International Conference 25-28 June
Sustainable Urban Areas
Rotterdam 2007

W04 - Housing Economics

HOUSING DEMAND AND FINANCIAL REGULATIONS IN THE NETHERLANDS

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Paper for the ENHR 2007 International Conference 'Sustainable Urban Areas'

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Abstract

Changes in the system of financial regulations in the housing market are a recurring topic in discussions in the Netherlands. We investigate the expected effects of changes in the Dutch system of regulations. Therefore we construct a model that explains the behaviour of households, and in particular the effects of prices and income on the tenure choice and on the level of housing consumption. We analyse the effects that may be expected of (1) a conversion of (implicitly) subsidised rents to market rent levels, (2) restrictions on the mortgage interest relief for owner-occupiers, and (3) a switch from the currently existing fiscal system for owner-occupiers to a general tax reduction. Results indicate that the initial disadvantageous effects on the costs of housing services may be large. Taking into account the reaction of households to the changing regime and the expected changes of price levels, the long-run effects are generally much smaller, even though they may be substantial for individual households. These findings indicate that implementation of such policy changes may be possible without destructive effects for the economy in the Netherlands. Of course, successful implementation requires cautious operation and good transitional provisions.

Keywords: housing demand, user cost, financial reforms

1 Introduction

In this paper we study the potential effects of changes in financial regulations in the Dutch housing market.[1] Such possible reforms are a recurring topic since there are large money flows between government and households in connection to housing. In 2002 about 9 billion euros were transferred from the government to households mostly by mortgage interest tax relief for owner-occupiers, and a rent subsidy for low-income renters. On the other hand, households paid 6 billion euros to the government in the form of local property taxes and conveyance taxes and a tax on imputed income from home ownership. The balance, a flow of about 3 billion euros from the government to households, equals about 0.7% of gross national product.

For years, the discussion in Dutch politics has focused on the justification and sustainability of the mortgage interest tax relief system, which is said to be the cause of the high dwelling prices. The former government had plans to relax the price regulation on the rental market, in order to enhance competition. However until now substantial reforms have not been effectuated, only small adjustments to the prevailing arrangements have been made. The recent 2007 government abandons the rent reform plans and explicitly refuses to make preparations or to investigate any possible reform for the fiscal regime for owner-occupiers.

Many plans for reforming either the market for owned dwellings or the rental market have been suggested, but they usually lack a thorough empirical background. This paper attempts to fill a part of that lacuna using a model for the demand for housing to simulate the effects of policy reforms.

In Ras, Van Gameren & Eggink (2005) we have developed a model for the demand for housing services (size and quality of housing). This model describes the tenure choice, and the amount of housing services that renters and owner-occupiers choose. We relate these choices to the prices of housing the households are confronted with, their income and characteristics such as age and household composition. For the prices of housing we use the user cost concept. This yields consistent prices both for renting and owning a dwelling, including the effects of the financial regulations. By recalculating the user cost values for alternative policies, we can simulate the (long-term) effects of reforms.

In Section 2 we briefly describe the Dutch housing market. Based on the characteristics of the Dutch situation and the ongoing discussions we select some policy reform options. In particular we study the impact of: (1) a conversion of (implicitly) subsidised rents to market rent levels, (2) restrictions on the mortgage interest relief for owner-occupiers, and (3) a switch from the currently existing fiscal system for owner-occupiers to a general tax reduction. In Section 3 we give an overview of the relevant housing demand literature. Section 4 describes the set-up of the behavioural model, and gives the details of the simulation procedure, while section 5 gives the empirical results. Section 6 concludes.

2 The Dutch housing market and some possible reforms

2.1 Financial regulations and the housing market

[1] The results of this paper form part of the larger study Ras, Eggink, Van Gameren & Ooms (2006) (in Dutch).

In 2002, 54% of the Dutch housing stock consisted of owner-occupied dwellings. These owner-occupied dwellings are more likely to be occupied by multi-person households with higher incomes than rental dwellings, and in general they were also larger or of better quality.

The market for owned dwellings is not regulated in terms of entry conditions or price regulation. However, owner-occupiers benefit from the mortgage interest tax relief system, which in most situations allows them to deduct the paid mortgage interest from their taxable income. On the other hand, they have to add imputed income from their dwelling to their income. This imputed income (in Dutch: *eigenwoningforfait*) is set at a percentage of the value of the dwelling. About 87% of owner-occupiers had a mortgage in 2002, and this proportion is even higher among the highest income groups. On average owner-occupiers reclaim 28% of interest paid each year in the form of tax relief. Furthermore owners pay local property taxes (for owning and for using the dwelling[2]) and, when buying a dwelling they pay a conveyance tax.

