the price of housing services in the owner-occupied sector to be undone. The higher price level in the owner-occupied sector has also consequences for the rental sector as well. Tax subsidy policy operates to increase the vacant possession value of rented houses to no less a degree. If the rental level were based on the vacant possession value, the favourable tax treatment would result in higher rental levels, higher than would be the case in a market equilibrium without tax subsidy (White and White, 1977). This is the case in the CPB study, as a result of which the reported implicit subsidy in the rental sector is higher. Rent control can also be seen as a means whereby the favourable tax treatment afforded to the owner-occupied sector is prevented from harming tenants by pushing up prices (Romijn and Besseling, 2008).

The third significant characteristic of the Dutch housing market is the major share of the housing associations. Their share in the total housing stock is 33 per cent and they own 75 per cent of all rented housing. This, in comparison with other developed countries, is a high share. Taking the net present value of the cash flows derived from their assets less those of their liabilities, net equity on the balance sheets of Dutch housing associations stands at 30 per cent on average. This strong equity position is exceptional in an international perspective. Housing associations are thus in a position to realise new rented houses on their own even if market rates of returns are unobtainable. Despite rent control and the downwards pressure on rents that results, new rented houses are thus added to the stock. Partly enabled by their equity situation, rents charged for association-owned housing are lower than what is permissible under rent control. Management and maintenance costs of housing associations are higher than those in the commercial rental sector. Data will be presented later in this paper. This higher level of costs comes in part from a better service provided to tenants and in part from the value gap inefficiencies. This then creates the paradoxical situation whereby the strong net equity situation of housing associations leads to a policy in which the tenanted investment value of the houses and thus of their net equity position is depressed. In conclusion it is important to note that housing associations only make limited sales of rented houses to owner-occupiers. In general, sales are only made to finance new investments. In general, housing associations do not view the possibility of realising a profit on the sale that would arise from the difference between the vacant possession value and the tenanted investment value as being a sufficient reason to sell rented houses. On average housing associations sell only 0.6 per cent of their houses each year (CFV, 2008).

This only constitutes a brief sketch of the Dutch housing market and above all points to the factors that have led to an enormous value gap. The fiscal subsidy in the owner-occupied sector together with the inelastic supply increases the vacant possession value. The low rent level depresses the tenanted investment value. In principle this applies to all rented housing, but is the greatest in the case of association-owned housing. The non-profit behaviour of the housing associations deepens the value gap present in association-owned housing.

3. *The value gap in association-owned houses*

As a consequence of the various factors at play in the Dutch housing market there is in particular amongst the houses owned by the housing associations an inbuilt difference between vacant possession and tenanted investment value: the value gap. The size of the gap can be determined with the aid of data from the Central Fund for Social Housing (CFV), the national regulator for the housing associations. The average value in use of the rented houses is available for each association. This value is equal to the net present value of the future cash flows, for which the policy intentions of the housing associations forms the basis. Taking the different housing policies of the individual association into account, this value in use corresponds to the tenanted investment value. The average taxable value, the valuation under the Valuation of Property Act, of rented houses is also available for each housing association. This taxable value constitutes a good approximation of vacant possession value. In both cases the valuation date is 1 January 2007. At that time there were 455 housing associations in operation. Three small housing associations have been excluded from the analysis because of their lack of data. The remaining housing associations own 2.2 million rented houses.

Table 2.1 provides details of vacant possession and tenanted investment values for association-owned housing. The value gap is the difference between the two values. The average vacant possession value stands at €151,591 per rented house, the tenanted investment value at "only" € 33,512 per rented house. The value gap amounts therefore to an average of € 118,079 per rented house. This means that the major proportion of the vacant possession value is not realised by the housing associations over the rental period and is lost. The vacant possession value can of course be realized by selling the rented house. But housing associations only sell a small portion of their houses. Besides that, the focus of this paper is that it is of great importance to understand the factors causing so great a loss in value, amongst others by the housing policy of the housing association.

Table 2.1: Vacant possession value, tenanted investment value and the value gap present in association-owned houses, in Euros, 2007

	n	Minimum	Maximum	Mean	SD
Vacant possession value	2,242,830	61,916	334,479	151,591	27,320
Tenanted investment value	2,242,830	427	104,170	33,512	7,355
Value gap	2,242,830	11,460	296,734	118,079	27,508

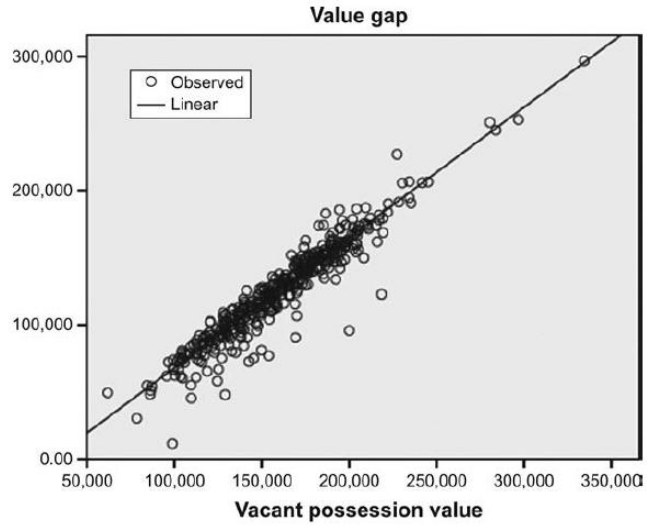
Source: CFV, own calculations

There is no statistical correlation between the level of the vacant possession and the tenanted investment value (R^2 = 0.01). The tenanted investment value is primarily determined by the actual rent level. This implies that also the actual rent has no statistical correlation with the vacant possession value (R^2 = 0.05). This is remarkable. It shows that the rent levels set by the housing associations, partly as a consequence of rent control, are out of line with the vacant possession value. In regions where the vacant possession value is relatively high, rental levels are no higher than elsewhere. A consequence of this is the lack of migration from the rental to the owner-occupied sector in these regions because there owner-occupation is more expensive than renting. Because there is no statistical correlation between vacant possession and

tenanted investment values there is indeed a strong correlation between the vacant possession value and the value gap (R^2 = 0.93). Figure 2.1 illustrates this correlation. Housing associations with a relatively high vacant possession value also have a relatively high value gap and vice versa.

The vacant possession value shows a clear regional differentiation while the tenanted investment value shows only a very limited regional differentiation. Figure 2.2 features the average of these two values as well as the average gap per Dutch province.

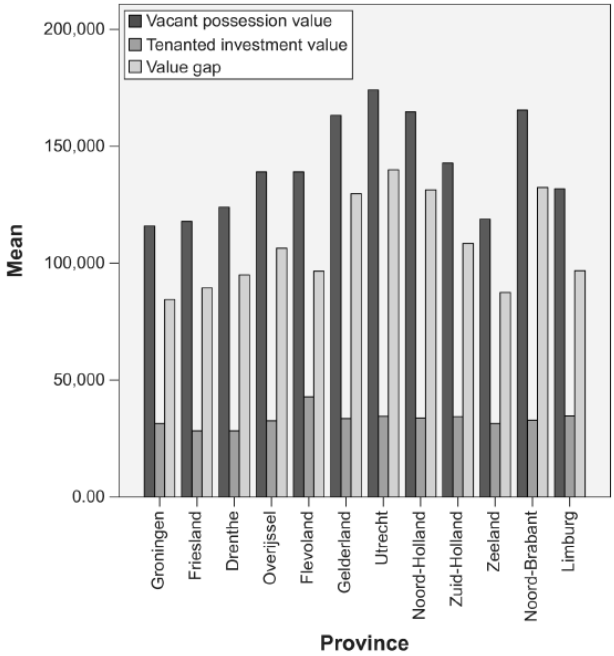
Figure 2.1: Vacant possession value and the value gap present in association-owned houses, in Euros, 2007



Note: Cases weighted by number of houses

Source: CFV, own calculations

Figure 2.2: Vacant possession value, tenanted investment value and the value gap by province, in Euros, 2007



Source: CFV, own calculations

As a partial consequence of scarcity the vacant possession value in the west of The Netherlands is relatively high but is relatively low in the peripheral provinces such as Zeeland, Groningen and Friesland. Tenanted investment values vary little between the provinces, the province of Flevoland being an exception. The fact that the tenanted investment value is higher here than in other provinces is attributable to the fact that this province, consisting of recently drained polder land, is relatively young as are the houses there. The differentiation by province in the average value gap follows that of vacant possession value.

4. The model

An equilibrium model is used to explain the difference between the vacant possession value and the tenanted investment value in association-owned housing. Where the housing market is in equilibrium and where there is no government policy influencing the value of houses, there is in principle no value gap. In that case the vacant possession value and the tenanted investment value are equal. In terms of determining the value of a house, it is of no consequence whether the house is owner-occupied or rented out. In the current situation a value gap has arisen. On the one hand this is because the favorable tax treatment is capitalized in the value of the owner occupied houses. On the other hand this is because the tenanted investment value has been depressed by, amongst other things, rent control in the rental sector.

The basis of the model used to explain the value gap is the relationship between the value of the house on the one hand and that of the future cash flows on the other. Where the market is in equilibrium the value of the house is equal to the present value of the future cash flows. The cash flows that are distinguished are rental revenues, maintenance costs, the other management costs, including insurance and taxes, and the residual value at the end the lifespan of the house. The following formula sets out the relationship:

$$MV_{t=0}^{eq} = R_{t=1}^{eq} \sum_{t=1}^{t=n^{eq}} \frac{(1+r)^{t-1}}{(1+d)^{t-1}} - MT_{t=1}^{eq} \sum_{t=1}^{t=n^{eq}} \frac{(1+mt)^{t-1}}{(1+d)^{t-1}} - MA_{t=1}^{eq} \sum_{t=1}^{t=n^{eq}} \frac{(1+ma)^{t-1}}{(1+d)^{t-1}} + RV_{t=1}^{eq} \frac{(1+rv)^{n^{eq}-1}}{(1+d)^{n^{eq}-1}} \quad (1)$$

where:

MV^{eq} = market equilibrium value of the house;
R^{eq} = rent level, market equilibrium;
MT^{eq} = maintenance costs, market equilibrium;
MA^{eq} = management costs, market equilibrium;
RV^{eq} = residual value of the house, market equilibrium;
r = yearly increase of the rent level;
mt = yearly increase of the maintenance costs;
ma = yearly increase of the management costs;
rv = yearly increase of the residual value;
d = discount factor/desired total rate of return.

The level of the cash flows that determine the market value of the house is in line with market equilibrium. How these levels are set is examined later in this paper. Depreciation is not present in formula (1). Depreciation is indeed a cost for the landlord but is not a cash flow. Depreciation does play a part later on. The conventional definition for depreciation is used here:

$$DP_t^{eq} = (1+p)MV_{t-1}^{eq} - MV_t^{eq} \qquad (2)$$

where:

DP^{eq} = depreciation, market equilibrium;
p = inflationary price increase of the value of the house.

The formula expresses that there is in principle an inflationary price increase resulting in an increase in the value of the house. To the extent that the value is lower, there is depreciation.

These two formulae can be used to derive the level of a market equilibrium rent. An equilibrium rent is equal to the user costs, a concept that is well- known in housing economics:

$$R_t^{eq} = dMV_{t-1}^{eq} + MV_t^{eq} + MA_t^{eq} + DP_t^{eq} - pMV_{t-1}^{eq} \qquad [4] \qquad (3)$$

The formula shows that the equilibrium rent level is equal to the desired total rate of return for the landlord multiplied by the market value of the house, being the invested capital, plus maintenance costs, management costs and depreciation. The inflationary increase in the value of a house, the indirect rate of return from housing operation, is deducted.

In the current situation the favorable tax treatment increases the vacant possession value. Because this paper does not further review the manner in which this increase comes into being, the following simple formula is used:

$$MV_t^{eq} = (1-f)TV_t \qquad (4)$$

where:

TV = the taxable value;
f = a factor by which the taxable value is decreased.

The equilibrium value of the house is determined by lowering the current vacant possession value by this factor f. Where market equilibrium obtains in the absence of government influence, this value applies in principle to both ownership sectors. Regional differences in the effect of the favorable tax treatment on the vacant possession value have been left out of consideration.

[4] In this formula the present value of the cash flows is prenumerando calculated. In order to derive formula (3) this should be postnumerando. When this is done the outcome of the model is slightly different.

The tenanted investment value reported by the housing association is the value which the housing association, based on rent control and its own policy, expects to realize during the remaining lifespan of the house. It is also calculated as the net present value of the future cash flows and the same classification of cash flows is applied. So the formula for the tenanted investment value resembles very much formula (1) for the market equilibrium value:

$$TIV_{t=0}^{ha} = R_{t=1}^{ha} \sum_{t=1}^{t=n^{ha}} \frac{(1+r)^{t-1}}{(1+d)^{t-1}} - MT_{t=1}^{ha} \sum_{t=1}^{t=n^{ha}} \frac{(1+mt)^{t-1}}{(1+d)^{t-1}} - MA_{t=1}^{ha} \sum_{t=1}^{t=n^{ha}} \frac{(1+ma)^{t-1}}{(1+d)^{t-1}} + RV_{t=1}^{ha} \frac{(1+rv)^{n^{ha}-1}}{(1+d)^{n^{ha}-1}} \quad (5)$$

where TIV^{ha} is tenanted investment value as reported by the housing association.

Although this formula appears very similar to formula (1), there are major differences behind that similarity. In principle the level of all cash flows realized by the housing associations can vary from what may be expected in a market equilibrium. This is indicated by the suffix ha. Also the remaining lifespan of the house differs.

5. The decomposition of the value gap

This model makes it possible to break down the value gap into six components which jointly explain the difference:

(1) the favorable tax treatment in the owner-occupied sector;
(2) a difference in the remaining lifespan;
(3) a difference in rent level;
(4) a difference in maintenance costs;
(5) a difference in management costs; and
(6) a difference in residual value at the end of the remaining lifespan.

Except for the first component, the other components are a result of the intended future housing policy of the housing association. Every component quantifies the effect compared with market equilibrium values.

The assumptions

The effect of the favorable tax treatment in the owner-occupied sector on the value gap is based on research in which an estimate is made of the decline in value when the favorable tax treatment is terminated. The estimates vary between 30 per cent and 15 per cent (Boelhouwer et al., 2001; Briene et al., Koning et al., 2006). The basic variant is based on a decline in value of 20 per cent (f = 0.20). Components 2 to 6 inclusive are all concerned with the value effect of the difference between a market equilibrium level versus the level applied by the housing association. Table 2.2 shows the average levels for housing associations as well as the market equilibrium values. The model is calculated for each housing association separately and the specific figures are used instead of the here presented averages.

Table 2.2: The average value taken by housing associations and the market equilibrium value of various factors in their housing operations, 2007

	Average values taken by housing associations	Market equilibrium values
Rent level 2007	€4,383	Endogenous, determined within the model
Maintenance costs 2007	€1,125	€875
Management costs 2007	€1,089	€730
Residual value (2007 prices)	€5,000	15 per cent of the market equilibrium value of the house
Remaining lifespan (years)	23	23 + 25

On average, housing associations assume a remaining lifespan of 23 years. This is partly based on a total 50-year operating period at the time when operations begin. The assumption often taken in the literature is that of an economic lifespan of 100 years whereby no distinction is made between owner-occupied and rented housing (CBS, 1954). Given that owner-occupied houses have on average a higher initial level of quality relative to rented houses, differentiating the lifespan is justified. An average lifespan of 125 years is assumed to apply to owner-occupied housing and one of 75 years to rented housing. Based on this the remaining lifespan of the houses of the housing associations has been raised by 25 years.

The rent level charged by the housing associations is relatively low as a consequence of rent control, but is also downward influenced by their own non-profit rent policy. The rent level that is used by the housing associations to determine their tenanted investment value is on average € 4,383 per year. The level of the equilibrium market rent is determined by the model. Results from the model will be shown later.

Housing associations have on average higher maintenance costs than those applicable under the VEX market standard. The VEX market standard gives the cost level of commercial landlords and is used as the market equilibrium cost level (FGH, 2008). The VEX market standard for maintenance amounts to an average of € 875 per rented house; housing associations spend an average of € 1,125 per house on maintenance. There is no reliable information of the reasons behind this difference. It is partly the result of the policy of housing associations to deliver more services and partly the result of inefficiencies. Housing associations' management costs, including expenses such as insurance and taxes, are also higher. The VEX market standard for management and other costs amounts to an average of € 730 per rented house; housing associations spend an average of €1,089 per house on management and other costs. Reliable indications of the reasons for the management costs are lacking as well. The residual value of association-owned houses is relatively low if it is assumed that the land made available at the end of the lifespan will be used for the construction of new association-owned houses. On the basis of this assumption the regulator retains as residual value the figure of € 5,000 for association-owned housing. A market residual value has been taken as being 15 per cent of the market equilibrium value of the house.

The following long-term assumptions have been made in the basic variant that allow for inflation, other parameters and the desired total rate of return/discount rate. General inflation (CPI) has been set at 2 per cent. Because the price increases of houses, maintenance and management in practice exceed the CPI, price increases of 3 per cent have been retained for each of these three items. Also the residual value of the house is supposed to increase yearly with 3 per cent. The annual inflationary rent increase has been set at 2.25 per cent; this equals the 3 per cent price increase of houses minus an annual obsolescence rate of 0.75 per cent. Finally the desired total rate of return/discount rate has been calculated by taking a 4 per cent risk-free rate of return plus a 2 per cent risk premium, taking the total to 6 per cent.

Results of the basic variant

The results of the model consist of two components: the quantitative decomposition of the value gap and the level of the market equilibrium rent plus the factors from which the rent level are built up. Table 2.3 shows how the model explains the value gap totaling € 264.8 billion.

Table 2.3: The breakdown in the value gap of 2.2 million association-owned houses by the different factors, in billions of Euros, 2007

Vacant possession value	*340.0*
Effect of tax policy	−68.0
Market equilibrium value	*272.0*
Effect of lower rent level[a]	−127.8
Effect of higher maintenance costs[a]	−14.9
Effect of higher management costs[a]	−21.3
Effect of lower residual value[a]	−7.6
Effect of shorter lifespan	−25.2
Tenanted investment value	*75.2*

Note: [a]This effect has been calculated on the assumption of a remaining lifespan in line with market equilibrium

Source: CFV, own calculations

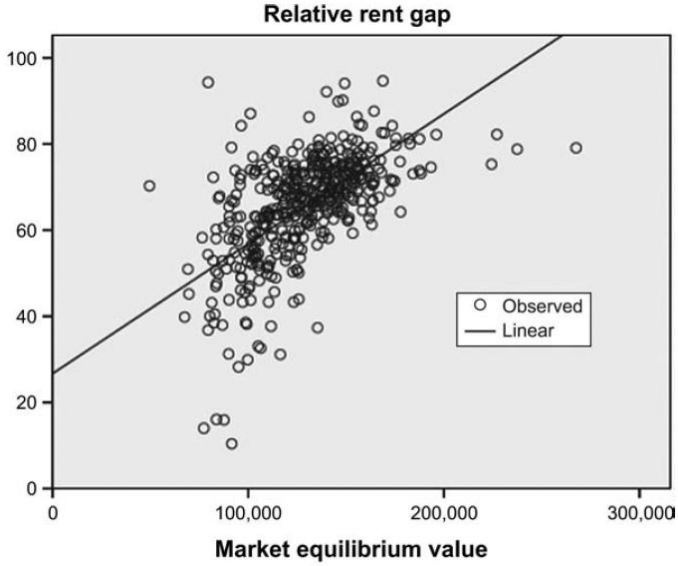
As stated above, six factors are distinguished, each of which are responsible for a part of the loss in value. The reduction in vacant possession value due to the effect of the tax policy amounts to € 68.0 billion. The market equilibrium value of the 2.2 million association-owned houses, without the distorting influence of the tax policy, thus comes out at € 272.0 billion. Housing associations "only" realize € 75.2 billion of this value. Rent policy, combined with rent control, causes the greatest loss of value, which amounts to €127.8 billion. This corresponds to the capitalized value of the difference between the market equilibrium and actual rent levels. Additionally the higher maintenance and management costs contribute € 14.9 billion and € 21.3 billion respectively to the loss in value. The fact that housing associations take housing units out of operation relatively quickly results in a loss of value of € 25.2 billion. Lastly the lower residual value of association-owned housing further depresses the tenanted investment value by € 7.6 billion.

There are major differences between housing associations, not merely in terms of the size of the value gap as has been shown above. The effect of each differentiating factor also varies sharply. This concerns specifically the effect of the five factors that comes from the housing associations' operating policy. These five factors are

responsible for the difference between the market equilibrium value and the tenanted investment value, the adjusted value gap, amounting to € 197 billion in total. In the model the effect of tax policy is always an identical percentage of the vacant possession value for each housing association and therefore has been omitted in the adjusted value gap.

On average 65 per cent of the adjusted value gap is caused by the lower rent level. The size of the rent gap, the part of the value gap which is caused by the difference between the market rent level and the actual rent level, as a percentage of the adjusted value gap is primarily determined by the level of the market equilibrium value of the house. The higher this value, the greater the rent gap is. In addition, the actual rent level is also of importance for the rent gap. The lower the actual rent level, the higher the rent gap. The combination of these two variables explains the size of the rent gap to a large degree (R^2 = 0.80). Figure 2.3 shows the correlation between the relative rent gap and the market equilibrium value per rented house.

Figure 2.3: The size of the relative rent gap as a percentage of the market equilibrium value and the market equilibrium value per rented house, 2007



Note: Cases weighted by number of houses

Source: CFV, own calculations

Maintenance and management costs are responsible for 18 per cent of the adjusted value gap. The relative gap due to the difference in costs is primarily determined by the size of the actual costs per house and also by the level of the market equilibrium value of the house (in aggregate R^2 = 0.81).

Sensitivity analysis

The breakdown of the value gap shown depends on the assumptions made, so it is relevant to make a sensitivity analysis for some important assumptions. The analysis is made concerning the following assumptions:

- The size of the value effect of the favorable tax treatment in the owner-occupied sector. In the basic variant a 20 per cent effect is assumed. Variants with a 17 per cent and 23 per cent effect have been calculated.
- The residual value level at the end of the operating period. In the basic variant the calculation allowed for 15 per cent of the market equilibrium value of the house. Alternative assumptions are 10 per cent and 20 per cent of the market equilibrium value.
- The duration of the remaining lifespan of the houses. In the basic variant 25 years were added to the remaining lifespan stated by the housing association. This additional lifespan has also been set at ten and 40 years.

