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Essays on the economics of housing subsidies

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Publication date
2012

[Link to publication](#)

Citation for published version (APA):

Schilder, F. P. W. (2012). *Essays on the economics of housing subsidies*. Thela Thesis.

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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 led 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 off 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 constrained. 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% ($0.04 \times 0.3 = 0.012$). 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 (Cattle *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).

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 value⁶ (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:

$$\text{Relative home equity} = (\text{tax assessed value} - \text{outstanding mortgage}) / \text{tax assessed value}$$

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:

$$\text{Debt capacity} = \text{multiple} * \text{gross annual household income}$$

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:

$$\text{Use of debt capacity} = \text{mortgage} / \text{debt capacity}$$

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

Age	2002					
	Overall		Not moved		Recently moved	
	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

Age	2006					
	Overall		Not moved		Recently moved	
	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

Age	2009					
	Overall		Not moved		Recently moved	
	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 income⁷. The regression is given below:

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

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 their 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. $\ln[-\text{capital gains}]$ 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):

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

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.