In contrast to the market for owned dwellings, the larger part of the rental market is regulated. For the regulated dwellings, there is a system that assigns a maximum rent to each dwelling based on its quality and volume (*woningwaarderingsstelsel*). Also the government sets a maximum to the annual rent increase. Only the 5% most expensive rented dwellings are exempted from this rent regulation. Households with a low income receive a rent subsidy depending on the rent level, and the income and composition of the household. In 2002, about one third of the tenants received a rent subsidy. Their average rent subsidy amounted to approximately one third of the average rent. Besides this, tenants also paid the local property tax for using the dwelling.
In addition to the facts discussed in the text, table I gives an overview of the number of households and the amounts of money that are concerned with these financial regulations.

Table I: Households and money amounts of financial regulations, 2002

	number of households (x 1,000)	money amount (in mln. euro per year)	
rent subsidy	990	1,540	
mortgage interest tax relief	2,900	7,620	
subtotal subsidies			9,280
local property tax, occupiers	6,300	840	
local property tax, owners	3,400	1,040	
imputed income from home ownership	3,340	1,720	
conveyance tax	280	2,500	
subtotal taxes			6,100
total			3,060

2.2 Selection of possible reforms

We choose to study some reforms that have been discussed frequently in politics or in the media. It is unclear whether these or other reforms will be implemented. The present government refrains from interventions in the housing market. This provides some security that households will be able to afford to stay in their current dwelling in the near future, but it is unlikely that this policy will be sustainable in the longer run. The results from the

[2] The local property tax for using a dwelling was abolished in 2006.

simulations of the reforms we choose are informative about the possible outcomes of interventions, for the short and the long term.

1. Conversion of rents to market rent levels
The rental market is subsidised to a large extent, partly by price regulation. Because of this, most rent levels are (much) lower and more equally distributed than the corresponding (theoretical) market rent levels. As a result, the actual rent levels show little relationship to the market value of the property. This simulation assumes that all regulated rent levels are replaced by a rent conform the market price, to give insight into the impact of such an extreme reform. In practice much less drastic reforms have been discussed recently, such as a phased deregulating 25% of the rental market, in particular the more expensive rental dwellings.
We simulate the situation that all rent levels are linked to the property values which are set by the Valuation of Immovable Property Act (*Wet Waardering Onroerende Zaken*, hereafter referred to as *WOZ*-value). This value was determined in 1999 to be used in the 2001-2004 period as the base for the local property taxes. Based on estimates by Brouwer, Ferment, Willems & Poulus (2004) we assume that the market rent equals 5.4% of the *WOZ*-value. This means that the rent of dwellings with a relatively low *WOZ*-value may decrease, while other dwellings may increase in rent. In this simulation the system of rent subsidy is not changed. However, the amount of rent subsidy per household may be affected since the subsidy is (partly) based on the rent.

2. Restriction of the mortgage interest relief for owner-occupiers
The present income tax system is progressive: high income households are taxed at a higher marginal tax rate than low-income households. For most households (under 65 years) the marginal tax rate is 42%; for the highest income groups it equals 52%. This implies that high-income households may discount their deductibles such as the mortgage interest at a higher tax rate. The fairness of such a progressive system is often discussed in the Netherlands. Therefore, in this simulation we assume that the mortgage interest may be deducted for all income groups at the tax rate for the lowest income groups (14.5% for the elderly (65+) and 32.35% for other households). In the simulation, the imputed income from home ownership (added to the taxable income) is also discounted at this lower rate.

3. Conversion of the fiscal system for owner-occupiers to a general tax reduction
The system of mortgage interest tax relief is often disputed. The budget has grown substantially over the years, especially because of the increasing housing prices and the accompanying mortgages. In addition the budget is sensitive to economic trends, in particular the interest rate. Therefore we simulate a conversion of the current fiscal system (mortgage interest tax relief and imputed income from home ownership) to a general tax reduction, with a neutral effect on government spending. In this simulation each household (owner-occupiers and renters alike) receives a fixed tax reduction of 900 euros. Reforms of this kind have been suggested by OECD (2004), VROM-Raad (2004), and Boelhouwer & De Vries (2005).