Table 2.4 features the results of these six variants. In all variants the effect of a lower rent level is the greatest by far. The variants show only limited change from the other effects. The results of the basic variant are thus relatively robust.

Table 2.4: The breakdown in the value gap of all association-owned housing in the case of different variants, in billions of Euros, 2007

		Tax effect		Residual value		Remaining service life	
	Basic variant	17 per cent reduction in the vacant possession value	23 per cent reduction in the vacant possession value	10 per cent of the market operating value	20 per cent of the market operating value	10 years extra	40 years extra
Vacant possession value	*340.0*	*340.0*	*340.0*	*340.0*	*340.0*	*340.0*	*340.0*
Effect of tax policy	−68.0	−56.7	−78.5	−68.0	−68.0	−68.0	−68.0
Market operating value	*272.0*	*283.3*	*261.5*	*272.0*	*272.0*	*272.0*	*272.0*
Effect of lower rent level[a]	−127.8	−139.2	−117.4	−131.4	−124.3	−140.1	−122.3
Effect of higher maintenance costs[a]	−14.9	−14.9	−14.9	−14.9	−14.9	−12.2	−16.6
Effect of higher management costs[a]	−21.3	−21.3	−21.3	−21.3	−21.3	−17.4	−23.8
Effect of lower residual value[a]	−7.6	−7.6	−7.6	−4.1	−11.1	−11.7	−5.0
Effect of shorter lifespan	−25.2	−25.2	−25.2	−25.2	−25.2	−15.3	−29.2
Tenanted investment value	*75.2*	*75.2*	*75.2*	*75.2*	*75.2*	*75.2*	*75.2*

Note: [a]This effect has been calculated on the assumption of a remaining lifespan in line with the market

Source: CFV, own calculations

Market equilibrium rent level

The value gap is what is lost during the lifespan of the house if the intended future housing policy of the housing associations is actually put into practice. It is the loss capitalized over the remaining lifespan. The total loss is built up from the yearly losses relative to the market equilibrium benchmark. This yearly loss may be quantified using the market equilibrium rent level and the components from which it is built up. Table 2.5 shows the result given by the model for the market equilibrium rent level.

Table 2.5: The market equilibrium rent level and how it is built up under the basic variant, 2007

R	=	i*MV − 1	+ MT	+ MA	+ dp*MV − 1	P*MV − 1
€6,836	=	6%*€121,273	€875	€730	1,32%*€121,273	3%*€121,273

Source: CFV, own calculations

The average market equilibrium rent level is € 6,836 on an annual basis. Related to the market equilibrium value of the house which is on an average € 121,273 (80 per cent of the vacant possession value), the equilibrium rent level is 5.6 per cent. As shown in Table 2.2 the actual rent level amounts to an average of € 4,383 per year. There is thus a rent discount of 36 per cent. This rent discount is the consequence of rent control and the rent policy pursued by the housing associations. The difference of € 2,453 can be seen as an implicit subsidy. The total size of the implicit subsidies across the 2.2 million rented houses owned by the housing associations amounts to € 5.5 billion.

A recent study by the CPB also derived the market equilibrium rent level (Romijn and Besseling, 2008). According to the CPB this amounts to an average of € 8,620 per year for an association-owned house. The difference between both results is to a large degree explained by the fact that the CPB calculates the market rent on the basis of the vacant possession value without adjusting for the value boost coming from the favorable tax treatment afforded to owner-occupiers. The favorable tax treatment in the owner-occupied sector does indeed exert an upward push on prices in the rental sector. That effect does not exist in a situation of market equilibrium in which prices in both the rental and the owner-occupied sector are not influenced by government policy and this is the reason requiring an adjustment to the vacant possession value. If the model makes use of the unadjusted vacant possession value to calculate the market rent the average market rent comes to € 8,139 per year.

There are two other differences with the CPB analysis that cancel each other out to a large degree. The model features an average depreciation percentage (dp) of 1.32. Depending on the individual housing association, this figure varies between 0.91 per cent and 1.77 per cent. The CPB bases itself on a figure of 0.4 per cent (Koning *et al.*, 2006). A depreciation percentage of 0.4 is exceptionally low and does not accord with the expected remaining lifespan of association-owned houses. The result given by the model is to be preferred. On top of the risk-free rate of return, the CPB also retains a relatively high risk premium of 3 per cent, as a result of which the desired rate of return amounts to 7 per cent. In this analysis the risk premium has been set at 2 per cent for investments in rented housing.

Loss of direct return

The housing associations forgo return by virtue of their lower rent levels and higher operating costs. This specifically concerns direct rate of return. The scale of the loss of direct return can be determined by comparing the equilibrium values in the case of a market rent level with the actual values set out in Table 2.2. In 2007 the housing associations forewent an average of € 2,453 in rental revenues and average operating costs were € 609 higher. Table 2.6 provides some data about the key figures for loss of direct return.

Table 2.6: Market equilibrium direct rate of return, actual direct rate of return, and loss in direct return, as a percent of market equilibrium value of the house, 2007

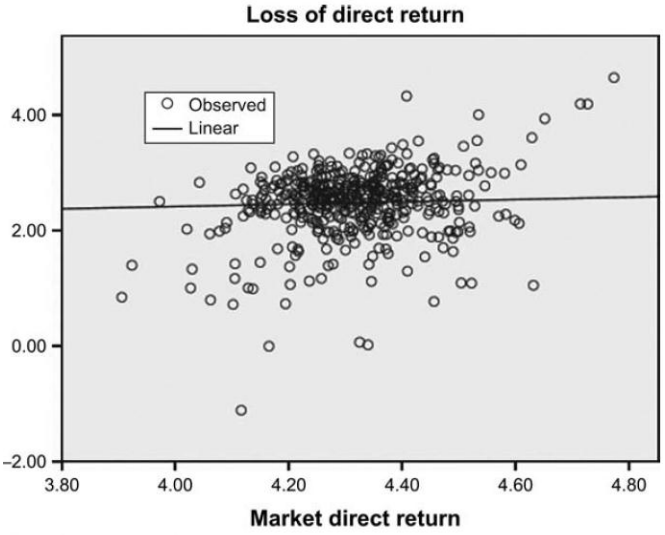
	n	Minimum	Maximum	Average	SD
Market direct rate of return	2,242,830	3.91	4.77	4.32	0.09
Actual direct rate of return	2,242,830	0.08	5.23	1.84	0.44
Loss in direct return	2,242,830	−1.11	4.65	2.48	0.43

Source: CFV, own calculations

Direct returns under market conditions amount to an average of 4.3 per cent, and the spread is limited. The actual direct return is only 1.8 per cent. The loss in direct return therefore amounts to an average of 2.5 per cent, calculated on the market equilibrium value of the house. There are two very small housing associations where the data shows that their actual direct yields exceed that of the market.

It might be assumed that the loss of direct return incurred by housing associations increases in line with an increase in the market direct return. Where a market direct return is high, more return can be sacrificed without this leading to financial problems. However, that correlation is entirely absent (R^2 = 0.00). Figure 2.4 gives the loss of return for each housing association compared to the market direct return and illustrates this point.

Figure 2.4: Market direct return and loss of return by housing associations, as a per cent of market equilibrium value, 2007



Note: Cases weighted by number of houses

Source: CFV, own calculations

The average 2.5 per cent loss of return can also be expressed in Euros. Relative to the market benchmark, the housing associations have lost a total of € 6,736 million on their operations in 2007. This is a substantial sum. That housing associations do not behave as a commercial landlord and as a result do not achieve a market return is inherent to their non-profit policy goals. The central question is indeed whether, given the scale of the loss of return, this is performed in an efficient manner.

6. Discussion

The value gap in association-owned houses and with commercial landlords as well, is an inbuilt characteristic of the Dutch housing market. The persistence of this value gap is made possible in part by the limited transfers between rent and owner-occupied houses. This implies at the same time that the simple fact of the existence of the value gap does not necessarily lead to gentrification. While this factor may promote gentrification, it is not a sufficient condition.

The existence of the value gap, and certainly on the scale that is the case in The Netherlands, shows that the housing market is not in equilibrium. The total value gap amounts to € 265 billion. The analysis has shown that this gap, in order of importance, is caused by the:

(1) relatively low rent level (48 per cent);
(2) effect of tax policy (26 per cent);
(3) effect of a shorter lifespan (10 per cent);
(4) effect of higher management costs (8 per cent);
(5) effect of higher maintenance costs (6 per cent); and
(6) effect of lower residual value (3 per cent).
The relative low rent level is by far the most important factor causing the value gap, on a distance followed by the effect of the tax policy in the owner-occupied sector.

The value gap has a number of consequences for the functioning of the housing market. The owner-occupied and the rental segments are separate housing markets between which migration is at a level that becomes lower and lower. New construction of rented housing by commercial landlords hardly ever takes place primarily because no market rate of return is possible in a rental market which is dominated by housing associations. The fact that housing associations indeed realize new rental housing comes from the fact that their required rate of return on the invested value can be very low. With the price level of owner-occupied housing is driven upwards by favorable tax treatment, potential first time buyers find it hard to access the owner-occupied sector. The functioning of the housing market may be improved when the value gap declines steadily. This calls for the favorable tax treatment to disappear from the owner-occupied sector over time and for rent levels in the rental sector to be raised to market level. Because of the major financial consequences for the owners' occupiers, the landlords and the tenants involved, a recovery of the housing market will take many years.

The manner in which the objectives of housing policy are realized forms a separate point in the discussion. An important objective is housing affordability for lower

income groups. In addition to housing allowances, Dutch housing associations play a significant part in renting houses out at a relatively low rent. This paper has shown that, as a result, a loss in value for the housing associations arises worth € 128 billion. This loss in value comes at the expense of the housing associations' capacity to invest. Furthermore, this relatively low rent level is a mechanism for providing a wide-ranging, generic subsidy to housing consumption. The key point here is that there is no guarantee that this subsidy policy and the value loss so created constitute an efficient use of resources. Higher income groups also live in association-owned houses, in which case there is no need for a housing consumption subsidy. Housing affordability may well be achieved more efficiently by transforming the generic subsidy policy into a targeted form of subsidizing by increasing the rent level to a market level and at the same time expanding the system of housing allowances. Since 2008 housing associations are carrying out experiments under the title of "Customized Rentals" in which these options are being explored (Vos, 2008). Welfare is expected to increase when this experiment is implemented to all houses of housing associations.

Chapter 3: Home equity, fiscal policy and the demand for housing

1. Introduction

The life cycle theory is a powerful theory describing and predicting household consumption. Within the context of the life cycle theory total wealth is consumed over the household life cycle; total wealth constitutes of all income and financial assets, including pension and home equity. Since households early in life have little wealth they leverage against future (expected) wealth; later in life households have more wealth and less income and should divest assets. Since home equity is the most important asset class for most households, its role is of special interest in studying life cycle consumption behavior of households.

Empirical results from the housing market, however, regularly conflict with predictions from the life cycle theory. Famous example of such conflict is the apparent reluctance of elderly to reduce home equity reported in Venti and Wise (1990; 2001), also reported in Poterba and Samwick (1997). In a pure life cycle framework we should have seen household reduce their consumption of housing services and consume their home equity. Less naïve specifications of the life cycle model can accommodate for e.g. bequest motives or market frictions, such as transaction costs and incomplete capital markets, which may cause households to behave in a seemingly irrational manner.

Based on standard economic theory we expect that households spread consumption over their total life cycle. This implies that households divest home equity towards the end of their life cycle. In this paper we study whether households in the Netherlands divest home equity towards the end of their life cycle, or that we find similar reluctance to divest home equity as in e.g. Venti and Wise. Another source of potential conflict between life cycle theory predictions and households' treatment of home equity arises with fiscal institutions aimed at home equity. In the Netherlands the fiscal treatment of the owner-occupied dwelling is generous; all mortgage interest payments are fully deductible against the marginal income tax rate and home equity as well as capital gains is untaxed. Moreover, a change in the tax system in 2004 made extraction of home equity fiscally unattractive. The household therefore has a strong incentive to a) maximize debt and b) roll over home equity. This implies a specific role of home equity in the demand for housing that deviates from other non-housing wealth and thus a violation of the household life cycle theory.

Standard economic theory implies that housing demand should be a function of total wealth. Fiscal policy, however, gives households an incentive such that home equity might have a different impact on housing demand than other sources of wealth. We will test empirically in this paper whether home equity has a different impact on housing demand than non-housing wealth.

All in all, the role of home equity in the economy is a source of lively debate. In this paper we shall briefly review some of that debate. We add to existing literature by testing the life cycle theory's predictions regarding the role of home equity in housing demand using a quasi-panel micro dataset.

2. Housing, investment, fiscal policy and the life cycle

The life cycle framework has been an important theoretical framework for economic research on intertemporal allocation of resources since Friedman (1957) popularized the notion of permanent income. The essence of the life cycle theory is that households' consumption and saving behavior does not respond to short-term fluctuations in wealth and income, but is smoothed over the course of the life time. Consumption in general and consumption of housing services in particular should therefore not depend on short term fluctuations of the market value of assets. Only when wealth increases we may expect households to react and adjust (life time) consumption. In this section we shortly review some important literature regarding both issues.

2.1 Divesting home equity

As stated before, households are theoretically assumed to smooth consumption over their life cycle. This implies that households build up equity early over the life cycle in order to consume this capital when income from labor decreases. An oft-used way to build up capital over time is via buying a house and repaying the mortgage: households then build up capital in home equity. In two of the best known papers on this matter, Venti and Wise (1990, 2001) describe the reluctance of elderly to reduce home equity holdings towards the end of the household life cycle. These findings are also reported in Poterba and Samwick (1997). Recently similar results have been presented in Toussaint and Elsinga (2011) and Chiuri and Jappelli (2010). Households thus build up capital over their life cycle, but do not use it to smooth consumption in the later stages of their life.

The empirical evidence of households' general preference not to divest home equity seems to contradict the predictions from standard economic theory: there are, however, economic explanations that may (at least partly) help understand why households prefer not to divest home equity. Li and Yao (2007), for instance, justly point out that households may be expected to divest more liquid assets such as savings first before turning to more illiquid assets as home equity. Moreover, Megbolugbe *et al.* (1997) claim that altruism may explain the tendency of elderly to not consume out of home equity; especially households that have children that are doing economically poorly do not divest home equity. Finally, Skinner (2007) argues that not smoothing home equity over consumption after retirement might be a rational way of insuring against future needs such as medical care. The apparent contradiction that the reluctance to divest home equity creates with the life cycle theory may thus be reconciled by applying a less strict interpretation of the theory. The question remains to what extent these reconciliations really account for the observations presented in the quoted studies.

2.2 Housing wealth effect in the demand for housing

Over the past decades house prices in many countries have increased strongly (Girouard *et al.*, 2006). As a result many households have experienced an increase in home equity. The question is to what extent the increase in home equity has lead to an increase in aggregate wealth. Indeed these households have higher home equity; however, these households also have higher payments for housing services. On a macro level some households might benefit from the increase in home equity, others will be less well of having to pay higher prices. The findings of Li and Yao (2007) imply a distributional effect of wealth: existing home-owners gain at the expense of future home-owners. On aggregate, with perfect capital markets, housing wealth from house price increases actually does not constitute a real wealth effect (e.g. Buiter, 2008; Glaeser, 2002). House price changes should therefore not affect consumption in general, and not affect the demand for housing in particular.

Although there is no reason to assume a wealth effect for the aggregate economy, at the level of the individual household there may be serious effects of house price fluctuations. On a micro level, increases in home equity may indeed result in increased consumption. Papers by e.g. Case *et al.* (2005), Carroll *et al*. (2006) and Bostic *et al.* (2009) report significant wealth effects on consumption of housing wealth. The housing value elasticities of consumption reported in these papers vary around 4 to 10 percent. These results suggest that house price increases might have an impact on the demand for housing services. Results of Campbell and Cocco (2007) imply that rising house prices relax borrowing constraints; this is in line with Ortalo-Magné and Rady (2006) who predict that rising house prices may result in increasing demand for housing if households are borrowing constraint. These results, however, still fit within the life cycle theory. The only implication from the quoted results is that certain desired levels of consumption are timed differently within the life cycle resulting from market frictions. However, Dusansky and Koç (2007) and Dusansky *et al.* (2011), stress that (expectations about future) price developments have a positive impact on demand for housing. Chan (2001) focuses on price decreases and finds that decreasing home equity leads to lower probabilities of moving. Increases in home equity may therefore drive demand for housing, despite the simultaneously occurring higher price of housing services.

Nonetheless, we find no evidence that housing wealth has any different impact on the demand for housing than non-housing wealth. Poterba (2001) points out that the different fiscal treatment of asset classes may impact households' investment decisions. The complex yet favourable fiscal treatment of the owner-occupied dwelling in the Netherlands might result in home equity becoming a stronger driver for housing demand than other sources of equity. In order to explain how this works we need to elaborate somewhat on the fiscal treatment of assets in the Netherlands.

2.3 Fiscal policy on home ownership in the Netherlands

The size of home equity, the degree of liquidity and the impact that home equity has on the demand for housing depend on the fiscal treatment of owner-occupied housing. In the Netherlands there is a significant fiscal benefit to the owner-occupier. The fiscal treatment of the owner-occupied dwelling has become less generous in recent

years. One of the effects of the changes in the fiscal treatment is that home equity has become less liquid. In this paragraph we shall briefly review the fiscal treatment of owner-occupied housing in the Netherlands (see also Rouwendal, 2006).

The Dutch tax system differentiates taxes to the source of income. Households are taxed on income (box 1) and taxed on equity (box 3). In this box 3 not the actual return on equity but an attributed return is taxed. The attributed capital gains tax is 1.2% over the net equity. This percentage is based on a notional return on net equity of 4% and a tax rate on this return of 30% (0.04*0.3=0.012). The owner-occupied dwelling and the mortgage on the dwelling, however, are not situated in box 3, but in box 1. Therefore, on the one hand, the costs associated with the owner-occupied dwelling, such as the mortgage interest, are deductible from income tax. On the other hand, the income associated with the dwelling, reflected in an imputed rent, is taxed. The mortgage interest is, due to the placement in box 1, fully deductible from income tax during a period of 30 years. The effect of this deductibility is dependent on the marginal tax rate, which varies between 33.5% for the lowest tariff (until an income of € 17,789 annually) and 52% for the highest tariff (above € 54,777). The highest income groups therefore effectively pay only 48% of the interest payments. The imputed rent which is taxed is equal to the gross imputed rent minus the costs (i.e. management, maintenance and depreciation). This net imputed rent is set at 0.55% of the value of the house. For houses below € 75.000 this percentage is lower, for houses with a value in excess of € 1 million the net imputed rent is higher and will increase in the coming years to 2.35% for the share over € 1 million. The majority of all houses (>95%) fall within these boundaries and for these dwellings a net imputed rent of 0.55% applies. The effect of this tax also depends on the marginal tax rate: the added tax due for higher income groups for the net imputed rent is (52% multiplied by 0.55%) 0.286% over the value of the property. Moreover, the imputed rent is only due when its amount does not exceed the interest payments. The net effect of fiscal treatment of owner-occupied housing is that user costs of housing can be significantly lowered.

It has been well documented that the fiscal treatment of the owner-occupier is very generous in the Netherlands. Van den Noord (2005) reports it as the most generous in the OECD countries. The fact that the home equity is not taxed like other assets and the mortgage interest is tax deductible gives the owner-occupiers yearly an implicit subsidy of € 14 billion (Van Ewijk *et al.,* 2006): this implies a reduction of user cost of 20%. The tax treatment invites the owner-occupier to hold high levels of mortgage debt, especially when his income falls within the highest tax bracket. This is done by financing the house with a high loan-to-value ratio within the limits which are set by the banks. Many households have mortgages that include no repayment of the loan to maximize mortgage interest deductions. "Dutch households have strong incentives to maintain mortgages at high levels given the extremely favorable tax treatment of debt-financed owner-occupied housing" (Girouard *et al.*, 2006). As a result the total mortgage debt as a percentage of GDP is the highest in Europe (EU-15 countries). In the Netherlands this ratio is 111%; the average for the European countries is 46% (Yelten, 2006).

The fiscal treatment of the owner-occupied house has become less generous in the last few years. An important example of the decrease of subsidization to owner-occupiers is the introduction of the additional loan act in 2004. The additional loan act states

that a mortgage to refinance the withdrawal of home equity is not eligible for mortgage interest deductibility. Also when one is moving to another home one has to use all home equity to finance the new home. Before this act households were able to refinance their home equity and invest it elsewhere or to consume it freely. The additional loan act does not forbid refinancing, but it does make refinancing more costly than it was before. This act thus makes alternative use of home equity less attractive. Figures with the relatively high rate of equity withdrawal in the Netherlands (Catlle *et al.*, 2004) are based on the fiscal policy before 2004 when it was advantageous to withdraw equity and not anymore representative for the period since 2004.

The fiscal treatment of equity is not identical for all sources of equity. This may affect the asset selection and allocation decisions of households. The change in fiscal policy made it even more attractive fiscally for households to keep built-up equity within the owner-occupied dwelling. The incentive to build up capital in the owner-occupied dwelling, as well as the disincentive to extract it, could increase demand for (investment in) owner-occupied housing. Whether this is the case is tested in the second section of the empirical part of this paper.

3. Data

In this study we use three datasets from the housing survey: "WBO2002", "WoON2006", and "WoON 2009". The surveys are conducted by Statistics Netherlands and contain a large number of questions on a wide range of topics related to housing, such as house values, mortgages and rents paid, house and household characteristics, information on previously occupied dwellings and future potential housing market behavior. Home equity, however, is not an observed variable in this database. We obtain a value for home equity by subtracting the remaining amount of the mortgage from the house value. We extract the variables that relate to home equity from each wave and merge these datasets into a new dataset comprising 217,119 unweighted observations. Summary statistics of our dataset are presented in Table 3.1. We made a selection on a small set of variables to eliminate outliers. Our selection discards all non-typical dwellings (e.g. dorms, nursing homes, boats), all dependent households (e.g. older children living with parents), and all observations where house value is below € 20.000 or in excess of € 1.000.000. This discards 485,605, 1,530,086, and 696,589 weighted observations in 2002, 2006 and 2009 respectively (12,814, 19,154, and 14,378 unweighted).

Table 3.1: Summary statistics[5], 2002 - 2009

	2002			2006			2009		
	All households	Owners	Recently moved owners	All households	Owners	Recently moved owners	All households	Owners	Recently moved owners
Disposable annual income (*1000 €)	31.3	39.3	40.3	29.6	38.7	37.6	34.7	42.8	42.4
Value (*1000 €)	170.4	210.4	196.5	216.1	271.9	248.3	237.6	284.8	260.9
Relative home equity (%)	-	51.8	16.5	-	49.9	14.9	-	45.7	14.5
Age head of household	50	49	38	51	49	38	52	51	39
Occupation duration	13	13	1	13	14	1	14	14	1
Household composition									
Single +/- child(ren)	39%	21%	23%	42%	23%	26%	40%	25%	29%
Couple	30%	35%	39%	29%	35%	39%	30%	35%	37%
Couple + child(ren)	31%	43%	36%	28%	41%	34%	29%	39%	34%
Other	1%	1%	1%	1%	0%	1%	1%	1%	1%
Housing market behavior									
Not moved	83%	86%	-	83%	87%	-	84%	87%	-
Moved within owner-occupied sector	6%	8%	54%	5%	7%	51%	5%	7%	52%
Moved from rented sector	8%	5%	34%	8%	4%	34%	7%	4%	31%
Moved as starter	3%	2%	13%	4%	2%	15%	4%	2%	17%
Source of income									
Salary	59%	69%	85%	56%	68%	85%	55%	62%	79%
Business - entrepreneur	6%	8%	8%	8%	11%	10%	11%	14%	13%
Pension	26%	21%	7%	27%	21%	6%	25%	21%	7%
Social security	15%	8%	6%	18%	10%	6%	9%	3%	2%
N (weighted)	6371826	3362606	477947	5563491	2597063	337678	6550191	3810499	500815
n (unweighted)	61379	33638	5732	44563	20621	2629	63018	36043	4816

Source: WBO 2002, WoON 2006, WoON 2009

[5] The numbers for source of income in the waves of 2002 & 2006 do not add up to 100 because of a different questionnaire.

There are little surprises in the summary statistics in Table 3.1. The only surprise is the decrease in disposable income from 2002 to 2006. The income for owner-occupiers remained stable in that period in nominal terms; renters' income even decreased a bit from 2002 to 2006 (Ministry of Housing, 2008). This is amplified in Table 3.1 by the inflation correction; the income reported in Table 3.1 is real disposable income. The general pattern is familiar, though: owner-occupiers generally have a higher income than renters, for instance, and owner-occupiers on average live in more expensive dwellings than renters. More mobile households tend to be younger than non-mobile households. We furthermore see that owner-occupiers are more often a couple or a couple with children. Also, owner-occupiers, especially more mobile owners, tend to have salary as the main source of income. A recent move strongly decreases the average relative home equity in the dwelling. Generally, there is little variation within the key statistics of each of the three waves.

The focus of this paper is on home equity; we therefore summarize some key statistics on home equity from merged dataset. Home equity is defined as the difference between the tax assessed value[6] (observed) and the outstanding mortgage (observed). The objective of this paper is to test whether households divest home equity. The level of equity, however, is strongly dependent on the value of the house. For testing whether households divest home equity we are therefore not so much interested in the absolute level of home equity, but rather in the relative home equity. We thus use relative home equity as dependent variable. Relative home equity is defined as follows:

Relative home equity = (tax assessed value – outstanding mortgage) / tax assessed value

A second objective of this paper is to test whether households' demand for housing consumption is increased by home equity, or at least more so than other equity. If households indeed increase their housing consumption in the presence of (increasing) levels of home equity, we should observe households rolling over home equity and maximizing mortgage debt holdings. This implies that households should use their full debt capacity when moving house. We therefore also summarize the use of debt capacity. Debt capacity is defined as follows:

*Debt capacity = multiple*gross annual household income*

The multiple is agreed upon by banks and depends on gross income and mortgage interest rate; higher incomes lead to higher multiples, higher interest rates lead to lower multiples. The multiples for 2006 and 2009 are identical given roughly similar average mortgage interest rates; the multiples in 2002 were slightly lower. Households with higher incomes can therefore *ceteris paribus* obtain larger mortgages. The variable of interest, however, is not the debt capacity itself, but rather the extent to which households use their debt capacity. This is defined as follows:

Use of debt capacity = mortgage / debt capacity

[6] In the Netherlands the tax assessed value of the property is a good proxy for actual value of the house. In 2002 and 2006 the assessment date was a few years prior to the questionnaire; we applied price increases (30% and 14,5% respectively) to correct for this.

Our estimate of the debt capacity is in most cases overestimating household debt capacity. Households that have two income earners cannot use the full debt capacity of both incomes to obtain a mortgage; the second income only counts partially. In some occasions we underestimate the debt capacity as banks may deviate from the legal multiple in cases of future income increases. This happens mostly with highly educated young professionals. Banks, however, also have the discretion to offer loans below the debt capacity according to the above stated definition. Since the global credit crunch banks have increasingly applied the multiple as a strict maximum for mortgage lending. Generally, we are therefore most likely to overestimate debt capacity and therefore underestimate the use of debt capacity.

Table 3.2a: Leverage and use of debt capacity

	2002					
	Overall		Not moved		Recently moved	
Age	Relative home equity	Use of debt capacity	Relative home equity	Use of debt capacity	Relative home equity	Use of debt capacity
<=25	11	71	27	73	5	70
26 - 35	22	55	31	49	6	66
36 - 45	42	45	46	42	16	70
46 - 60	58	35	60	33	28	63
>60	83	22	83	21	67	35

Source: WBO 2002, own calculations

Table 3.2b: Leverage and use of debt capacity

	2006					
	Overall		Not moved		Recently moved	
Age	Relative home equity	Use of debt capacity	Relative home equity	Use of debt capacity	Relative home equity	Use of debt capacity
<=25	6	82	16	84	2	81
26 - 35	16	66	21	61	5	76
36 - 45	39	54	42	51	17	76
46 - 60	57	38	59	36	27	68
>60	80	27	81	26	57	53

Source: WoON 2006, own calculations

Table 3.2c: Leverage and use of debt capacity

	2009					
	Overall		Not moved		Recently moved	
Age	Relative home equity	Use of debt capacity	Relative home equity	Use of debt capacity	Relative home equity	Use of debt capacity
<=25	3	95	9	84	0	98
26 - 35	7	80	11	76	1	87
36 - 45	28	66	31	63	14	81
46 - 60	51	45	53	43	28	70
>60	78	29	79	29	65	40

Source: WoON 2009, own calculations

There seems to be some change in leverage and use of debt capacity over time, as can be seen in Tables 3.2a through 3.2c. Households generally have less home equity in relative terms in 2009 than in 2002. Tables 3.2a through 3.2c furthermore show that households use a larger share of their debt capacity in 2009. The results in Tables 3.2a through 3.2c are striking, since as of January 2004 the fiscal benefit of withdrawing

home equity for consumption has been abolished. Households since then have a stronger incentive to roll over home equity and are thus, given moderate price increases in the period after 2004, expected to use less debt to finance their homes. This is, however, not the case; the use of debt as a percent of total debt capacity increases over time. Moreover, debt capacity in 2006 and 2009 is higher than in 2002 as a result of lower interest rates (allowing a higher maximum mortgage).

Besides the increasing debt levels in the Dutch housing market, Tables 3.2a through 3.2c also show the expected patterns of home equity holdings over different age groups. Older households generally have higher levels of home equity than younger households. Moreover, older households tend to use less debt relative to their debt capacity in financing a new home than younger households. Households therefore do not seem to maximize debt levels to an absolute maximum in order to maximize the interest deductibility.

4. Results

4.1 Home equity over the household life-cycle

In the first part of the results section we test whether households consume home equity towards the end of their life. Oft-quoted studies by Venti and Wise discussed earlier report that households generally do *not* wish to divest housing. Our summary statistics suggest similar results: we find consistently higher average relative home equity over the age groups. In order to create further insight in the relation between household characteristics and home equity we run a regression model on home equity. The variables used in the regression are summarized in Table 3.3:

Table 3.3: Variables used in first model – Relative home equity

Variable	Description
Disposable income	Inflation-adjusted disposable household income (annual, 1000's €)
Marginal tax rate	
Low tax	1/0; 1 if low marginal tax rate applies (reference)
Middle tax	1/0; 1 if middle marginal tax rate applies
High tax	1/0; 1 if high marginal tax rate applies
Age	Age of the head of the household (years)
Occupation duration	Number of years the household lives in current dwelling
Maturity	Remaining number of years until maturity of mortgage
Type of move	
Not moved	1/0; 1 if household did not move in past 2 years (reference)
Own-own	1/0; 1 if household moved in owner-occupied sector in past 2 yrs
Rent-own	1/0; 1 if household moved from the rented sector in past 2 years
Starter	1/0; 1 if household moved as a starter in past two years
Type of income	
Salary	1/0; 1 if salary is main source of income (reference)
Business	1/0; 1 if income from business is main source of income
Pension	1/0; 1 if pension is main source of income
Social welfare	1/0; 1 if social welfare is main source of income
Age	
18 – 25	1/0; 1 if age between 18 and 25 years (reference)
26 – 35	1/0; 1 if age between 26 and 35 years
36 – 45	1/0; 1 if age between 36 and 45 years
46 – 60	1/0; 1 if age between 46 and 60 years
>60	1/0; 1 if age over 60 years
Year	
2002	1/0; 1 if wave of questionnaire is 2002 (reference)
2006	1/0; 1 if wave of questionnaire is 2006
2009	1/0; 1 if wave of questionnaire is 2009

The model is an OLS that is estimated on the total sample of owner-occupiers described earlier, which consists of 75,847 observations after correction for outliers and excluding households with more than one source of income[7]. The regression is given below:

$$(1)\ \textit{Relative home equity} = \textit{constant} + b_1*\textit{disposable income} + b_2*\textit{marginal tax} + b_3*\textit{occupancy duration} + b_4*\textit{maturity} + b_5*\textit{type of move} + b_6*\textit{type of income} + b_7*\textit{age} + b_8*\textit{year} + e$$

The model explains variance reasonably well. We obtain an R-squared of 41.8%. The results of this regression are summarized in Table 3.4. All of the presented coefficients have the expected signs. All presented coefficients are statistically significant by the normal standards.

[7] The exclusion of households with more than 1 source of income does not affect the interpretation of the coefficients: n without exclusion of these households is 79.219.

Table 3.4: Regression coefficients model 1 – Relative home equity, 2002 - 2009

Variable	Coefficient	Std. Error	p
Disposable income	-0.062	0.005	0.000
Marginal tax			
Middle tax	2.460	0.595	0.000
High tax	4.142	0.628	0.000
Occupation duration	0.892	0.012	0.000
Maturity	-0.570	0.011	0.000
Type of move			
Own-own	-8.763	0.367	0.000
Rent-own	-16.754	0.439	0.000
Starter	-9.757	0.666	0.000
Type of income			
Business	3.463	0.328	0.000
Pension	4.059	0.480	0.000
Social welfare	2.878	0.544	0.000
Age			
26 - 35	2.212	0.724	0.000
36 - 45	14.235	.0737	0.002
46 - 60	21.722	0.747	0.000
>60	26.449	0.858	0.000
2006	-3.362	0.253	0.000
2009	-10.895	0.216	0.000
Constant	28.817	0.949	
R-squared	41.8		

Source: WBO 2002, WoON 2006, WoON 2009, own calculations

Household income has a *ceteris paribus* negative effect on relative home equity; households with higher income thus appear to take on more debt. This effect is in line with the reported incentive from the Dutch fiscal treatment of the owner-occupied dwelling to hold high levels of mortgage debt. The effect, however, is very small: every 1.000 euro of additional annual income results in a decrease of 0.06 percentage points of home equity. The variables capturing the marginal income tax rate imply that households with higher income (and therefore higher tax rates) have larger shares of home equity in their dwellings. The effects are not very large, though: shifting from the lowest tax bracket to the middle tax bracket increases relative equity on average with 2.2 percentage points. Age and occupation duration are the most important factors explaining relative home equity. We find that, in line with Tables 3.2a through 3.2c, relative home equity increases with age. Especially young households have little home equity. This is caused by two phenomena: first, these younger heads of household have had less time to repay on the mortgage, and second, these younger heads of household have entered the housing market after a prolonged period of price increases. Older households' home equity has to a significant extent grown as the result of more than two decades of non-stop house price increases in the Netherlands. Especially households that were owner-occupiers before the late 1990's have seen there home equity increase rapidly. Residential mobility decreases home equity. In case of movers within the owner-occupied sector this is mostly the result of diluting the absolute amount of home equity; households generally move up on the housing ladder. Renters and starters have less wealth upon buying a property, as they lack previously built-up home equity, and therefore relative home equity is decreased. Moreover, a longer duration results in higher home equity shares resulting from

repayment of the mortgage. In line with this result we find that maturity has a negative effect; the further the final payment on the mortgage is in the future, the smaller is the share of relative home equity. Keeping everything else constant, households with a fixed salary have the smallest share of home equity. This can be explained by the fact that these households are also least constraint; given their steady income these households more easily obtain mortgages. Finally, in line with the results from Table 3.2a through 3.2c we find that relative home equity decreases over time; households in 2009 have *ceteris paribus* almost 11 percent points less home equity than households in 2002.

The life-cycle theory implies that households divest home equity towards the end of their lives. Empirical results in the U.S., and our results for the Netherlands, imply differently. Indeed relative home equity increases with age supporting the prediction that households accumulate wealth mid-career, however, we find relative home equity not to decrease at high age. We may therefore not conclude that households indeed divest home equity towards the end of their lives. These results, however, may also be explained by households moving into smaller owner-occupied dwellings towards the end of their lives: such moves would keep relative home equity close to maximum and thus mask the fact that households are in fact divesting home equity. In order to check this we summarize a few key statistics on residential mobility among elderly households. These statistics are:

Probability to move: number of households that moved within two years prior to the wave over the total number of households
Probability own-rent: number of households that have moved from owning to renting over the total number of moved households
Average occupation: average occupation duration over all households
Value mobility ratio: the value of the current owned property over the value of the sold property

Table 3.5: Mobility statistics across age

Age	P(move)	P(own-to-rent)	Average occupation duration	Value mobility ratio
18 - 25	68.1%	5.4%	2.4	1.18
26 - 35	35.3%	5.7%	4.2	1.48
36 - 46	15.8%	11.7%	8.3	1.50
46 - 60	8.4%	14.0%	15.0	1.36
>60	6.9%	21.1%	21.6	1.08

Source: WBO 2002, WoON 2006, WoON 2009, own calculations

The Figures presented in Table 3.5 strengthen our conclusions earlier: older households do not divest home equity. Surely older households move relatively more often into rented sector and into smaller housing when moving into owner-occupied housing; this effect, however, is tremendously small given the low mobility rates among older households. Younger households, even households with a head of household as “young” as up to 60 years old, move into significantly more expensive housing when moving from one owner-occupied dwelling into another. Based on Table 3.5 we might therefore conclude that there are indeed households that divest home equity towards the end of their lives; their numbers are, however, limited.

4.2 Home equity driving demand

A second implication from the life cycle theory that we test is whether home equity is "ear-marked". Wealth drives consumption: if wealth increases, consumption is supposed to increase as well. According to standard economics it should not matter where the wealth comes from. Some behavioral scientists, however, describe a process referred to as mental accounting: within this framework different sources of wealth can indeed have different effects (e.g. Thaler, 1990). Given the fiscal treatment of the owner-occupied dwelling households have an incentive to roll over home equity; home equity might therefore be (fiscally) ear-marked. This would imply that home equity would drive demand for housing and that is what is tested in this section.

To test whether home equity has a different effect on housing consumption than other wealth we will run a regression. We regress housing consumption on capital gains and non-housing wealth and a set of control variables. Housing consumption is proxied for by house value in our model. House value is the tax assessed value of the property; this value is the basis upon which local taxes are levied as well as the value upon which the imputed rent is based. We do not use regional price indices to correct for potential regional scarcity effects (such as e.g. Ras *et al.*, 2006); our work therefore follows the assumptions made in e.g. Koning *et al.* (2006) and Romijn and Besseling (2008). Capital gains of the previous dwelling are defined as previous selling price minus previous buying price; current home equity cannot be used because of endogeneity. This creates a timing problem: since the capital gains have been realized in the recent past and the housing wealth is observed in present time, it might well be that a part of the capital gains we observe are reallocated into other wealth. To decently disentangle the wealth issue we need a panel; we only use the wave of 2009 since it is the only wave in which we have full information on household wealth. We therefore use past capital gains and non-housing wealth in a combined variable "total wealth". Potentially total wealth overestimates actual total wealth, since an overlap cannot be excluded. This, however, only applies to a smaller subsample of our data, as can be seen in Table 3.6:

Table 3.6: Distribution of wealth over recently moved owner-occupiers

	Capital gains only		Capital gains + other wealth		Overall	
	Absolute (€)	Relative	Absolute (€)	Relative	Absolute (€)	Relative
Capital gains	62,694	100.0%	104,090	40.7%	73,023	65.8%
Non-housing wealth	0	0.0%	151,807	59.3%	37,878	34.2%
Total wealth	62,694		255,897		110,900	
House value	247,039		343,946		271,227	

Source: WoON 2009, own calculations

We identify the households with non-housing wealth present by a dummy variable. The variables used in this section's model are described in Table 3.7:

Table 3.7: Variables used in second model – Demand for housing

Variable	Description
User cost	User cost of owning
Income	Disposable income
Capital gains	Capital gains on previous dwelling
Wealth	Current non-housing wealth
Total wealth	Sum of capital gains and non-housing wealth
Marginal tax rate	
Low tax	1/0; 1 if low marginal tax rate applies (reference)
Middle tax	1/0; 1 if middle marginal tax rate applies
High tax	1/0; 1 if high marginal tax rate applies
Age	Age of the head of household (years)
Education	
Low education	1/0; 1 if households has only basic education (reference)
Middle education	1/0; 1 if household has some secondary education
High education	1/0; 1 if household has minimum of BAS education
Household composition	
Single (w | w/o children)	1/0; 1 if household is single person (w-w/o children) (ref.)
Couple	1/0; 1 if household consists of two persons
Couple with child(ren)	1/0; 1 if household consists of two persons & child(ren)
Other	1/0; 1 if household is different from above categories
Type of income	
Salary	1/0; 1 if salary is main source of income (reference)
Business	1/0; 1 if income from business is main source of income
Pension	1/0; 1 if pension is main source of income
Social welfare	1/0; 1 if social welfare is main source of income

All continuous variables are estimated in log-linear form. This excludes a small number of households with negative capital gains (about 1%). A robustness check using a piecewise log-linear transformation of capital gains (i.e. ln[-capital gains] for households with negative capital gains in addition of the regular variable) implies that this does not affect our results. A detailed description of the definition of the user cost of owning can be found in the appendix of chapter 4.

The model used to estimate the propensity to use housing and non-housing wealth for housing consumption is given in (2):

$$(2)\quad Value = c + b_1*user\ cost + b_2*income + b_3*total\ wealth + b_4*non\text{-}housing\ wealth\ dummy + b_5*age + b_6*education + b_7*household\ composition + b_8*type\ of\ income + e$$

Table 3.8: Regression coefficients model (2) – Demand for housing
Continuous variables entered log-linearly

Variable	Coefficient	Std. Error	p
User cost	-0.435	0.039	0.000
Disposable income	0.286	0.014	0.000
Total wealth	0.013	0.001	0.000
Other wealth dummy	0.096	0.014	0.000
Age (dummy)			
26 - 35	0.075	0.024	0.002
36 - 45	0.177	0.025	0.000
46 - 60	0.236	0.027	0.000
>60	0.227	0.036	0.000
Education			
Middle	0.072	0.028	0.009
High	0.173	0.028	0.000
Household composition			
Couple	0.076	0.016	0.000
Couple w child(ren)	0.190	0.016	0.000
Other	0.003	0.046	0.949
Type of income			
Business	0.162	0.016	0.000
Pension	0.144	0.033	0.000
Social welfare	0.109	0.041	0.008
Constant	7.484	0.165	
R Squared	47.2		

Source: WoON 2009, own calculations

The control variables have the expected signs; we find for instance that higher user costs lead to decreased demand for housing. We furthermore find that higher human capital results in higher demand for housing, and that household composition influences the demand for housing. Finally, we see that age has a positive impact on housing demand. In the model specification with age dummies we can observe that this effect is strongly non-linear. Housing demand increases with age only until the head of household is in his or her late forties or early fifties.

With the model presented in (2) we want to test whether housing wealth is earmarked and gives households the incentive to increase housing consumption. We find that the presence of non-housing wealth in the total wealth portfolio increases housing demand. This effect, however, is small: the presence of other wealth in the total household wealth increases housing demand by only 0.1%. We furthermore find small effects of total wealth on housing demand. The effect is minimal: a 1% increase in total wealth results in a 0.01% increase of housing demand. For all households that have all their wealth in housing this implies that given the average total wealth of € 62,694, an increase of wealth of € 630 leads to an increase of housing consumption of only € 33. For households that have non-housing wealth as well as home equity the increase of housing consumption following a 1% (€ 2,559) increase of total wealth is € 375. Similarly, if disposable household income increases by 1% (€ 440), demand for housing increases by 0.3% (€ 783). The impact of (housing) wealth on the demand for housing is thus of no economic relevance.

All in all, demand for housing seems more to be the outcome of income (debt capacity) and the position of the household in the household life cycle than a result of tax incentives. The general picture that shows from Table 3.8 is that households do not act upon a potential incentive from the fiscal treatment of home equity. The demand for housing seems mostly influenced by other factors that, moreover, are in line with traditional life cycle theory. We have not been able to fully disentangle the wealth effect from home equity and non-housing wealth. Given the economic insignificance of wealth in determining the demand for housing in general, however, this question is irrelevant.

5. Conclusion

In this paper we investigate two important implications from the standard life-cycle theory of consumption. The first implication we test is whether households spread consumption over time, the second implication is whether money is ear-marked.

With respect to households spreading investments and consumption over the life-cycle we find that households do *not* divest home equity to spread life-time consumption. This finding is in line with the oft-quoted paper by Venti and Wise (1990) and *not* in line with standard economics. The second implication we test is i) whether money is (fiscally) ear-marked, and ii) whether home equity drives housing consumption. Our results suggest that, in line with economic theory, home equity is not driving households to increase housing consumption. The question whether money is earmarked remained unanswered in our paper due to data issues.

We do, however, find that households that are climbing the property ladder use the fiscal treatment of the owner-occupied dwelling to increase housing consumption. This, however, decreases over time: households decrease debt later in life and once more wealthy, the positive relation between high potential benefits from the fiscal regime and housing consumption disappears. Households are therefore not "very hungry caterpillars" that push housing consumption to high levels just for tax benefit.

Chapter 4: Time-varying state dependency in tenure choice

1. Introduction

"Once an owner, always an owner?" is the question raised in the title of a study into housing choice in the Netherlands (Helderman, 2007). Both this study and a study by Feijten (2005) conclude that households are very unlikely to move back into rented housing once the move into the owner-occupied sector has been made. Similar results may are well documented in other countries as well, such as the United States (e.g. Börsch-Supan, 1990; Ioannides & Kan, 1996; Kan, 2000). This pattern is in fact very strong; casual empirical results for the Netherlands indicate that 81% of all owners that have moved in the period of 2006-2008 moved within the owner-occupied sector. In the rented sector 62% of all moving households in the same period moved into a new rented dwelling. These choice patterns suggest path dependence in housing choice. Path dependency is often referred to as the notion that "history matters". David (2001) gives a more formal definition of a path dependent process: "A path dependent stochastic process is one whose asymptotic distribution evolves as a consequence (function of) the process's own history."

In terms of an individual household's housing choice this implies that the outcome of the (in principle stochastic) tenure decision is influenced by the outcome of earlier tenure decisions. There is apparently an unobserved dynamic process in housing choice that results in a pattern in which previous tenure decisions prove good predictors of consecutive tenure decisions. Given the type of data often applied for tenure choice models, cross sections or aggregate time series, these processes are often not accounted for (Börsch-Supan, 1990). In this study we will use a series of cross sections with some limited backward looking data in order to test whether there is, and what could be the source of, path dependence in a heavily regulated housing market (specifically the Dutch). Since we lack true longitudinal observations, and therefore cannot test an actual path, we shall refer to the impact of previous tenure as state dependence; a term coined by Ioannides and Kan (1996). The term state dependence fits our analysis of our quasi-panel data well; our contribution is the notion that state dependence has a time-varying character.

2. Literature

There is a large body of literature on tenure choice of which an important share is empirical. The general idea behind tenure choice models is that households choose for owning or renting optimizing the expected utility derived from their decision. This is reflected in the empirical models in the literature: the tenure choice is usually modeled using a probit or logit regression on several explanatory variables. Often used explanatory variables include the relative cost of owning over renting (e.g. Bourassa & Hoesli, 2010), income and wealth (e.g. Haurin *et al.*, 1997; Henderson & Ioannides, 1983), marginal tax rates (e.g. Bourassa & Yin, 2006; Haurin & Gill, 2002), and some additional household characteristics (e.g. household composition, age of the head of household). Apart from practical issues such as availability in data, past tenure does not seem to fit within the general tenure choice model: in a well functioning (frictionless) market there is no reason why it would matter for expected

utility whether the household is currently owning or renting. Housing markets, however, are generally markets *with* frictions.

One example of such frictions is the cost of moving: moving house is costly, both in terms of expenses (e.g. costs involved with selling property, expenses made for moving) and psychologically (e.g. searching for new house, parting with familiar neighborhood, stress of selling property). Zorn (1988) therefore adds the costs of moving into his model. The model by Zorn is set up to model the joint decision to move and the tenure decision in the Korean housing market. In his model he specifies three variables for capturing the costs of moving, one of which is the past tenure of the household. Specifically, the past tenure is added to the model to capture the financial costs involved with leaving the previous residence, defined in Zorn (1988) as containing the costs of the termination of the lease or selling the property. The results reported suggest that when the household is currently owning, the likelihood of moving into ownership or renting is decreased; i.e. residential mobility decreases with home-ownership. In Rosenthal *et al.* (1996) previous tenure is also added to the model. In their specification the previous tenure controls for the costs of housing for previous home-owners following rollover provisions. They further mention that credit constraints may differ between previous and new owners. Previous tenure therefore corrects for potential differences in mobility rates. Rosenthal *et al.* (1996) find that previous home-owners are more likely to become owners than previous renters. Moreover, they report that previous owners consume more housing than previous renters. Ioannides and Kan (1996) and Kan (2000) report similar results with decreasing mobility for home-owners and, conditional on moving, increased probabilities of moving back into home-ownership: mobility and tenure choice decisions are thus state dependent. Taxability of capital gains and transaction costs are mentioned as possible explanations here as well.

Frictions in the housing market that have inspired previous researchers to investigate state dependence are often the result of governmental intervention: the rollover provision in Rosenthal *et al.* (1996) and Ioannides and Kan (1996) being a good example. In line with the more aggregate study of Fisher *et al.* (2003) the papers reviewed here show that institutions matter in housing choices. State dependence is the interpretation of Ioannides and Kan (1996) for the impact that past tenure has on tenure choice because of the institutional setup of the American housing market. State dependence implies an impact of past tenure on current tenure choice decision. The effect of institutions on households' decisions need not be constant over time, however (e.g. Gyourko & Linneman, 1996; Schutjens *et al.*, 2002). Using our quasi-panel we shall contribute to existing literature in testing whether and to what extend state depence is time-varying.

Institutions seem to be of key importance in explaining homeownership rates (Fisher *et al.*, 2003). Since the stringently regulated market of the Netherlands is so different from other markets we shall first briefly discuss the main institutions that may affect housing choice.

3. The institutional set-up of the Dutch housing market

In the short review of literature we thus find that there may be important time-dependent dynamics in tenure choice. We further find that the studies generally relate these findings to specific institutions in the housing market. The institutional set-up in the Netherlands has caused the owner-occupied and the rented sector to grow apart; each sector with a completely different set of interventions and corresponding economic incentives. In this section we do not deal with supply-side interventions: although the Dutch housing market has extremely strict zoning policy, this policy affects owners and renters alike and is unlikely to affect tenure decisions in the short term.

On the demand side housing is strongly subsidized in the Netherlands. In 2006 the annual amount of subsidization reached nearly 30 billion euro, or 5.5% of GDP (Koning *et al.* 2006; Romijn & Besseling, 2008). This amount is roughly equally distributed over the owner-occupiers and renters. Therefore, households that move from one sector to the other may lose one subsidy, but gain another. The way this redistribution is organized, however, is completely different and the net benefit of potential subsidies depends per household on individual characteristics, of which income is by far the most important one. We shall first discuss how owner-occupiers are subsidized and whether this could lead to time-varying state dependence. Thereafter we shall discuss the most important institutions in the rented sector.

3.1 Institutions in the owner-occupied sector

Government intervention in the owner-occupied sector, at least on the demand side, is completely fiscal in nature. There are two main fiscal subsidies to home owners: mortgage interest deductibility and tax exemption for home equity. There is one main fiscal tax on owning and that is the transfer tax levied upon buying a dwelling.

Households that own their dwelling in the Netherlands are allowed to deduct all interest payments on their mortgage against their marginal income tax rate (Hilbers *et al.*, 2008). The Netherlands has a progressive income tax system, making interest deductions larger with increasing income (*ceteris paribus*). The deductibility of interest payments is restricted to the primary residential dwelling and (obviously) conditional upon owning a dwelling. The subsidy is unrestrictedly available to all home owners and decreases the user cost of owning.

The other main source of subsidization in the owner-occupied sector is the tax exemption of home equity (Hilbers *et al.*, 2008). Since households generally have their largest share of wealth in home equity and other financial assets are taxed, the tax exemption of home equity is an important subsidy. When capital gains are realized they remain untaxed; only the attributed return on the equity is taxed. The effects of rollover provisions as in e.g. Rosenthal *et al.* (1996) therefore do not apply in the Netherlands; the tax exemption merely lowers the user cost of owning.

Transaction costs are another important potential source of state dependence: selling a house is more costly than terminating a rent. Moreover, transaction costs for buyers are considerable: between 8% and 10% of the property value (Van Ommeren & Van Leuvesteijn, 2005). However, in the Netherlands transaction costs are typically born

by the buyer. Some of these costs, such as the legal fees and financing costs, are fiscally deductible against marginal income tax rate and, moreover, are identical for previous owners and previous renters. Transaction costs may therefore affect the tenure choice, but may not be expected to cause state dependence; the costs of buying are equal to current renters and owners.

Finally, an important factor in the owner-occupied sector is formed by credit constraints. In the Netherlands it is allowed to finance the dwelling over 100% with debt (Elsinga *et al.* 2009). This implies that the impact of credit constraints are comparatively lower. The only constraint that is firm in the Netherlands is the loan-to-income constraint that banks impose on households. Albeit this constraint has become firmer after the credit crunch of 2008, mortgages over 100% of value are still allowed. Access to the owner-occupied sector is therefore not classically credit constraint (i.e. with down payment requirements), but more income constraint. Households that are income constraint, but do have significant wealth may choose to invest their wealth into their property in order to fulfill the income constraint. Households, however, tend to have most of their wealth in home equity; those households that have significant shares of wealth in other assets tend to be high income households with additionally also important levels of home equity.

3.2 Institutions in the rented sector

Housing market institutions in the rented sector are much more regulatory in nature. Rents are regulated as is the access to the rented sector. Finally, depending on income households may qualify for housing allowances. In our analysis of the institutions we restrict ourselves to the regulated rented sector which contains 95% of all rented housing. The non-regulated sector is more accessible, but much more expensive; given the small size of this subsector we ignore it in our discussion. Regulations mentioned below do not apply to the non-regulated sector, however.

Access to the rented sector is restricted by two means: queues and income. Generally there is a queue for rented housing. The length of this queue in urban areas can easily reach 4 years, but in very high demand areas as Amsterdam is up to 10 years. Anyone may enter the queue at any given moment, regardless of eligibility for rented housing in the end. The actual access to the dwelling is determined upon *current* income only. Revisions of eligibility or rent level based on changes in income are prohibited. Only households with lower incomes have, given the queue, unrestricted access to the rented market. Households with middle and higher incomes cannot enter the rented sector; elderly households with low income, but high wealth *can* enter the rented market. Income is thus key in gaining access into the rented market: keeping the impact of income equal, there is no reason to assume that some households would have better chances at entering the rented market than others. The accessibility of the rented market may therefore, in a *ceteris paribus* econometric framework, not lead to time-varying state dependence with respect to tenure choice.

Rents are regulated in the Netherlands up to a certain rent level. All rental contracts that agree upon a rent below this level are under regulation. For an important share the rent level may not be set beyond the regulation boundary because of a too low quality level of the dwelling. For a significant share of the market, however, goes that the dwelling could be priced beyond the regulation threshold given its quality. Nonetheless, most dwellings, both low and high quality, are regulated (Conijn &

Schilder, 2011b). This is the result of the dominant position of social landlords in the Netherlands. Social landlords not only rent out low quality housing, but also high quality (and thus potentially non-regulated) housing; since these landlords are non-profit organizations rents are typically set below the regulation threshold. Private landlords are then forced by competition with the social landlords to follow these low rents since households prefer waiting over a higher rent. Regulated rents are well below any estimated measure of market rents in the Netherlands and on average are about 50% of that market rent; this subsidy is higher in high demand areas and does not exist in low demand areas (Conijn & Schilder, 2011b). This subsidy is available equally to all renters in any local housing market and significantly decreases user cost. Finally, conditional upon rent level and income, households may qualify for housing allowances. The exact system is rather complicated, but the general idea can be summarized as follows: the first X euro of rent need to be paid by the household regardless, the additional Y amount of rent is subsidized fully until a threshold. Beyond that threshold amount Z of rent paid is subsidized partly. An exact description of the thresholds can be found in Elsinga *et al.* 2007, p.79). The amount of subsidization spent on housing allowances is marginal compared to the amount of implicit subsidies following below-market rents. Housing allowances may however, especially for low income household, significantly lower user cost.

3.3 Synthesis

We have discussed the most important institutions that make up the Dutch housing market and influence housing choice. We have argued that the majority of these institutions only result in lower user cost. The impact subsidies have on user cost may influence the tenure choice of households depending on whatever set of subsidies generates the highest utility; the subsidies surely do not cause time-varying state dependence. There is no lagged impact of tenure upon user cost, so we may not expect to find any of such effects based on the institutional set-up in the Netherlands.

We furthermore argued that there is a major impact of income on housing choice: income is the crucial factor determining both access to the owner-occupied and the rented sector. In the owner-occupied sector the income constraint may be slightly relaxed by bringing in other assets into the dwelling. The impact, however, may not be expected to be too large as households' wealth typically consists of home equity.

4. Data and methodology

4.1 Data

We use multiple waves of the Dutch Housing Needs Survey. For this study we will use all waves held from 1986 onwards: 1986, 1990, 1994, 1998, 2002, 2006, and 2009. The survey is conducted using comparable questionnaires among a representative sample of Dutch households. Each questionnaire contains a large number of questions regarding housing, such as current and previous dwelling, price or rent of the current and previous dwelling, several dwelling characteristics, location, satisfaction with dwelling and location, household characteristics as composition and income. We are unable to identify whether a household appears in more than one wave; our dataset can therefore not be used for true longitudinal analysis.

Based on the datasets we have created a new dataset that includes all observations from all waves. For each observation we know whether it deals with a recently moved household or a non-mover household. Households that are recent movers are all households that have moved in the two years prior to the year of the wave: we thus include all observations from e.g. the 2009 wave, of which we have information on current housing status (all) and previous housing status (recent movers only, i.e. moved between 2007 and 2009). The final tenure choice model will thus be estimated using the information of recent movers only (i.e. recent movers from the 1982 wave, the 1986 wave et cetera), for we only have information on the previous tenure mode of these recent movers. We essentially reconstruct the tenure choice that recently moved households have made.

Our data is thus "backward looking". Most of the household characteristics, such as income and composition, are recorded in "current time". There is therefore a slight probability that these parameters have changed since the tenure choice. We assume, however, that all characteristics during the interview are representative for the situation when the tenure choice was made. This is a reasonable assumption given the fact that we only record the tenure choice back until two years prior to the wave and many characteristics are therefore unlikely to have changed dramatically. Moreover, in many a case of large changes the household might have anticipated the large change and therefore taken the *current* situation into consideration in the *past* tenure choice (e.g. a birth of a child resulting in a different household composition is unlikely to be unanticipated for given a move in the last two years).

4.2 Model

Tenure choice decisions are most valuable when studied taking into account the mobility decision simultaneously. We therefore apply a Heckman correction to our binary choice model (e.g. Greene, 2008). The selection equation and outcome equation are given in (1):

(1) $m_i^* = y_i\gamma + u_i$

$$m_i = \begin{cases} 1 \; if \; m_i^* > 0 \\ 0 \; if \; m_i^* \leq 0 \end{cases}$$

$$T_i^* = x_i\beta + \varepsilon_i \quad if \quad m_i^* > 0$$

$$m_i = \begin{cases} 1 \; if \; m_i^* > 0 \\ 0 \; if \; m_i^* \leq 0 \end{cases}$$

Where m_i^* is the predicted probability of moving, y_i is a vector of explanatory variables for predicting a move, γ is a vector of regression coefficients and u_i is an error term. m_i^* is predicted using the actual observations of a move, m_i. The outcome equation, on tenure choice, is then given with T_i^* being the predicted tenure choice of the household, given a vector of explanatory variables x_i and a vector of regression coefficients β, and is conditional on observing a move. The vector of explanatory variables is constructed using the generally reported important variables from empirical tenure choice literature. An overview is presented in Table 4.1:

Table 4.1: Overview of variables in tenure choice model

Previous tenure	1/0, 1 if owner
Relative cost	cost of owning / cost of renting
Income	household real current income
Age	age of the head of household
Cohort	based on year of birth of the head of the household
Lowest - 1910	1/0
1911 - 1920	1/0
1921 - 1930	1/0
1931 - 1940	1/0
1941 - 1950	1/0
1951 - 1960	1/0 (reference)
1961 - 1970	1/0
1971 - 1980	1/0
1981 - 1990	1/0
1991 - 2000	1/0
Marginal tax	attributed marginal tax rate
Low tax	1/0 (reference)
Middle tax	1/0
High tax	1/0
Education	highest level of education within household
Low education	1/0 (reference)
Middle education	1/0
High education	1/0
Urbanity	level of urbanity of location where household lives
Strongly urban	1/0 (reference)
Urban	1/0
Moderately urban	1/0
Rural	1/0
Strongly rural	1/0
Household composition	
Single (with/without child)	1/0 (reference)
Couple	1/0
Couple with children	1/0
Other	1/0
Type of income	main source of income
Income from job	1/0 (reference)
Entrepreneurial income	1/0
Pension	1/0
Welfare	1/0
Year	time dummy
Dummy for 1986, 1990	1/0 (2009 reference)
1994, 1998, 2002, 2006, 2009	
Interaction previous tenure*year	1/0, 1 if owner in year x
Region	40 regional dummies (1/0)

All but two variables reported in Table 4.1 are based on observations from the questionnaires. The marginal income tax rate and the relative cost are estimated variables. The procedures for these estimations are given in the appendix of this paper.

5. Results

Using the data on actual household moving behavior we have constructed simple transition matrices containing the moving probabilities of households. The transition matrices can be found in the appendix of this paper. Given the transition matrices it is possible to estimate the probability of a household moving within the same sector. These probabilities are given for owners and renters in Table 4.2, along with the relative size of the owner-occupied sector:

Table 4.2: Probability of household moving within same housing sector

	Moved		Stock
	Own-own	Rent-rent	Own
1986	59%	71%	44%
1990	66%	64%	46%
1994	72%	57%	49%
1998	71%	59%	54%
2002	75%	61%	53%
2006	79%	61%	55%
2009	81%	62%	58%

Source: WBO / WoON 1986-2009

The results in Table 4.2 seem to be in line with the literature reviewed earlier. Owners are most likely to become owners and renters are most likely to become renters. The effect is stronger for owners, which is also in line with results presented in the empirical literature: households try to move up the property ladder and into ownership. We see furthermore that the share of owners that choose ownership again when moving increases over time. Table 4.2 thus supports the hypothesis of time-varying state dependence of tenure choice. The results in Table 4.2, however, are not taking into account (changing) market and household characteristics.

In order to correct for market and household characteristics as well as household mobility we estimate a probit tenure choice model with a Heckman correction[8]. The results of this procedure are given in Table 4.3:

[8] Estimated using the heckprob command in Stata v.12.

Table 4.3: Estimation results of tenure choice model with Heckman correction

		Coefficient	Std. Error	Sig (p)
Outcome equation: Tenure				
	Previous tenure	0.892	0.033	0.000
	Relative cost	0.017	0.038	0.662
	Income	0.450	0.018	0.000
	Marginal tax			
	Middle	0.327	0.024	0.000
	High	0.513	0.036	0.000
	Education			
	Middle	-0.166	0.013	0.000
	Low	-0.459	0.017	0.000
	Urbanity			
	Urban	0.100	0.021	0.000
	Moderately urban	0.244	0.022	0.000
	Rural	0.382	0.023	0.000
	Strongly rural	0.430	0.027	0.000
	Type of income			
	Business	0.158	0.022	0.000
	Pension	-0.373	0.024	0.000
	Social welfare	-0.456	0.020	0.000
	Starter	-0.532	0.019	0.000
	Birth year			
	1921-1930	-0.629	0.033	0.000
	1931-1940	-0.259	0.027	0.000
	1941-1950	-0.031	0.022	0.155
	1961-1970	0.214	0.018	0.000
	1971-1980	0.282	0.023	0.000
	1981-1990	0.389	0.034	0.000
	1991-2000	0.005	0.287	0.986
	Time			
	1986	0.085	0.037	0.023
	1990	0.272	0.035	0.000
	1994	0.299	0.036	0.000
	1998	0.295	0.027	0.000
	2002	0.171	0.027	0.000
	2006	0.031	0.029	0.283
	Interaction			
	Previous tenure 1986	-0.199	0.056	0.000
	Previous tenure 1990	-0.254	0.052	0.000
	Previous tenure 1994	-0.213	0.054	0.000
	Previous tenure 1998	-0.233	0.037	0.000
	Previous tenure 2002	-0.144	0.040	0.000
	Previous tenure 2006	-0.048	0.045	0.287
	Inverse Mills' ratio	0.438	0.037	0.000
	Constant	-6.162		
Selection equation: Move				
	Age	-0.916	0.007	0.000
	Household composition			
	Couple	0.075	0.007	0.000
	Couple/child	-0.353	0.006	0.000
	Other	-0.070	0.013	0.000
	Constant	2.414		

Source: WBO / WoON 1986-2009, own calculations

Since both the selection and outcome equation are estimated simultaneously standard fit measures, such as McFadden's pseudo R-square, cannot be computed. In order to give some idea about the model's predictive power we tabulate the observed and the model predicted tenure in Table 4.4. In general the tenure choice model predicts the observed tenure well. The model seems to become more accurate over time. This may in fact be a result of increasing state dependence in tenure choice: the groups of owners and renters becomes more distinct over time.

Table 4.4: Predictive power Heckman corrected tenure choice model

Overall		Predicted		
		Owner	Renter	Total
Observed	Owner	34.551	10.849	45.400
	Renter	8.703	26.342	35.045
	Total	43.254	37.191	80.445
Correct predictions	1986	71,0%		
	1990	72,4%		
	1994	73,9%		
	1998	75,7%		
	2002	76,5%		
	2006	79,8%		
	2009	80,0%		
	Total	75,7%		

Source: WBO / WoON 1986-2009, own calculations

The correlation between the error terms of the selection and outcome equation is significant. This implies that correcting for sample selectivity (household mobility) is needed. The coefficients in the selection equation have the expected signs: mobility decreases with age and the presence of children in the household. In the tenure choice equation the control variables also have the expected signs: income increases the probability of choosing home-ownership, with some non-linearity captured by the tax rates. Decreasing education leads to decreasing probabilities of home-ownership. Given the availability of rented housing in more rural areas we find that the probability of owning increases in more rural areas. We further find that households that have income from jobs, either regular salary or from business, have a larger probability of moving into home-ownership. Being a starter on the housing market significantly decreases the probability of home-owning. The cohort-dummies indicate that households of which the head was born in or closely after the post-war period have a higher probability of owning. The year fixed effects captured by the year dummies indicate an explosive increase in the move into owner-occupancy around the turn of the millennium. The results on the 39 regional dummies are not given in Table 3; only 5 are statistically significant at 5%. We added the variable to the model nonetheless in order to filter out regional variance not related to price from the regional price variable.

The key variable of interest in the model is the previous tenure variable: this variable shows a highly significant and positive coefficient. This indicates that, controlling for mobility and a handful of control variables, in line with literature there is state dependence in tenure choice decisions. The results in Table 4.3 indicate that being a

home-owner increases the probability of moving into home-ownership. Moreover, given the interaction terms with the year fixed effects we find that this state dependence increases over time, especially after the housing boom of 1998. Thus, over time, owners become even *more* likely to become home-owner when moving.

In line with expectations we find that there is significant state dependence in tenure choice decisions of households. These results are in line with the reviewed literature, however, cannot be explained by institutions, like in the United States. An obvious alternative explanation could be given in terms of unobserved heterogeneity: there might be a taste for home-ownership that we cannot explain within our model, e.g. a preference for independence. The fact that we find that state dependence increases almost over the entire period of our findings at least partly dismisses explanations on this line. We therefore take a look into the two most likely explanations for this phenomenon: (i) the demand for certain levels of quantity of housing that is only available in either of both sectors, and (ii) the role of home equity in progressing through the market.

Households may have different tastes for housing consumption. Although the Dutch rented market is highly regulated and predominantly social, it does service households up to middle income levels. The rented sector furthermore contains a variety of types of properties, including single-family units. Nonetheless, the average quality of housing in the Dutch rented market is far less than in the owner-occupied sector. Households that have demand for higher quality housing are therefore restricted to owning their property. Moreover, the divide between the owner-occupied and rented sector has allegedly increased over time: our time-varying state dependency findings might simply be the result of this quality divide between both sectors. In order to test this we model households' housing demand in our basic model. We estimate housing demand by the value of the actual housing bundle consumed i.e. the value of the property the household currently lives in. This may be seen as a valid approximation of housing demand as in the outcome equation we only observe households that have recently moved; we may therefore assume that their housing consumption is reasonably reflecting their housing demand. We can only do so in the last three waves of our data, due to data limitations. The results are presented in Tables 4.4 (baseline model without housing demand, 2002 – 2009) and 4.5 (baseline model including housing demand, 2002 – 2009).

Table 4.5: Estimation results of baseline tenure choice model with Heckman correction 02-09

		Coefficient	Std. Error	Sig (p)
Outcome equation: Tenure				
	Previous tenure	0.994	0.037	0.000
	Relative cost	-0.262	0.603	0.664
	Income	0.772	0.033	0.000
	Marginal tax			
	Middle	0.142	0.040	0.000
	High	0.241	0.064	0.000
	Education			
	Middle	-0.249	0.022	0.000
	Low	-0.608	0.035	0.000
	Urbanity			
	Urban	0.062	0.036	0.088
	Moderately urban	0.147	0.037	0.000
	Rural	0.250	0.044	0.000
	Strongly rural	0.247	0.051	0.000
	Type of income			
	Business	0.123	0.038	0.001
	Pension	-0.432	0.055	0.000
	Social welfare	-0.627	0.036	0.000
	Starter	-0.561	0.025	0.000
	Birth year			
	1921-1930	-0.624	0.088	0.000
	1931-1940	-0.159	0.068	0.020
	1941-1950	0.066	0.047	0.165
	1961-1970	0.195	0.036	0.000
	1971-1980	0.339	0.041	0.000
	1981-1990	0.325	0.056	0.000
	1991-2000	0.403	0.416	0.332
	Time			
	2002	0.183	0.037	0.000
	2006	-0.100	0.048	0.036
	Interaction			
	Previous tenure 2002	-0.150	0.046	0.001
	Previous tenure 2006	-0.098	0.054	0.070
	Inverse Mills' ratio	0.176	0.065	0.007
	Constant	-8.847		
Selection equation: Move				
	Age	-1.000	0.011	0.000
	Household composition			
	Couple	0.148	0.010	0.000
	Couple/child	-0.292	0.010	0.000
	Other	-0.154	0.026	0.000
	Constant	2.740		

Source: WBO 2002, WoON 2006, WoON2009, own calculations

We will not discuss all coefficients for these Tables. The most important variables in our model are the previous tenure variable and the time dummy interacted previous tenure variables. We find economically similar results in both specifications. The coefficient on previous tenure hardly changes with the adding of housing demand. The interaction dummies also do not change importantly. Moreover, the results are in line with the general baseline model from Table 4.3. The predictive power of the model is given in similar style as before in Table 4.6. The model's predictive power is also in line with the complete model.

Table 4.6: Predictive power Heckman corrected tenure choice model 02-09

Overall		Predicted		
		Owner	Renter	Total
Observed	Owner	9.496	2.815	12.311
	Renter	2.696	11.213	13.909
	Total	12.192	14.028	26.220
Correct predictions	2002	77,8%		
	2006	79,3%		
	2009	80,1%		
	Total	79,0%		

Source: WBO 2002, WoON 2006, WoON2009, own calculations

Housing demand does significantly increase the probability of owning. The results, however, do not change significantly when not modeling housing demand in the selection equation (which may be expected given the non-significance of correlation of error terms that is indicated through the inverse Mills' ratio in Table 4.7).

Table 4.7: Estimation results of tenure choice model with Heckman correction, housing demand 02-09

		Coefficient	Std. Error	Sig (p)
Outcome equation: Tenure				
	Previous tenure	0.918	0.037	0.000
	Relative cost	-0.486	0.622	0.434
	Value	0.812	0.029	0.000
	Income	0.636	0.033	0.000
	Marginal tax			
	Middle	0.181	0.041	0.000
	High	0.191	0.065	0.004
	Education			
	Middle	-0.196	0.023	0.000
	Low	-0.501	0.037	0.000
	Urbanity			
	Urban	-0.042	0.037	0.263
	Moderately urban	0.013	0.039	0.732
	Rural	0.033	0.045	0.474
	Strongly rural	0.010	0.053	0.848
	Type of income			
	Business	0.006	0.039	0.871
	Pension	-0.415	0.058	0.000
	Social welfare	-0.635	0.037	0.000
	Starter	-0.504	0.025	0.000
	Birth year			
	1921-1930	-0.528	0.093	0.000
	1931-1940	-0.147	0.072	0.041
	1941-1950	0.039	0.050	0.432
	1951-1960	0.178	0.038	0.000
	1961-1970	0.342	0.046	0.000
	1971-1980	0.330	0.062	0.000
	1981-1990	0.268	0.426	0.529
	1991-2000	0.616	0.042	0.000
	Time			
	2002	0.616	0.042	0.000
	2006	-0.055	0.049	0.262
	Interaction			
	Previous tenure 2002	-0.130	0.048	0.007
	Previous tenure 2006	-0.055	0.056	0.325
	Inverse Mills' ratio	-0.063	0.072	0.388
	Constant	-16.221		
Selection equation: Move				
	Value	-0.189	0.007	0.000
	Age	-0.967	0.011	0.000
	Household composition			
	Couple	0.195	0.010	0.000
	Couple/child	-0.213	0.010	0.000
	Other	-0.122	0.026	0.000
	Constant	4.834		

Source: WBO 2002, WoON 2006, WoON2009, own calculations

The model's predictive power is again summarized in a tabulation of observed and predicted tenure. The results are given in Table 4.8.

Table 4.8: Predictive power Heckman corrected tenure choice model with housing demand, 02-09

Overall		Predicted		
		Owner	Renter	Total
Observed	Owner	9.362	2.571	11.933
	Renter	2.249	10.145	12.394
	Total	11.611	12.716	24.327
Correct predictions	2002	79,5%		
	2006	80,0%		
	2009	81,2%		
	Total	80,2%		

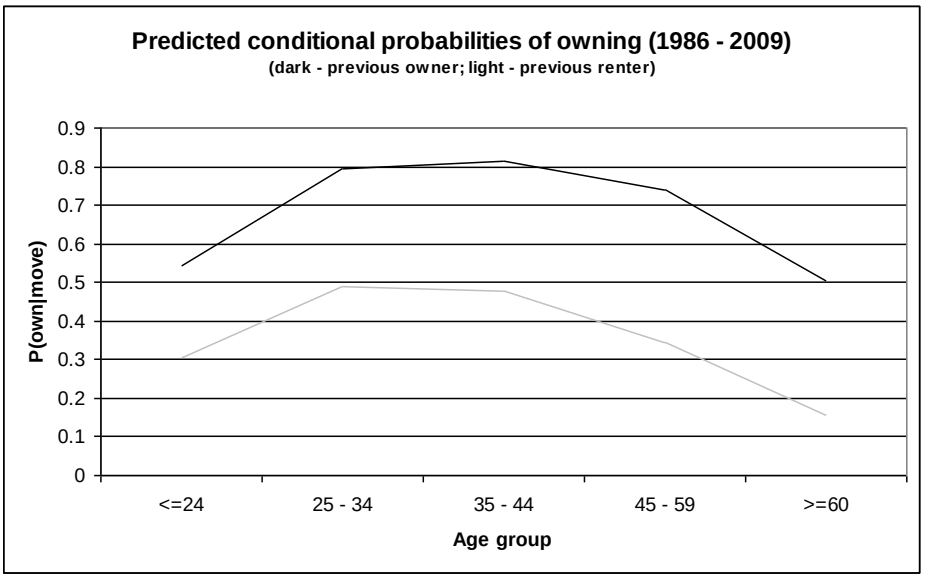
Source: WBO 2002, WoON 2006, WoON2009, own calculations

Given the results presented in Tables 4.5 and 4.7 we may conclude that housing demand is not an important driver of our state dependency results. The insignificant impact of the selection equation when modeling consumption does imply that when taking into account the demand for housing, the question whether or not a household has recently moved becomes irrelevant. This might be the result of the fact that the selection equation captures the general dynamic of renters being more mobile than owner-occupiers. Taking into account the demand for housing, given the setup of the Dutch housing market, captures that dynamic: increasing demand reduces the probability of moving.

We also proposed the impact of home equity as an important driver for our state dependency results. The main idea behind the impact of home equity is that if households wish to move up the housing ladder, they will need home equity as income will not suffice to obtain a full mortgage. Moreover, empirical results by Venti and Wise (1990) and Conijn and Schilder (2010) indicate that households indeed do not spend their home equity, but rather keep it in their dwellings. Given these findings we hypothesize that time-varying state dependency might be the result of households rolling over home equity into (new) dwellings. Owners will therefore remain owners (despite not being forced to do so by institutions); renters, having no home equity, are then forced to consume their housing services in the rented sector. Initial evidence for this has already been presented in the baseline model in the negative coefficient for starters (also with no home equity).

We cannot test this assumption directly by estimating a model with (previous) home equity since this is collinear with the previous tenure. We can, however, estimate a model with total wealth (i.e. home equity *plus* other, non-housing, wealth). We only have an estimate for total wealth for the wave of 2009. The variables relating to time have therefore been removed from the model; all else is equal to the previously presented models. Based on the Heckman-corrected tenure choice models we predict conditional probabilities of becoming an owner. First we present the predicted probabilities for the entire time-period (i.e. the baseline model). Then the probabilities for the wave of 2009 are given: once including a correction for total wealth and once without a correction for total wealth.

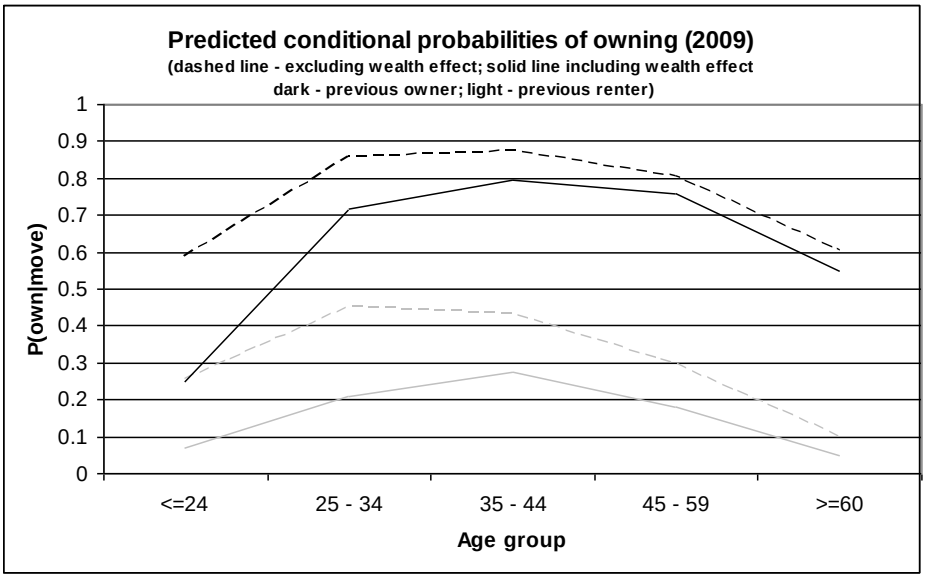
Figure 4.1: Conditional probability of becoming a home-owner by age group and previous tenure



Source: WBO / WoON 1986-2009, own calculations

Figure 4.1 clearly displays a sort of life-cycle effect in housing tenure choice: households are increasingly likely to become home-owners up to some period in life (age group 35 - 44) after which the likelihood of moving into the owner-occupied sector decreases significantly. The shape of the predicted lines are in line with what may be expected based on the general (household) life-cycle theory. The difference in probabilities of becoming an owner between owners and renters is in line with general findings so far and confirms the state dependence in tenure choice.

Figure 4.2: Conditional probability of becoming a home-owner by age group and previous tenure



Source: WoON 2009, own calculations

Figure 4.2 displays a very similar pattern of probabilities as Figure 4.1. The dark lines represent the previous owners' probability of becoming home-owner again after a move. As is the case for the entire period, we observe an increase of likelihood in the

early years of the household and a decreasing probability of moving into the owner-occupied sector as the household progresses in age. The light gray lines display the similar pattern for renters. Also as for the entire period we observe an important difference between owners and renters in the likelihood of becoming home-owner, thus confirming state dependence in tenure choice.

Figure 4.2, however, also displays the different probabilities of becoming home-owner within previous tenure class based on whether the model corrects for total wealth. The wedge between the predicted probabilities based on either model can be interpreted as an indicator of the importance of wealth in the tenure choice decision. Thus, if the difference between the two solid lines decreases compared to the difference between the dotted lines, a part of the state dependence can be attributed to wealth. This, however, is only the case for the youngest age group. In older age groups we find opposite or no effects, implying that wealth cannot explaining state dependence.

6. Conclusion

We find strong evidence for the existence of state dependency in the Dutch housing market. Our findings are in line with international literature in that we find an effect of previous tenure on the current tenure decision. We furthermore find that the impact of state dependency on households' tenure choice decisions increases over time: state dependency therefore seems have increased over the past two decades.

Contrary to international literature we have no institutions that could be seen as the main driver of state dependence. We therefore test two broad hypotheses that may help explain state dependence and its development over time. The first test entails a test of housing demand; households with high demand for housing can only consume housing in the owner-occupied sector. Our test indicates, however, that housing demand can not explain the strong state dependency in our results. A second hypothesis that we test is that home equity gives households an incentive to roll over home equity in a new dwelling: the argument is based on empirical results by Venti and Wise (1990) and Conijn and Schilder (2010). There is no clear economic reason why home equity should encourage state dependency. Nonetheless, we find that households that have older heads, and presumably more home equity, indeed are significantly more likely to make state dependent housing decisions. Home equity thus seems to, at least partially, cause state dependence in tenure choice decisions. We can only indirectly test this hypothesis because of lack of direct wealth data. Further research into the question why there is (time-varying) state dependency in tenure choice is thus needed.

Appendices

Appendix A: estimation of control variables

We estimate two control variables to add to our model: the marginal income tax rate and the relative cost of owning over renting. In this appendix we shortly describe how both variables have been created.

Marginal tax

The marginal tax rate of a household determines its potential benefit from the tax treatment of owner-occupied housing. The higher the marginal tax rate, the higher are also the potential gains from owning. The marginal tax rate is not given in our dataset. De Vries and Boelhouwer (2009) use the average marginal tax rate used to predict the fiscal benefit from owning and set it at 40.5%. Koning *et al.* (2006) find the average marginal tax rate to be 44%. According to Boelhouwer *et al.* (2004) "tax conditions for home owners in the Netherlands were very stable during the last few decades" and they apply a marginal tax rate of 40.5%. Applying a constant marginal tax rate in a tenure choice model gives no satisfactory results: effects caused by the fiscal treatment of the owner-occupied dwelling are then most likely to be captured by income. There is, however, a potential non-linear effect resulting from the different marginal tax rates households have.

The tax system in the Netherlands changed dramatically in 2001. The system before and after 2001 are very hard to compare. Nonetheless, the average tax payer's marginal rate has been relatively stable over time, despite the change. We therefore take the post-2001 system and see which income percentiles qualify for the low rate, which households qualify for the average rate and which households are taxed according to the high rate. In the three waves after 2001 roughly 20% of all households have an income that would qualify for the low rate, and roughly 25% of all households qualify for the high rate. All others are in between at the average rate. We extrapolate these groups to qualify households in earlier waves into either of three groups, based on their applicable income percentile. This thus results in three dummy variables that capture a potential non-linear effect of income on tenure choice resulting from the fiscal treatment of the owner-occupied dwelling.

Relative cost ratio

The relative cost of owning over renting is an important variable for explaining tenure choice. We follow Bourassa and Hoesli (2010) in applying a regional relative cost variable. We first create the relative cost variable by estimating for each household its user cost. This is done in line with Conijn and Elsinga (1998):

(2) $UC_o = I + i*(V-M) + r*V + o*V + PT + PI + Tc + (d-a)*V + F$

(3) $UC_r = R - HA$

I = mortgage interest paid
i = required rate of return on invested equity
(2.8% : 4 required return - 1.2 tax exemption on income from investments)
r = risk premium (2%)
V = value of the property (as assessed for tax purposes)
M = mortgage
o = percentage value of maintenance (0.9%[9])
PT = property taxes (levied by municipalities; on average 0.1%[10] of V)
PI = property insurance (on average 0.1%[11] of V)
Tc = attributed transaction costs (0.5%: 0.2%[12] + 0.3%[13] attributed transfer tax)
a = (expected) appreciation rate (long term annual average taken; 3%[14])
d = depreciation (1%[15])
F = net fiscal benefit mortgage interest deductibility
R = rent paid
HA = housing allowance

We use actual observations from our dataset for all parameters of user cost of the above mentioned formulas, except for *Tc* and *(a-d)*; in those cases we applied a constant percentage of the property value.

The second step of estimating relative cost involves scaling the total user cost to a constant quality consumption unit. This can normally be done using a representative property. However, one of the difficulties in the Dutch housing market is that the difference in average quality between the owner-occupied and the rented sector is so large that a representative average dwelling is inconceivable. The Dutch government, however, has a "rental points system" that is used for setting maximum rent levels under regulation: this system is used to create a constant quality housing consumption unit. The rental points system is a simple score card that attributes points for housing characteristics as floor space and type of dwelling and for the quality of the surroundings, like the proximity to public transport and the availability of schools. Romijn and Besseling (2008) estimate these scores and find a proper fit in the rental sector of their estimate and the actual points as given in the data of 2006. Their

[9] In line with Koning *et al.* (2006).
[10] This is the lower bound reported in Van den Noord (2005); ours is estimated using observations of property taxes levied and house values in the database.
[11] This is in line with Koning *et al.* (2006) and is estimated using observations of property insurance paid and house values in the database.
[12] In line with Koning *et al.* (2006): based on average transaction costs and an average tenancy spell.
[13] Based on Koning *et al.* (2006): Table 1, p. 10.
[14] In line with Koning *et al.* (2006).
[15] Based on an average of the economic depreciation in the owner-occupied sector reported in Conijn (1995) and for the rental sector reported in Conijn and Schilder (2011); 0.83% and 1.3% respectively.

estimates can be extrapolated to the owner-occupied sector in order to come up with the equivalent quality scores of owner-occupied housing. We use the score card syntax from Romijn and Besseling (2008) to do so. Now, the user cost of each household can be scaled to 1 quality unit by dividing total user cost from (2) and (3) by the quality points. We take the regional average score for each of 40 COROP-areas; these are regional areas used by Statistics Netherlands and are very constant over time. The regional relative cost can thus be estimated as follows:

$$(4) \qquad \left(\frac{\overline{(U_{o,i} / Q_i)}_l}{\overline{(U_{r,j} / Q_j)}_l} \right)_l$$

Equation (4) simply says that the relative price ratio of region *l* is the ratio of the regional average user cost of owning per quality unit of all owners in region *l* over the regional average user cost of renting per quality unit of all renters in region *l*.
Our dataset comprises the waves of 1986 through 2009. Not all waves contain all the necessary data to estimate the user cost of owning correctly. We therefore extrapolate the complete ratio to the other waves. The numerator is adjusted using a regional hedonic house price index created from a dataset of the Dutch Association of Brokers and Real Estate Experts (NVM). The index used can be found in Schilder and Conijn (2010) and is estimated for each of the 40 regions separately with annual time dummies. The denominator is adjusted using an index created from the annual rent price adjustments set by the government and is taken from Statistics Netherlands.

Appendix B: transition matrices

Unconditional probabilities

1986		Destination		
		Owner	Renter	Not moved
Origin	Owner	3%	2%	95%
	Renter	4%	9%	87%
	Starter	25%	75%	0%

1990		Destination		
		Owner	Renter	Not moved
Origin	Owner	4%	2%	93%
	Renter	5%	8%	87%
	Starter	27%	73%	0%

1994		Destination		
		Owner	Renter	Not moved
Origin	Owner	4%	2%	95%
	Renter	4%	5%	91%
	Starter	28%	72%	0%

1998		Destination		
		Owner	Renter	Not moved
Origin	Owner	8%	3%	89%
	Renter	9%	12%	79%
	Starter	28%	72%	0%

2002		Destination		
		Owner	Renter	Not moved
Origin	Owner	8%	3%	89%
	Renter	5%	8%	87%
	Starter	30%	70%	0%

2006		Destination		
		Owner	Renter	Not moved
Origin	Owner	7%	2%	91%
	Renter	6%	9%	86%
	Starter	30%	70%	0%

2009		Destination		
		Owner	Renter	Not moved
Origin	Owner	7%	2%	92%
	Renter	6%	9%	85%
	Starter	33%	67%	0%

Source: WBO / WoON 1986-2009

Conditional probabilities

1986		Destination	
		Owner	Renter
Origin	Owner	59%	41%
	Renter	29%	71%

1990		Destination	
		Owner	Renter
Origin	Owner	66%	34%
	Renter	36%	64%

1994		Destination	
		Owner	Renter
Origin	Owner	72%	28%
	Renter	43%	57%

1998		Destination	
		Owner	Renter
Origin	Owner	71%	29%
	Renter	41%	59%

2002		Destination	
		Owner	Renter
Origin	Owner	75%	25%
	Renter	39%	61%

2006		Destination	
		Owner	Renter
Origin	Owner	79%	21%
	Renter	39%	61%

2009		Destination	
		Owner	Renter
Origin	Owner	81%	19%
	Renter	38%	62%

Source: WBO / WoON 1986-2009

Chapter 5: Allocative efficiency of different housing subsidy systems

1. Introduction

Housing subsidies give households an incentive to consume a different bundle of housing services than they would do in absence of this subsidy. This phenomenon has been studied extensively in the (housing) economics literature (see e.g. Rosen, 1985; Poterba, 1992). Often the result of subsidization programs is that housing consumption is altered to such an extent that a significant welfare loss to society arises: this implies that society had been better off without the subsidy.

Estimating welfare losses using Harberger triangles can be an insightful way to study the distorting impact of different subsidy schemes. The use of Harberger triangles presumes a free choice of consumption bundles by households. Despite regulation in the rented sector in the Netherlands choice is not overly restricted; access to rented housing is not for instance restricted to small apartments only. The length of the queue, however, may depend on the type of dwelling and its location. Still, since households are relatively free to choose from a broad variety of consumption bundles (i.e. upon eligibility) we will apply Harberger triangles for estimating the welfare loss of subsidization.

Despite the welfare losses resulting from housing subsidies most countries do have some form of housing subsidy (Kangasharju, 2010; Lyttikäinen, 2008; Le Blanc, 2005). Often housing subsidies are introduced for correcting market failures. In the housing economics literature some subsidies have been proven to be less efficient than others (see e.g. Fallis *et al.*, 1995). Expenses on housing allowances are generally large therefore the efficiency of such programs is of interest to both planners and scientists (Kangasharju, 2010).

Generally, demand subsidies are found to be more efficient than supply subsidies (e.g. Mayo, 1999). In this study we will test whether a system consisting of demand subsidies only is more efficient than a system consisting of both supply and demand subsidies. Currently in the Netherlands there is extensive subsidization in the rented sector consisting of both supply and demand subsidies. We want to know whether and at which costs welfare gains can be made by shifting towards a theoretically more efficient program without decreasing affordability in the rented sector. Two programs are compared to one another: the current program that contains supply and demand subsidies and a program that contains only an extended version of the existing demand subsidy.

2. Intervention in the housing market

Intervening in the housing market inevitably affects the behavior of both suppliers and consumers of housing services. Governmental intervention in the housing market can therefore result in 'government failure' (Krueger, 1991). The extent to which intervention disrupts the functioning of the market depends on the use of instruments (Boelhouwer & Hoekstra, 2009). Nonetheless, there may be good reasons to intervene

in housing markets. Commonly used arguments for intervening can be categorized as efficiency and equity arguments (Rosen, 1985; Currie & Gahvari, 2008).

Efficiency arguments include the well-known positive externality argument where the positive input of one household spills over to other households. Research, however, generally finds little support for the costs of exploiting these externalities (e.g. Rosen, 1985; Glaeser & Shapiro, 2002). The presence of market failures is one of the main motives to intervene in the housing market (Hakfoort *et al.*, 2002). The presence and quality of public space, such as nature, is not automatically safeguarded in a free market and therefore requires spatial planning (Donders *et al.*, 2010; Brueckner, 2000). The prevention of the social costs of slums, or the improvement of neighborhoods via investments, is another example of an efficiency argument. Again, research suggests that housing subsidies are inefficient means for such goals and that results do not justify the investments (Rosen, 1985). Market failures, however, may also arise in the provision of housing quality; free markets might not deliver the quality of housing that are considered socially desirable (Whitehead, 2003).

Equity arguments are another category of arguments for housing subsidies: these arguments usually entail some form of redistribution of wealth over households (e.g. Boelhouwer & Haffner, 2002). The objective of housing policy based on equity arguments predominantly aims to create more equality between households. However, as Rosen (1985) justly points out, if redistribution would be the only objective of the policy, why not transfer in cash? This is generally much cheaper as it decreases the administrative burden compared to in-kind transfers. The answer can be found in politics. Redistributive policies require political support (Currie & Gahvari, 2008). This might be the reason why often in-kind transfers are given when cash transfers would be more cost efficient. Housing policy thus seems to be more the result of political considerations than of economic reasoning (Rosen, 1985).

Most of the mentioned arguments presented here are, at least to some extent, used to justify governmental intervention in general and the use of specific housing policy instruments in particular. However, as mentioned earlier, government intervention might just as well lead to 'government failure' (Krueger, 1991). Whitehead (2003) sums up two practical questions to assess whether government intervention into the malfunctioning market can be justified: i) are the welfare costs to society large enough to care and ii) will intervention result in a better functioning market or replace one evil with another? Recent work by e.g. Donders *et al.* (2010) suggests that welfare implications of the current set of housing policies results in very significant undesired side effects. The extent to which the government intervenes in the housing market cannot be justified for with above mentioned arguments and large welfare losses have been reported (e.g. Van Ewijk *et al.*, 2007; Romijn & Besseling, 2008).

3. Efficiency and subsidies

We have found that there are several generally reported reasons to intervene in the housing market. One of the most applied instruments to intervene in the housing market is via subsidies. Standard economics textbooks teach that in free markets goods are distributed among those who value these goods most: subsidies, however, change suppliers' and consumers' behavior. Goods are then no longer automatically produced efficiently nor are goods consumed by those who attach most value to these

goods. Subsidies thus cause economic inefficiencies. Nonetheless, most western economies know housing subsidies of some kind. In the next paragraph we discuss reasons to intervene in the housing market; first we will discuss the economic efficiency of subsidies in general.

There are two main sources of inefficiency: production inefficiency and consumption inefficiency (e.g. Rosen, 1985; Mayo, 1986). Production inefficiency occurs when the production costs of goods exceed the market value of these goods. Production inefficiency for instance occurs when the provided housing does not match the characteristics demanded in the market. Consumption inefficiency results from subsidized transfers being given to the beneficiary who values the subsidized transfer less than its cash equivalent: this may occur in e.g. housing voucher or housing allowance programs.

Subsidies can be broadly organized into two categories: supply-oriented subsidies and demand-oriented subsidies. This dichotomy in housing subsidies can be found widely in literature with sometimes slightly different names (e.g. Mayo, 1986; Mayo, 1999; Priemus, 2004; Conijn, 2008). Supply subsidies are subsidies that are aimed at the production of housing services; these subsidies are identical for each beneficiary, regardless of individual characteristics of the beneficiary: e.g. the famous bricks-and-mortar subsidies. Demand subsidies are oriented at supporting the beneficiary in his housing demand; these subsidies are differentiated towards the individual characteristics of the recipient of the subsidy (e.g. housing allowance programs).

Generally speaking, less restrictive subsidies are more efficient then more restrictive housing subsidies: fewer restrictions are expected to result in higher utility. In line with this general statement literature reports that supply subsidies are inferior to demand subsidies in almost all cases (see e.g. Fallis *et al.* 1995; Mayo, 1999). It is, however, a priori not necessarily the case that cash transfers always dominate housing allowances since the efficiency argument raised is based on perfect markets. Blackorby and Donaldson (1988) prove that imperfect information in markets can lead in-kind transfers to Pareto-dominate cash transfers; Gahvari (1995) shows that the presence of distortionary taxes can lead to a Pareto-improvement with in-kind transfers. Therefore, housing market interventions may be optimally designed using other than cash transfers: thus, as Harberger (1964) points out, comparing the welfare effects of different (combinations of) housing policy instruments is very relevant.

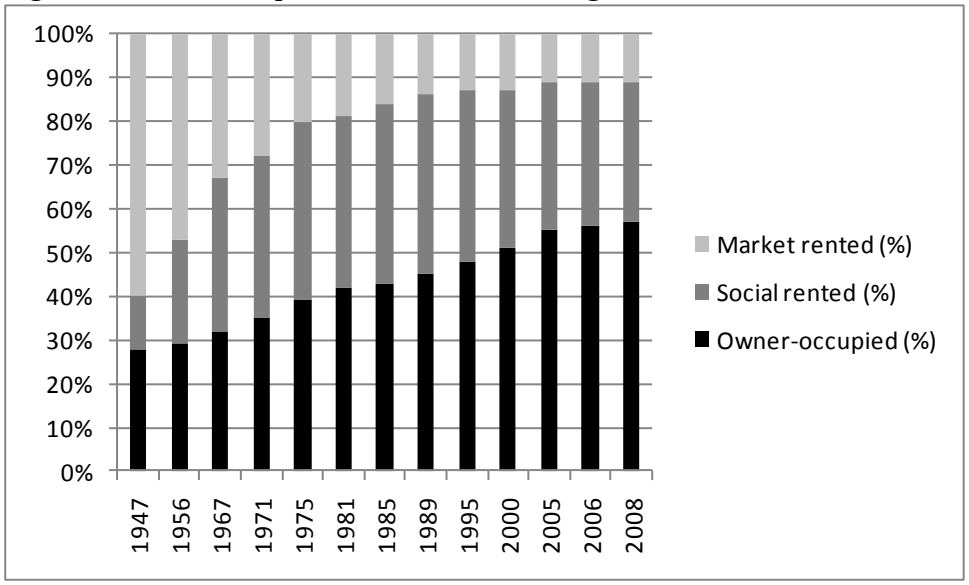
Mayo (1986) stresses that both types of subsidies may result in both types of economic inefficiencies. Supply subsidies, however, are especially prone to causing production inefficiencies. De Borger (1986) and Bilbao *et al.* (2010) both report households to consume different bundles of housing in a subsidized situation then they would in an unsubsidized situation. Supply subsidies are also more prone to allocation inefficiency: due to the untargeted nature of the subsidy all household, whether targeted by the program or not, benefit from the subsidy. In a comparison of the efficiency effects of both demand and supply oriented subsidies from several studies presented in Mayo (1999) one can conclude that the inefficiencies that follow from supply subsidies are generally larger than the inefficiencies caused by demand subsidies. Similar findings are reported in e.g. Cronin (1983) and Fallis (1993).

4. The Dutch rented market: institutions

In this section we will discuss the main institutions that *create* subsidies in the rented sector. We use the word 'create' because one of the two important subsidies is not an explicitly supplied subsidy, but rather is the result of the institutional setup of the rented sector. We will show how this subsidy potentially creates a strong distributional inefficiency. Before describing the specific subsidies to renters, however, we need to shortly describe the relationship between the rented sector and the owner-occupied sector.

The Dutch housing market has changed strongly over the past decades from a largely rented market to a more owner-occupied market. In the late 1940's more than 70% of the housing stock was rented housing; the majority of which was private rented. In 2006 almost 60% of the total stock is owner-occupied. The shift in ownership structure is displayed in Figure 5.1:

Figure 5.1: Ownership structure of the housing market



Sources: Haffner *et al.* (2009); Ministry of Housing (2009)

Households in both the rented sector and the owner-occupied sector receive subsidies. The way owners and renters are subsidized differs strongly. The subsidization in the rented sector is dealt with extensively in the following paragraphs, in this paragraph we focus shortly on the owner-occupied sector. Owner-occupiers are eligible to deduct mortgage interest payments against their marginal income tax rate. This results in a subsidy of between 42% and 52% of all interest payments. The user cost of owner-occupied housing in the Netherlands as we estimate later is 6.0%. The fiscal benefits to owner-occupiers, however, result in a net user cost of only 4.6%: a subsidy of 26%.

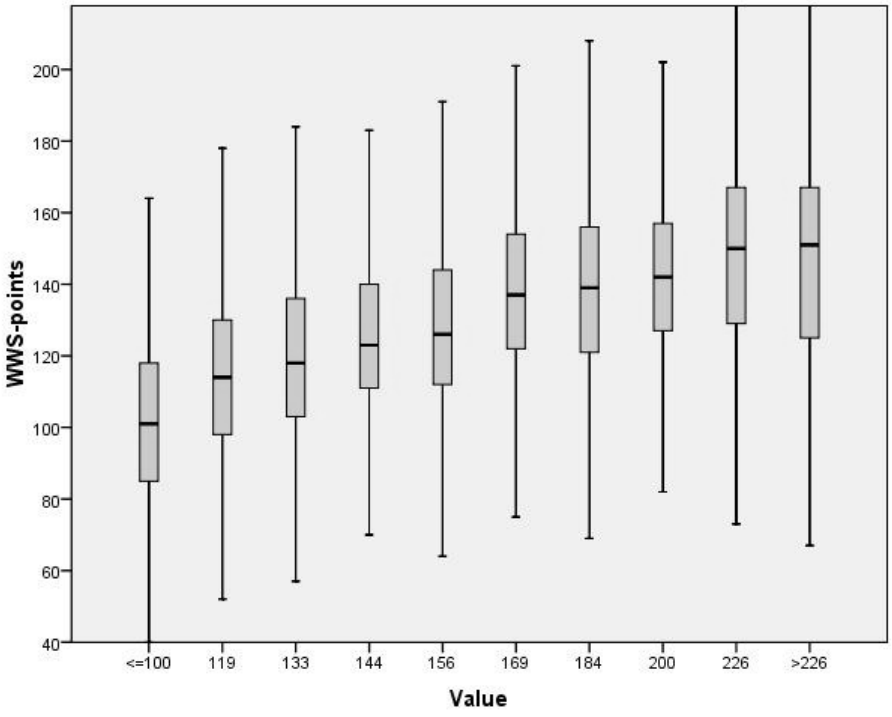
Due to the low price elasticity of supply this subsidy results in higher property prices. Increased property prices in the owner-occupied sector result in similar increases of property prices in the rented sector; i.e. the tax-assessed value of the rented properties increase by the same percentage. Thus, the vacant possession value (the value had the property been offered in the owner-occupied sector) of the rented property increases; its tenanted investment value (i.e. the value when renting the property out until the

end of the property's life span) is not. Due to regulations we will describe in the following paragraphs landlords cannot obtain rents to match the increased property values (Conijn & Schilder, 2011a). Many private landlords therefore choose to arbitrage the value gap that arises between the tenanted investment value of the property and its vacant possession value; the result of this phenomenon is the strong decrease of the private rented sector, as shown in Figure 5.1. Social landlords do not have such an economic incentive due to their social task. Market rents are not observed in the Dutch rented sector due to the mentioned regulation. Several authors have reported market rent estimates; their results converge around an estimated market rent of 4.5% (e.g. Conijn & Schilder, 2011a; Francke, 2010). In case of Conijn and Schilder (2011a) this is based on an arbitrage argument: renters that would be confronted with higher rents would switch to the owner-occupied sector and arbitrage the price difference away. Other methods, however, result in similar estimates.

4.1 "Supply" subsidy: regulated rents and competition

Rents in the Dutch housing market are strongly regulated: rents are based on an administrative point system ("WWS points") instead of the actual value of the property. The points system is simply a scoring card on which property characteristics are graded: square meters score points, facilities, type of heating et cetera. Within the point system local scarcity does not play a role: i.e. square meters of housing are equally expensive in a high demand area as Amsterdam's city center as they are in any given rural area. This results in rents being completely detached from property value. The relationship between the points and the tax assessed property value are given in Figure 5.2:

Figure 5.2: Value and "WWS points", 2008
Low-end of box = 25th percentile, intersection = median, upper-end of box = 75th percentile



Source: WoON 2009

The rents of all dwellings of which the number of points on the score card are 142 or lower are regulated by law. For these dwellings there is no strict relationship between value and rent possible, since there is no strong relationship between the WWS-points and the value of the dwelling as can be seen in Figure 5.2. This regulation implies three key elements: i) a maximum rent level, ii) annual rent adjustments are maximized by the government and usually set at inflation, and iii) tenant protection. Tenant protection applies to all households, however, is especially strong for households that rent regulated dwellings. Eligibility for the social rented sector for instance, is restricted based on income; during the contract, however, assessments of the income are not allowed. Furthermore, temporary contracts are not allowed.

The maximum rent level is a price ceiling for dwellings which have less than 143 points on the scorecard. Dwellings that have more than 142 points and of which the rent level in the contract was below the legal price ceiling are also regulated. This implies that all dwellings in the Netherlands are regulated if the rent level does not exceed the legal price ceiling (€ 7580 per year in July 2008 – July 2009). A good share (68 %) of all rents in the Netherlands is regulated by law via the point system. In practice, as can be seen in Table 5.1, the share of regulated dwellings is much larger. This is caused by the dominant market position of social landlords.

Table 5.1: Regulated rented dwellings by type of landlord, 2008
Figures in millions; percentages calculated over type of landlord

	Landlord		
	Social	Private	Total
Regulated	2,2 (97%)	0,3 (73%)	2,5 (93%)
Liberalized	0,1 (3%)	0,1 (27%)	0,2 (7%)
Total	2,3 (100%)	0,4 (100%)	2,7 (100%)

Source: WoON 2009

Table 5.1 clearly shows that the majority of rented housing, 93%, is regulated. Also when it concerns a private landlord the majority of dwellings are regulated. The larger share of housing in the rented sector has a higher number of "WWS points" than the upper bound for regulation by law; these dwellings could be, in principle, liberalized. There are, however, two important mechanisms that prevent this from happening. The first reason why many dwellings that can be potentially liberalized are in fact regulated is the before mentioned tenant protection: during a contract rents may not be raised beyond a governmentally prescribed percentage, which generally follows inflation. Furthermore, landlords cannot end contracts and temporary contracts are prohibited. The second reason why many rents are regulated lies in the fact that landlords do not liberalize rents after the dwelling becomes vacant. The main reason for social landlords to engage in this suboptimal pricing is the social task that these non-profit organizations have. The reason for private landlords to engage in suboptimal pricing is the strong competitive position of social landlords. The rented sector in the Netherlands is dominated by the non-profit social landlords, who have a market share of 84%. Private landlords cannot rent out dwellings at market prices, because households prefer to either wait longer for a social rented dwelling or buy a dwelling instead. Private landlords are therefore forced to offer dwellings at lower (regulated) rents, otherwise dwellings simply remain vacant. This results in a (too) low return on investment and gives private landlords the incentive to sell their property. This arbitrage opportunity following below-market level returns is the major

explanation for the strong decline of the private rented sector in the Netherlands over the past few decades.

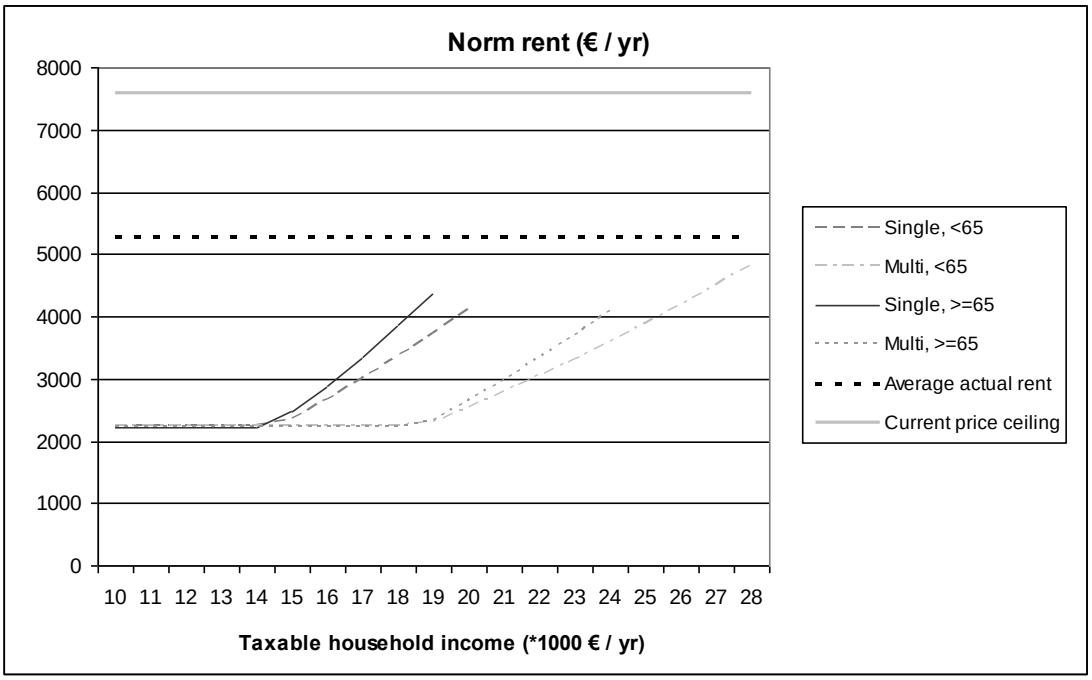
Given regulation and the price setting behavior from social landlords the average rent level in the Netherlands is far below market rent. The difference between the market rent and the actual rent is a subsidy to the renter. On average, this subsidy amounts to roughly one third (1/3) of the market rent (Conijn & Schilder, 2011b). Although this subsidy is not a real supply subsidy in the strict sense of the word, its effect is the same: households obtain a reduction in user cost that is only conditional upon tenure (i.e. one needs to rent to obtain the subsidy). Many households that benefit from this subsidy would probably not benefit as much had the subsidy been granted based on household characteristics therefore redistributing wealth inefficiently.

4.2 Demand subsidy: housing allowances

The demand subsidy in the Netherlands is provided in the shape of a housing allowance. Housing allowances were introduced in the Netherlands in the 1970's and were meant to support the affordability of rented housing for households (Elsinga *et al.*, 2007). All households that rent a dwelling of which the rent is below the price ceiling and whose income is below some level are eligible for housing allowances; households that rent a dwelling with a rent level over the price ceiling are not eligible for housing allowances, regardless of their income.

The amount of housing allowance a household receives depends on four main factors: income, rent level, household composition and norm rent. The norm rent is a price level a household should pay for themselves. The norm rent depends on income and household composition, as can be seen in Figure 5.3.

Figure 5.3: Norm rent and income
Norm rent lines end when income-tested eligibility ends

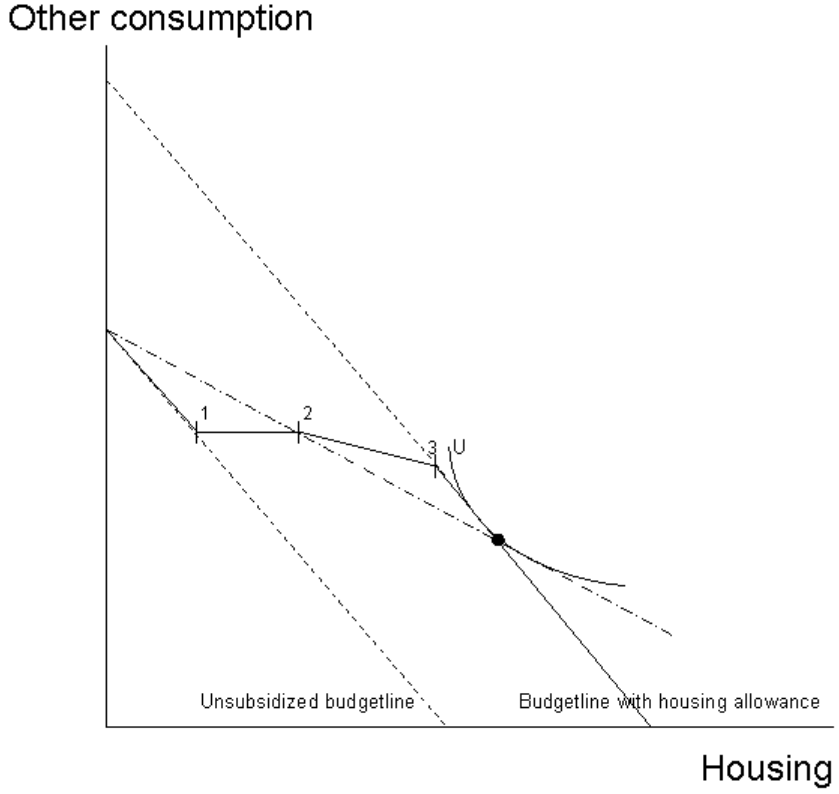


The difference between the actual rent and the norm rent is (partially) subsidized. The degree of subsidization depends on the specific rent level: up to some levels the difference between norm rent and actual rent is fully subsidized, beyond those levels the percentage drops to 75% and 50%. A detailed overview of the specific intermediate levels and the applicable subsidization percentages may be found in Elsinga *et al.* (2007).

There are four situations in which a household does not qualify for housing allowances: i) the actual household rent exceeds the price ceiling, ii) the attributed norm rent exceeds the actual rent, or iii) the income of the household is beyond the eligibility bound as can be seen in Figure 5.3, or iv) household wealth is beyond the maximum wealth bound (€ 20315 for single-person households, €40630 for multi-person households). The majority of renters, 70%, do *not* receive housing allowances. Among the lower income households the housing allowance can significantly lower the user cost of housing. We do find housing allowances in all income deciles, however; this is the result of the fact that housing allowances are based on taxable income, while our income deciles are based on disposable income.

Housing allowances, unlike the supply subsidy which only has an income effect, affects the shape of the budget line. The housing allowance leads to a kinked budget line, as can be seen in Figure 5.4.

Figure 5.4: Housing allowance, budget line and estimating welfare effects



There are three kinks: one where the housing allowance starts to be distributed (i.e. after the norm rent) and rents are subsidized for 100%. The budget constraint here is horizontal. Then there is a kink at the level of consumption where rents are subsidized for 75%. A final kink appears where households stop receiving additional housing

allowances for higher rent levels: at this point the budget line is again parallel to the unsubsidized budget constraint. This constitutes a problem, as is displayed by the long-short dotted line parallel to the indifference curve *U* in Figure 5.4: in estimating the impact of subsidization we estimate the effect on this long-short dotted line. This line, as can be seen in Figure 5.4, overestimates the price effect of the subsidy. For households that consume housing before the third kink it is a priori not clear whether the price effect is wrongly estimated. By the set-up of the system, however, a large share of households consume less than the bundle after the third kink. Moreover, 70% of the households do not receive any housing allowances at all. In total, only 5% of all renting households are on the parallel part of the kinked budget line. We therefore ignore this issue in our estimates.

4.3 Summary

The Dutch rented sector currently has a demand and a supply subsidy. The supply subsidy is not a true supply subsidy in the sense that is granted to landlords for construction; it is, however, a subsidy the renter obtains via low rents. The supply subsidy is the difference between the (attributed) market rent of the property (i.e. 4.5% of the value of the dwelling) minus the actual rent paid for the dwelling. The subsidy is thus conditional upon living in the rented dwelling; mind that this does not exclusively applies to social landlords, but also to commercial landlords as we have shown in Table 5.1. The demand subsidy is a housing allowance, of which we have described in broad lines how it is calculated for households. In our analyses we will not use the actual observations, but the calculated subsidy, and thus ignore the problem of eligible households not applying for subsidies. The demand subsidy is granted to lower income households exclusively and eligibility is annually tested. Because of the strict rules of housing allowances the majority of renters does not qualify for allowances. Nonetheless, renters are strongly subsidized following the "supply" subsidy of low rents. In fact, the majority of subsidization in the rented sector comes from this supply subsidy. The size of both types of subsidies is presented per income decile in Table 5.2:

Table 5.2: Subsidization of rents per income decile, 2008

	Market rent	Supply subsidy		Demand subsidy		Net rent	
Income decile	Absolute (€ / yr)	Absolute (€ / yr)	Relative (% market rent)	Absolute (€ / yr)	Relative (% market rent)	Absolute (€ / yr)	Relative (% market rent)
1	6685	2663	40	1316	20	2706	40
2	7047	2657	38	1451	21	2939	42
3	6953	2355	34	1063	15	3535	51
4	7155	2396	33	779	11	3980	56
5	7317	2428	33	758	10	4131	56
6	7475	2438	33	614	8	4423	59
7	8005	2653	33	391	5	4961	62
8	8195	2570	31	132	2	5492	67
9	8584	2695	31	39	0	5849	68
10	9638	3144	33	29	0	6465	67

Source: WoON 2009

It is clear that the supply subsidy is indiscriminate and distributed roughly equally over all renters. Moreover, due to renter protection, this subsidy can by no means be decreased within current legislation. The fact that the supply subsidy is indiscriminate inevitably results in inefficiencies. The demand subsidy, on the other hand, is income tested and therefore less inefficient. The extent to which the combination of these subsidies causes inefficiencies is estimated in the remainder of the paper.

5. Data and methodology

In this section we describe the data and methodology of the paper. The main strategy for this paper is to compare the welfare loss of two programs of housing subsidies in the rented sector. In the standard approach used in studies on welfare losses the current situation is compared to a non-subsidized alternative. Conijn and Schilder (2011b), however, show that abolishing all subsidies in the rented sector leads to unaffordable high rents. Estimating the welfare loss of distorted consumption given the existing supply and demand subsidies is therefore little insightful: abolishing all subsidization is simply not a feasible alternative. Subsidization of housing, however, can be organized in many ways as has been reviewed earlier and some subsidies appear to be more efficient than others. The objective of this paper is therefore to compare the welfare loss that results from different forms of subsidization. The welfare losses reported in this paper are still the standard welfare loss of distorted consumption compared to the non-subsidized alternative; they are, however, estimated for two different subsidization programs. The difference between the different subsidization schemes lies within the distribution of subsidies over households: reported welfare gains are therefore the result of increased distributional efficiency.

The baseline to which the alternative scenario is compared is the current situation in the rented sector: this situation thus includes both the supply and the demand subsidy. We estimate on a household level the total amount of subsidization and then follow e.g. Rosen (1985) and Poterba (1992) in estimating the welfare loss. We will compare the welfare loss in this baseline situation to the alternative situation that consists of market rents in combination with an extrapolated version of the current housing allowance system. The extrapolated housing allowance system is set-up in such a way that it prevents the dramatic changes in housing affordability at the lower end of the market from introducing market rents presented in Conijn and Schilder (2011b). The alternative thus includes only a demand subsidy and may therefore be expected to result in some welfare gain.

The current housing allowance program is based on a set of affordability criterions which are translated into norm levels for e.g. rent levels and income that have been discussed before. We use the norm levels in the current housing allowance program and increase these norm levels by the increase in rent levels that follows from introducing market rents: households are thus eligible for housing allowances up to higher rents and higher income levels than is currently the case. The increased norm levels in the program lead to overall slightly higher housing quotes (i.e. net rents as a fraction of disposable income), but does keep affordability for lower income groups at a comparable level to the current situation (see Table 5.5).

5.1 Data

We use the dataset from the 2009 wave of the housing needs survey: WoON2009. This is a dataset generated from a large survey held under a representative sample of the Netherlands. The total sample size of the survey is 78,071 households. The households in the sample all received a questionnaire containing a large number of questions relating to their current, previous and desired housing situation (e.g. tenure, house value, rent paid, housing characteristics *et cetera*), characteristics of the surrounding (e.g. urbanity, satisfaction with the surrounding *et cetera*), and all kinds of households characteristics (e.g. household composition, age, education, income *et cetera*). The dataset also includes sampling probabilities that can be used to weigh cases for descriptive purposes. We can interpret the dataset as a random and representative sample for the Dutch population.

In our analyses we use a selection to filter out unlikely observations in our data. Our selection criterion excludes dependent dwellings (e.g. in nursing homes, dorms), dependent households (e.g. children living with their parents), households with reported income below welfare, and housing that has a value of less than €25.000 or more than € 1.000.000.

5.2. Methodology

As stated in the introduction of this paragraph, we will compare the current system of housing subsidies in the rented market with a proposed alternative. The current system includes regulation, housing allowances and the object-based implicit subsidy; the proposed system includes market rents and extrapolated housing allowances. For each system we will estimate the welfare loss following the methodology presented in e.g. Rosen (1985) and Poterba (1992). This implies that we estimate the demand curve for housing. Using the income and price elasticity of demand and the budget share of housing we can estimate the compensated demand elasticity. Given the subsidization of housing services in either program we can estimate the welfare loss from distorted consumption.

In the estimation of the welfare loss we have to deal with two important issues that confound the analysis. First we correct for the non-random distribution of owners and renters over the housing sectors using Heckman's two-stage approach. Second, in the rented sector the demand curve cannot be estimated due to the heavy regulation. We therefore follow Romijn and Besseling (2008) in estimating the demand curve of owner-occupiers and use that as the assumed demand curve of renters in a free market: we thus implicitly assume that in equilibrium owner-occupiers and renters would make *ceteris paribus* identical choices.

We first apply Heckman's two-step procedure to estimate demand for housing services. Then, given the found elasticities, we estimate the welfare costs of subsidization on a household level. The first step of the model is a probit model for tenure choice and is defined as follows:

(1) $T^*_i = \gamma' z_i + u_i$

$$T_i = \begin{cases} 1 \; if \; T_i^* > 0 \\ 0 \; if \; T_i^* \leq 0 \end{cases}$$

The variable T^*_i is the revealed preference (i.e. the actual tenure choice), z_i is a vector of variables affecting tenure choice, and u_i is an error term. The explanatory variables in vector z_i are a number of household characteristics (dummy variable indicating marginal tax rate, dummy variable indicating age of the head of household, dummy variable for household composition, occupation duration, dummy variable for level of education in the household) a regional dummy variable for the housing market where the household lives, and the urbanization degree of the area where the household lives. Finally, relative price might play a role. Estimating relative price in the Dutch market requires regional aggregation, since the shadow price of the consumption bundle in the alternative tenure is not reasonably estimable due to heavy regulation (see Chapter 4). The relative cost ratio then captures the same variance as the regional fixed effects captured by the regional dummies.

Given the first step of the model the inverse Mills' ratio can be estimated. The inverse Mills' ratio can be obtained as follows (Sigelman & Zeng, 1999):

(2) $M_i = \lambda_i(\alpha_u) = \varphi(\gamma' z_i / \sigma_u)/\Phi(\gamma' z_i / \sigma_u)$

The inverse Mills' ratio is then used in the second stage of the Heckman two-step procedure to correct for the non-random allocation of households over both sectors. The second stage demand models are then given by:

(3) $Q_i = \beta_1 X_i - \beta_2 M_i + \varepsilon_i \quad if \; T_i^* = 1$
(4) $Q_i = \beta_3 X_i + \beta_4 M_i + \varepsilon_i \quad if \; T_i^* = 0$

Q_i is a measure for the number of housing services demanded and X_i is a vector of variables influencing demand for housing services. Q_i is specified as the value of the property in which household *i* lives. Vector X_i contains the price per housing service paid by household *i*, the disposable income of household *i*, a dummy variable indicating the level of education, a dummy variable for the household composition, a dummy for the marginal tax rate, and the age of the head of the household. All variables used in the selection equation and in the outcome equation are given in Table 5.3.

Table 5.3: Variables used

Selection equation: current tenure	
Previous tenure	1/0, 1 if previous owner
Capital gains	Selling price - buying price previous property, 0 if previous renter
Income	Disposable household income
Home equity	1/0, 1 if no or negative home equity
Marginal tax rate on income	
Low tax	1/0, 1 if low tax rate applies (reference)
Middle tax	1/0, 1 if middle tax rate applies
High tax	1/0, 1 if high tax rate applies
Age of the head of household	
18 - 24	1/0 (reference)
25 - 34	1/0
35 - 44	1/0
45 - 59	1/0
>=60	1/0
Regional dummy	
46 regional dummies	1/0 (region 1 reference)
Outcome equation: value	
User cost	User cost per unit of housing (%)
Capital gains	Selling price - buying price previous property, 0 if previous renter
Income	Disposable household income
Education	
Low education	1/0, if highest level of education in household is low (reference)
Middle education	1/0, if highest level of education in household is intermediate
High education	1/0, if highest level of education in household is high
Household composition	
Single	1/0, if household is single-person (with or without child)
Couple	1/0, if household exists of two adults
Couple with child	1/0, if household exists of two adults with child(ren)
Other	1/0, if other household composition

The coefficients based on the OLS in (3) and (4) give the conditional effects only if the variables do not also enter the selection model (1) (Sigelman & Zeng, 1999). In order to obtain the marginal effects a correction needs to be made on the coefficients of the variables that appear in both the first and second stage model. This is done according to Sigelman & Zeng (1999):

$$(5) \qquad \frac{\partial E(y \mid L > 0)}{\partial x_i} = \beta_i - \gamma_i \rho \sigma_\varepsilon \delta(-\gamma' z)$$

The welfare loss can now be estimated using the elasticities from (3) and (5). We estimate the welfare costs on an individual household level:

$$(6) \qquad DWL_i = 0.5*(p_m - p_c)^2 * M_i * \eta_i$$

DWL_i is the deadweight loss of household resulting from the distorted consumption of household i, p_m is the price per housing service paid under equilibrium market conditions by household i, p_c is the price per housing service paid subsidized market conditions by household i, M_i is the market price of the bundle of housing services consumed by household i, and η_i is the compensated price elasticity of demand for household i. The term in brackets is the subsidy to household i; this subsidy is expressed as a percentage of the market equilibrium price of housing services (M_i). The price of housing services is determined on an individual household basis as follows:

(7) $p_{c,R} = R_i - HA_i$

(8) $p_{c,O} = I_i + i_i*(V_i-M_i) + r_i*V_i + o_i*V_i + PT_i + PI_i + Tc + (d-a)*V_i + F_i$

where R_i is the actual rent, HA_i is the housing allowance, I_i is mortgage interest paid, i_i is the required rate of return on home equity, V_i is the value of the dwelling, M_i is the mortgage amount outstanding, r_i is a risk premium, o_i is maintenance, PT_i is property taxes, PI_i is property insurance, Tc are the transaction costs, d is the property depreciation, a is the long-term average price increase, and F_i is the fiscal benefit from interest deductions. The formulas in (7) and (8) give the after-tax user cost of housing in the rented and owner-occupied sector respectively. The pre-tax user costs for owner-occupiers are relatively straightforward. The term i_i is currently subsidized following the tax exemption of home equity; removing the tax exemption simply results in a higher value for i_i. Moreover, F_i needs to be removed from (8). In the rented sector, however, the gross user costs are in principle equal to the market rent. The market rent, however, can be estimated from two viewpoints: i) the required return of the landlord, or ii) from the viewpoint of the household and a no-arbitrage equilibrium price. In case of i) the market rent would equal the gross user cost in the owner-occupied sector, in case of ii) the market rent equals the net user cost in the owner-occupied sector. Since in this paper we do not model the effect of abolishing subsidization in the owner-occupied sector, gross user costs in the rented sector equal the net user costs of owner-occupied housing. This approach is followed in Conijn & Schilder (2011a); their results have been used in this paper as proxy for market rents. This lower gross user cost is sustainable since housing associations, the largest category of landlords, can have lower cost of capital.

In order to calculate (6) we need an estimate for η_i. We can obtain η_i from substituting the estimated uncompensated price elasticity and income elasticity of demand from (3) into the Slutsky equation:

(9) $\eta = \partial Q^c/\partial p = \partial Q/\partial p + (\partial Q/\partial HHI)*(UC/HHI)$

6. Results

In this section we will present our estimation results. We will furthermore present the budgetary consequences of a shift in subsidization policy for both the households and the government. We will first present some key summary statistics of our sample.

6.1 Summary statistics and fit of subsidization programs

In this section we present some key statistics of our sample and some benchmark details from the owner-occupied sector to put the figures into perspective. We furthermore present some initial evidence for the fit of our approximation of the current housing allowance program.

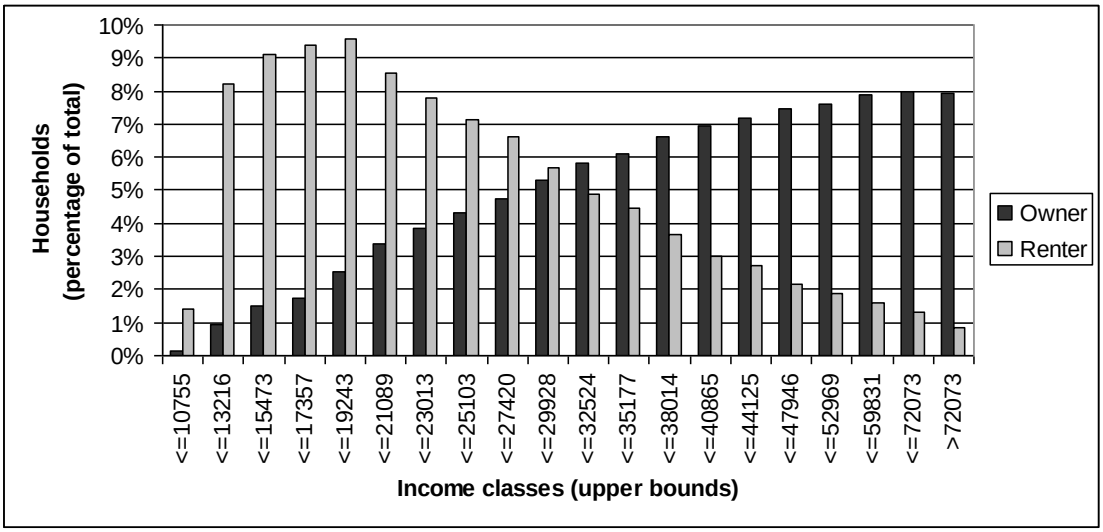
Table 5.4: Summary statistics, 2008

	Owner	Renter
House value (€)	283.469	174.653
Disposable income (€)	43.728	25.516
Gross user cost (% of value)	6,0%	4,5%
Net user cost (% of value)	4,6%	2,9%
Subsidy (% of market price)	26%	42%

Source: WoON 2009

Table 5.4 shows that the average property value in the owner-occupied sector is much higher than in the rented sector; the user cost are also far higher in the owner-occupied sector. The presented user cost is the current net user cost, thus including the subsidization of housing. It becomes clear that owner-occupiers are paying more for their housing services than renters. The subsidy to owners is thus also importantly lower than the subsidy renters obtain. The subsidy of renters includes both the housing allowance as the implicit subsidy from low rents. Finally, we observe that owners have, on average, much higher income than renters. The distribution of households across income is presented in Figure 5.5:

Figure 5.5: Distribution of households over income, 2008



Source: WoON 2009

Figure 5.5 shows two important characteristics of the Dutch housing market. First it clearly shows that households with higher income have a strongly increasing probability of becoming home-owner. Second, it shows that despite the concentration of lower income households in the rented sector and despite the restricted access to the majority of the rented sector there are still significant numbers of households with fairly high incomes in the rented sector. This is at least partly the result of eligibility for social housing, which is not annually tested.

We have an alternative program that we compare to the current system of hybrid subsidies. This program contains an extrapolation of the current housing allowance system. The extrapolation entails two main changes to the current system: an increase of all existing rent level boundaries and the maximum income level is removed. Since the introduction of market rents results in higher rent levels, the subsidization boundaries, such as the cut-off points for the 75% and 50% subsidization, are

increased by that same percentage. This is done locally in order to capture locally different price effects of market rents. We furthermore remove the maximum income requirement which currently leads the norm rents to stop at given income levels (see Figure 5.3). Instead, we make all households eligible for housing allowances and estimate a norm rent level for all households. Given the difference between the market rent and the estimated norm rent a certain amount of rent remains available for subsidization. The extrapolated rent level boundaries mentioned earlier determine, along with household composition and age, how much of the remaining rent is subsidized. The results of our alternative subsidization programs are summarized and benchmarked against the unsubsidized gross market rent in Table 5.5:

Table 5.5: Distribution of households over housing quote groups, 2008
Note: housing quote is ratio of user costs over disposable income

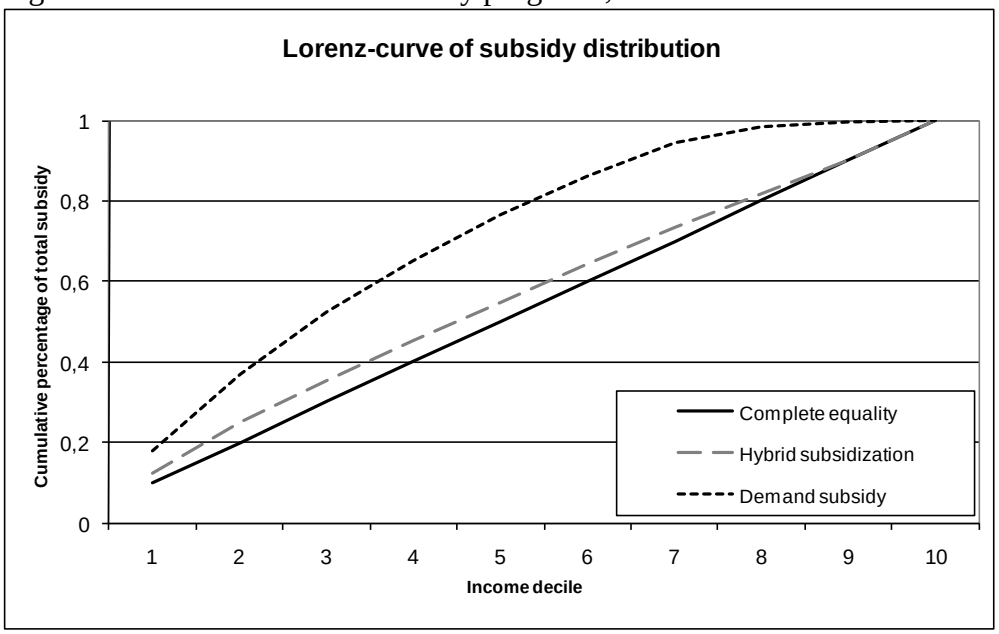
Housing quote	Hybrid subsidization	Gross market rent	Demand subsidization
<15	24	5	12
>=15 ; <20	28	9	21
>=20 ; <25	24	13	23
>=25 ; <30	13	15	18
>=30 ; <35	6	14	11
>=35 ; <40	2	11	6
>=40	3	33	9

Source: WoON 2009, own calculations

Table 5.5 shows that indeed subsidization is required after introducing market rents: almost 60% of all households would end up with a rental quote of over 30% when not compensated for the price increase. Based on the distribution of households over the different rental quote groups it can also be seen that the alternative subsidization program is subsidizing less then households are currently subsidized. In the situation of the extended housing allowance still a fair group of households ends up with a large rental quote. There are several reasons why we still find households with such high housing quotes, such as a number of households that is not eligible for housing allowances because of their wealth. Other groups of households that are confronted with very high housing quotes are households in the most expensive rented dwellings and households in the lowest income decile. It is beyond the scope of this paper to discuss or model solutions for these individual households.

Renters are subsidized significantly. Table 5.4 shows that on average almost 40% of the market value of the rented dwelling is subsidized. This subsidy contains both housing allowances and the supply subsidy. We argued earlier that the supply subsidy is distributed evenly over all households, and that this may cause allocative inefficiency compared to a program that would distribute subsidies over households based on their characteristics. We show this effect in a Lorenz-curve in Figure 5.6:

Figure 5.6: Lorenz-curves of subsidy programs, 2008



Source: WoON 2009, own calculations

Figure 5.6 displays the distributional characteristics of both the current and the alternative subsidy program. The current situation is referred to as the hybrid situation. It can be seen in Figure 5.6 that the hybrid situation barely deviates from complete equality. This implies that the subsidies in the rented sector are almost perfectly equally distributed over all households: this is caused by the fact that the majority of the current subsidization is given in supply subsidies rather than demand subsidies. When shifting to the demand-only subsidization program the curve clearly turns in favor of the lower income households. This must be interpreted as the lower income households benefiting relatively more from the subsidy than the higher income households: as a redistribution tool demand subsidization seems more adequate than the current hybrid subsidization program.

The subsidization in both situations differs: in the current situation renters get a demand and a supply subsidy, in the alternative situation renters get all of their subsidization based on their characteristics. This results in different amounts of subsidy for renters in both situations. The shift in subsidization is summarized per income decile in Table 5.6.

Table 5.6: Average subsidization per household, 2008

	Hybrid subsidization				Extended housing allowance	
Income decile	Demand subsidy	Supply subsidy	Total	Total (overall; bln €)	Demand subsidy	Total (overall; bln €)
1	1316	2663	3979	1.16	3446	1.01
2	1451	2657	4108	1.17	3597	1.03
3	1063	2355	3418	0.97	2961	0.84
4	779	2396	3174	0.90	2470	0.70
5	758	2428	3187	0.91	2162	0.62
6	614	2438	3052	0.87	1862	0.53
7	391	2653	3044	0.87	1581	0.45
8	132	2570	2702	0.77	732	0.21
9	39	2695	2735	0.78	222	0.06
10	29	3144	3173	0.90	102	0.03
Total	549	2601	3150	9.31	1662	5.48

Source: WoON 2009, own calculations

The distribution of housing subsidies is relatively equal in the current hybrid subsidization situation. When subsidizing on demand only one can observe a strong decrease of subsidization over income. This is in line with the rapidly decreasing gap between both lines in the Lorenz-curve from Figure 5.4. Nonetheless, even households in the lower income deciles will be subsidized less than in the current hybrid situation: all households shall be spending a larger share of their disposable income on rents.

6.2 Welfare losses

Figure 5.4 made clear that there is a significant difference between owners and renters. We described earlier the Heckman-correction method to correct for sample selection bias. The necessity for correcting for sample selectivity becomes clear in Table 5.7: the inverse Mills' ratio is statistically significant. Table 5.7 gives the estimates of the Heckman-corrected demand for housing services. The demand curve is estimated for recently moved owner-occupiers. This is done because we can only assume for recently moved households that their housing consumption is a reflection of their housing demand; it is only estimated for current owners because the rented sector is so strongly regulated that households cannot freely optimize their consumption with respect to their housing demand.

Table 5.7: Regression results, 2008

		Coefficient	Std. Error	Sig.	Mfx.
Outcome equation: Value					
	User cost	-0.336	0.040	0.000	-0.336
	Total wealth	0.013	0.001	0.000	0.013
	Income	0.493	0.024	0.000	0.250
	Education (ref. low)				
	Middle	0.071	0.039	0.068	0.071
	High	0.173	0.039	0.000	0.173
	Household composition (ref: single & single/child)				
	Couple	0.032	0.019	0.095	0.032
	Couple / child	0.152	0.020	0.000	0.152
	Other	-0.031	0.055	0.577	-0.031
	Starter	-0.110	0.017	0.000	-0.110
	Inverse Mills' ratio	0.157	0.022	0.000	
	Constant	5.614			
Selection equation: Tenure					
	Previous owner	0.655	0.161	0.000	
	Capital gains	0.000	0.015	0.984	
	Income	1.939	0.076	0.000	
	Marginal tax rate (ref. = low)				
	Middle	-0.526	0.105	0.000	
	High	-1.032	0.141	0.000	
	Age (ref. <25)				
	>=25, <35	0.426	0.077	0.000	
	>=35, <45	0.220	0.082	0.007	
	>=45, <60	-0.339	0.090	0.000	
	>=60	-1.252	0.115	0.000	
	Region	*			
	Constant	-19.585			

Source: WoON 2009, own calculations

The results we find are, at least in terms of direction, generally in line with what may be expected given the vast body of literature on housing tenure choice and housing demand. We find, for instance, that income increases the probability of moving into home ownership. In line with our results in Chapter 4 we find a strong state dependence in tenure choice: previous tenure is a good predictor for current tenure. Total wealth, consisting of capital gains on the previous dwelling and current non-housing wealth, increases housing demand. The results we find on age are in line with the life cycle theory: households move into owner-occupancy early in life and exit later on. The coefficients on the marginal tax rate, however, have odd signs, implying that when the fiscal bonus of owner-occupancy increases, the probability of home owning decreases. Mind, however, that this is also captured by the income variable, and our findings are (therefore) *ceteris paribus* results. Furthermore, despite the fiscal benefit of rolling over capital gains into a new owner-occupied dwelling, the impact of capital gains on the probability of home ownership are close to none.

Since the selection and outcome equation are estimated simultaneously, we cannot report the standard R-squared. Alternatively we run the outcome equation, including the Mills' ratio, as an OLS. We find the same coefficients and slightly different

standard errors as a result of not estimating the selection equation simultaneously. As an indication for our Heckman corrected model's fit we report the R-squared from this "sequential" or "conditional" model: 47,7%.

Given the inverse Mills' ratio we must conclude that indeed owners and renters are not randomly distributed over both sectors and, therefore, our Heckman correction is required. We find an uncompensated price elasticity of demand of -0.34 and an income elasticity of demand of 0.25. Comparable elasticities have also been reported in e.g. Zabel (2004). Our results are furthermore very much in line with previous findings on the Dutch housing market by Ras *et al.* (2006). Other findings are also in line with standard economic theory: higher human capital (i.e. education) results in higher demand for housing and larger households, especially with children, have a higher demand for housing services than other households.

In order to estimate the welfare loss from (6) we need the household's budget share. However, given the regulation in the rented sector we cannot assume that the current budget share reflects the budget share of households in an unregulated market. We estimate the household equilibrium budget share in two steps: first we use equations (1-3) to predict housing demand. Then, by assuming a market rent of 4,5% we estimate the price of the consumption bundle in equilibrium. By dividing the calculated price of the predicted consumption bundle we obtain the equilibrium budget share. We have done this procedure for both the owner-occupied and the rented sector; the procedure for the owner-occupied sector has been performed as a check for the quality of our prediction of the consumption bundle. The results of this estimation are presented in Table 5.8:

Table 5.8: Budget share of housing, 2008
Income decile estimated per tenure group: bounds differ for owners and renters

	Owner		Renter
Income decile	Observed budget share	Predicted budget share	Predicted budget share
1	50%	34%	45%
2	33%	30%	45%
3	30%	27%	43%
4	28%	25%	42%
5	25%	23%	40%
6	24%	23%	37%
7	23%	22%	34%
8	22%	21%	31%
9	22%	20%	27%
10	19%	16%	23%

Source: WoON 2009, own calculations

We present the average budget share per income decile by tenure group: we discard all predictions that exceed 50% of disposable income as outliers. Our linear prediction of housing consumption and consequential budget share results in a fairly accurate prediction of the observed budget share for owner-occupiers. Our predicted housing consumption thus, on aggregate, approximates actual consumption well. The results from the linear prediction on the renters display a similar pattern: lower income households spend a larger share of their disposable income on housing. Generally, though, renters shall spend a larger share of their income on housing services than owners. This, however, is due to their on average lower income.

Using the results from tables 7 and 8 we can estimate the compensated demand elasticity from (7). The compensated demand elasticity is on average -0.25; this Figure 5.is importantly lower than previous figures used for estimating the welfare loss of subsidization of housing services in the Netherlands in e.g. Van Ewijk *et al.* (2007; -0.75). When we use the compensated demand elasticity used in Van Ewijk *et al.* (2007) we estimate the same welfare losses: 1 billion in the owner-occupied sector and 2.7 billion in the rented sector. However, we are using our, importantly lower, estimated compensated demand elasticity to now calculate the welfare loss as in (6). The results are given summarized per income decile in Table 5.9:

Table 5.9: Welfare loss, 2008

	Hybrid subsidizations		Extended housing allowance	
Income decile	Average (€ / yr)	Total (bln € / yr)	Average (€ / yr)	Total (bln € / yr)
1	-310	-0.09	-244	-0.07
2	-314	-0.09	-249	-0.07
3	-245	-0.07	-191	-0.05
4	-236	-0.07	-158	-0.05
5	-234	-0.07	-145	-0.04
6	-224	-0.06	-122	-0.03
7	-227	-0.06	-96	-0.03
8	-199	-0.06	-39	-0.01
9	-195	-0.06	-14	0.00
10	-256	-0.07	-7	0.00
Total	-236	-0.70	-108	-0.36

Source: WoON 2009, own calculations

The welfare losses that are reported in Table 5.9 result from subsidy induced inefficient consumption of housing services. Since the subsidization is larger in the current hybrid system we may expect the largest welfare loss there as well. Indeed, if we look at the alternative program that results in fewer total subsidies we, by definition, observe less welfare loss. Moreover, looking at Table 5.9 we see that a shift from the current hybrid system to the demand-only system with the extrapolated housing allowance system leads to a welfare gain of 340 million euro annually. Table 5.9 furthermore shows that indeed subsidies would be more efficiently distributed under a demand subsidization program: the remaining welfare losses are all incurred within the lower income groups.

Our estimates deviate strongly from those presented by others (e.g. Van Ewijk, 2007; Romijn & Besseling, 2008). However, as stated before, if we estimate the welfare loss using the compensated demand elasticity used in those papers, we find similar results. Our paper therefore shows that the welfare estimates are enormously sensitive to the estimation of the housing demand function.

7. Consequences of realizing welfare gains

The welfare gains that can be achieved by switching from the current inefficient hybrid subsidization of rented housing services are hardly significant. There are, however, significant consequences: since there is less subsidization in total, households are less subsidized and therefore will need to pay more for their housing.

In addition to increased pressure on housing affordability, there is an important budgetary shift as well: in the current hybrid system the larger share of total subsidization comes from foregone rents of social landlords. In both presented shifts the total subsidy becomes part of the national budget. In this paragraph we will shortly shed some light on the major changes that follow from shifting towards a more efficient subsidization system.

One of the major consequences of subsidizing differently is that the subsidies are more efficiently distributed: i.e. only those households that need support in paying for housing services will receive subsidies. Still, given the change in total subsidization households might be confronted with higher net rental payments after subsidization. The distribution of households according to rental quote is given earlier in Table 5.5. In the current situation most households have rental quotes of less than 30%. After introducing market rents most households end up with a rental quote higher than 30%. This implies a strong decrease in affordability of housing in the rented sector. Some form of subsidization seems therefore required to keep housing affordable. The introduction of an extended version of the current housing allowance program results in an important decrease of the number of households with very high rental quotes. The number of households with housing quotes in excess of 40% reduces to 5.6% when excluding households that do not qualify for housing allowances based on high levels of equity. The distribution of households over different housing quote groups roughly mimics the current situation, albeit at a higher level, which indicates that current (implicit) affordability criterions are reasonably met.

The increasing amount of subsidization will put pressure on the national budget. Under the extended housing allowance scheme the government will have to spend almost € 3.6 billion extra annually on housing allowances. Without a tax on additional rents the landlords are the main beneficiaries of a shift towards more efficient subsidization. In order to make the transition budget neutral to the government compared to the current situation the tax on additional rents should be about 48%; the tax rate over all rents should be roughly 16%.

Table 5.10: Subsidies and rental revenues, 2008
All numbers in billions € / year

Income decile	Current housing allowance	Extrapolated housing allowance	Current rental revenue	Market rental revenue
1	0.38	1.01	1.18	1.95
2	0.41	1.03	1.25	2.01
3	0.30	0.84	1.31	1.98
4	0.22	0.70	1.36	2.04
5	0.22	0.62	1.40	2.09
6	0.17	0.53	1.43	2.13
7	0.11	0.45	1.52	2.28
8	0.04	0.21	1.60	2.34
9	0.01	0.06	1.68	2.45
10	0.01	0.03	1.85	2.74
Total	1.88	5.48	14.58	22.01

Source: WoON 2009, own calculations

8. Conclusion

Housing subsidies are economically often not efficient; subsidies drive households away from their market equilibrium. However, in case of market failures or for reasons of equity there may be good reasons for subsidizing housing. The general result in literature regarding subsidizing housing is that one better subsidizes its consumption than its production. The Dutch housing market, however, is characterized by a hybrid system containing both; the supply subsidy being by far the largest. Since the supply subsidy is granted to all renters in the same way and in virtually the same amounts there should be room for improvement in terms of welfare gains. Especially the distributional efficiency of the current housing subsidization in the rented sector is prone to deadweightlosses.

In order to test whether there are potentially significant improvements from shifting to just the subsidization of housing consumption we compare the current subsidization system to an alternative system. We therefore model a free market alternative rent for the current regulated market. As Conijn and Schilder (2011b) show, an introduction of market rents requires housing subsidies of some kind to keep housing affordable; we present similar evidence in this paper. After calculating market rents the alternative subsidy program can be estimated. Our alternative is the extrapolation of the current housing allowance system; in this situation we try and keep housing equally affordable by extrapolating current policy guidelines to match the predicted market rent levels. The alternative program is compared to the current hybrid subsidization situation.

We find that keeping the current housing allowance system in place with some extrapolation for the increase in rents leads to a very small welfare increase. In fact, we find a very small welfare loss to begin with, even for the current hybrid subsidization scheme. This is due to the much lower compensated demand elasticity we apply compared to other authors. The deadweightloss from overconsumption of rented housing services decreases with € 320 million euro annually. The total improvement must be attributed to more efficient allocation of subsidies. Welfare gains from e.g. increased labor market mobility are not taken into account in our study. Realizing the welfare gains does come at a cost: housing allowances are increased by € 3.6 billion in order to maintain affordability for lower income households. Still, households will spend more on rents as can be seen in the slightly higher housing quotes we estimate. The entire supply subsidy disappears and is realized by landlords: this implies additional rental revenue of almost € 7.5 billion. A tax rate of 48% on *increased* rents, or 16% on *all* rents, would make the operation budget neutral for the government. Our paper leaves for future research the costs and problems involved with the current tenant protection.

Samenvatting - Summary in Dutch

Recente geluiden over de woningmarkt zijn vrijwel zonder uitzondering negatief: woningprijzen dalen, starters hebben minder toegang tot de woningmarkt, de huursector zit op slot. Rond dit soort geluiden worden vaak ballonnetjes opgelaten met voorgestelde oplossingen. Vrijwel zonder uitzondering zijn dit lapmiddelen die aan de oorzaak van de problematiek voorbij gaan. Het probleem dat de woningmarkt steeds verder in de knel brengt is de bijna fundamentele scheiding tussen de koop- en de huursector. Door de verstorende uitwerking van overheidsingrijpen is de woningmarkt meer en meer verworden tot twee gescheiden deelmarkten met ieder hun eigen dynamiek. In dit proefschrift worden diverse problemen die samenhangen het verregaande overheidsingrijpen onderzocht.

De kloof tussen de koop- en huursector komt nergens zo sterk tot in uitdrukking als in het waardeverlies dat woningcorporaties leiden op de exploitatie van hun woningen. Gemiddeld is ieder corporatiewoning ruim vier keer zoveel waard als koopwoning dan als huurwoning. Het rendement dat corporaties realiseren is dan ook betreurend laag in vergelijk met de verdiencapaciteit die de woning feitelijk vertegenwoordigt. Deels komt dit door keuzes die corporaties zelf maken, deels echter wordt dit ook veroorzaakt door de van overheidswege geldende regulering van de huurmarkt. In hoofdstuk 2 van deze thesis worden de oorzaken van deze grote waardekloof gekwantificeerd aan de hand van de in de literatuur welbekende gebruikskosten. Uit het onderzoek komt naar voren dat met name het feit dat de huren zo laag zijn leidt tot een groot waardeverlies in de huursector.

Aan de andere kant van de kloof staan de eigenaren-bewoners. Deze groep huishoudens heeft gedurende een forse tijd zeer redelijke tot buitengewoon hoge rendementen behaald op de investering in de woning. Ondanks dat de woningmarkt al enige jaren afgekoeld is en er zelfs sprake is van prijsdalingen, bezitten veel huishoudens in de koopsector nog grote bedragen eigen vermogen: de zogenaamde “overwaarde” van de woning. Het onttrekken van deze woningwaarde is al enige jaren geleden fiscaal ontmoedigd via de bijleenregeling; tel daarbij op dat het eigen vermogen in de woning vrijgesteld is van vermogensbelasting en huishoudens hebben een aardig spaarpotje om zich mee over de woningmarkt te bewegen. Potentieel zijn de mogelijkheden veel groter: diversificatie van de totale beleggingsportefeuille, of simpelweg consumptie. De vraag is in welke mate het fiscale beleid ten aanzien van het eigen vermogen het gedrag van huishoudens in de koopsector beïnvloed: gaan huishoudens bijvoorbeeld in grotere woningen wonen omwille van het fiscale voordeel? Ons onderzoek in hoofdstuk 3 toont aan dat huishoudens inderdaad rigide vast houden aan het eigen vermogen: de overwaarde wordt niet verzilverd voor diversificatie van investeringen of consumptie. De gemiddelde Nederlandse koper laat zich echter ook niet verleiden het fiscale voordeel zo ver mogelijk te benutten: genoeg lijkt genoeg.

De tweedeling in de Nederlandse woningmarkt is ontstaan door de uitwerking van het overheidsbeleid: prijsstijgingen in de koopsector ten gevolge van restrictief grondbeleid en vraagstimulering en verschraling van de huursector ten gevolge van de dominante positie van woningcorporaties als gevolg van overdadige subsidiëring van sociale verhuurders. Er wordt vaak gesproken van twee gescheiden deelmarkten

wanneer gekeken wordt naar de Nederlandse woningmarkt. In hoofdstuk 4 van deze thesis wordt onderzocht hoe huishoudens hun afweging om te kopen of te huren maken. In tegenstelling tot veel onderzoek op dit gebied beschrijft onze studie een langere periode. Uit ons onderzoek blijkt dat huishoudens meer en meer in dezelfde sector terecht komen: kopers worden in de loop van de tijd steeds vaker opnieuw koper bij een verhuizing. Met name wanneer huishoudens wat ouder worden, en wat meer vermogen hebben opgebouwd in de eigen woning, wordt dit verschijnsel bijzonder sterk.

De beperkte doorstroming van huurders naar de koopsector en vice versa geeft een indicatie van de omvang van de kloof tussen beide woningmarktsectoren. Eén van de redenen waarom veel huurders niet doorstromen naar de koopsector, zelfs indien zij een eventuele koopwoning zouden kunnen financieren, wordt vaak gezocht in de riante subsidiëring van de huurwoning. Recent is geëxperimenteerd met een inkomensafhankelijke huurbepaling; huishoudens met hogere inkomens betaalden in dat experiment meer huur voor dezelfde woning dan huishoudens met lagere inkomens. Eén van de veronderstellingen van het experiment, een aanname die door de beperkte looptijd van het experiment helaas niet is getoetst, is dat huurders sneller en makkelijker verhuizen naar een woning die bij hen past. Nu nog zouden huurders te lang blijven wonen in een woning die eigenlijk ongeschikt is, puur omdat deze woning door de impliciete subsidiëring erg goedkoop is. In het vijfde hoofdstuk van deze thesis onderzoeken wij de potentiële welvaartswinst van een volledig inkomensafhankelijke ondersteuning van de huurder. Uit ons onderzoek blijkt dat veel huishoudens hoe dan ook ondersteund moeten worden in hun woonconsumptie: zonder subsidies zouden veel huishoudens hun woning niet kunnen betalen. Door het vervangen van de impliciete subsidie door lage huren met een inkomensafhankelijke huurtoeslag wordt inderdaad enig welvaartseffect behaald. De winst is echter “verrassend” klein, vooral omdat eerdere publicaties van het CPB impliceren dat het welvaartsverlies door verstoord consumptiegedrag juist buitengewoon groot is. De beperkte welvaarstwinst die wij vinden is vooral het gevolg van de veel lagere gecompenseerde prijselasticiteit van de vraag naar woondiensten.

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