3 Literature on housing demand

In the housing market, a number of standard assumptions of efficient markets are violated, see *e.g.* Smith, Rosen & Fallis (1988), Rouwendal (1988) and Whitehead (1999). At the demand side, households do not adjust their consumption quickly. It takes time and it is costly to move. Furthermore, in many countries subsidies and fiscal arrangements exist, each with another effect on behaviour and market conditions.

Despite the restrictions, we can still assume that a household maximises its utility level when choosing a dwelling. This enables us to set up a standard consumption model, in which the consumption of housing services is determined by the price per housing service, income and other household characteristics (Rosen, 1985). Consumption is measured by the classical concept of housing services. Whitehead (1999) and Rouwendal (1998) both refer to Muth (1960) for his description of a housing service as 'that quantity of service yielded by one unit of housing stock per unit of time'. The household takes the consumption of housing services and that of other goods into account and determines the desired dwelling. In general, the utility function, reflecting the preferences of the household, is optimised subject to budget and supply restrictions. In this paper, we keep housing supply constant and implicitly optimise given constraints on budget and supply. We do not aim to model the supply side. In the Netherlands, supply is rigid at the short and medium term, mostly independent of demand. Existing restrictions on the available locations, e.g. due to environmental regulations, and procedural requirements imply that it may take several years before a project can be started, all apart of the actual construction time. This means that reforms at the demand side that affect the affordability of owner-occupied dwellings will mostly be translated into lower 'market' prices. We use the model of Boelhouwer & De Vries (2005) to estimate market price changes for our reform simulations.

Within the housing market, there are clear differences between the owner-occupied sector and the rental sector. In the rental sector the dwelling is just a consumption good, but for households who own their dwelling it contains characteristics of both a consumption and an investment good. Moreover, many governments offer different financial arrangements for each sector. The differences between the sectors imply that the importance of considerations may vary when making decisions, and thus that the choice between owning and renting a dwelling (tenure choice) has to be modelled explicitly. We jointly model tenure choice and quantity, in the same way as *e.g.* Rapaport (1997), Ermisch, Findlay & Gibb (1996), Jaén & Molina (1994) and Goodman (2002). We include all households in the analysis, and do not restrict ourselves to recently moved households. We assume that the observed dwelling (apparently) sufficiently suits their preferences, given all the circumstances.

4 The behavioural model

4.1 Set-up

The model describes the relationship between the cost of housing and the choice of households for an owned or rental dwelling of a certain size and quality. We relate the actual housing situation of each household to the cost of the actual dwelling, and the potential cost of the alternative tenure situation. Thus for owner-occupiers we do not only take into account the cost of the current dwelling, but also their cost if they would be renting a dwelling.

The model consists of four steps. The first two steps are preliminary in order to construct the required variables. Given the results of these two preliminary steps, we construct the behavioural model in steps 3 and 4. The steps in the model are summarized here. For a detailed description we refer to Ras *et al*. (2005).

Step 1. Quantity of housing services
First we have to determine the size and quality of the consumption per dwelling. We will use the concept of housing services. The quantity of housing services per dwelling is based on the

WOZ-value. We decompose the *WOZ*-value of each dwelling into a quantity of housing services and a regional price component.[3] The quantity of housing services generated by a dwelling is then computed as its *WOZ*-value divided by the corresponding regional price.

Step 2. Price per housing service
In the second step we determine the price a household pays per housing service. This price differs from the regional price based on the *WOZ*-value for several reasons. As mentioned in Section 2.2, rents are not directly based on the *WOZ*-value of the dwelling, and the cost of owner-occupiers is related more to size of the mortgage and the interest rate paid by households than to the *WOZ*-value. We use the concept of user cost: the cost the households are assumed to pay, taking into account the financial regulations in the Dutch system (*e.g.* mortgage interest tax relief or rent subsidy). For each household we determine the price per housing service in the actual tenure situation but also in the alternative tenure situation. Thus, we determine the price to be paid by owner-occupiers as if they were renting a dwelling, and vice versa. Owner-occupiers usually live in a dwelling which is larger or of better quality (more housing services) than renters. This is taken into account when determining the user cost of the alternative situation (see Appendix).

Step 3. Model for tenure choice
Next, we model the relationship between the tenure choice, household characteristics and the relative prices of both tenure situations. We use a probit regression model. Age, education level, income, household composition, health status and native country are included as household characteristics. We use a theoretical income concept, permanent income. It is often preferred in this part of the model (see *e.g.* Goodman, 2002; Zabel, 2004) because tenure choice is considered a long-term decision. The permanent income captures the potentials of the household over a longer period while smoothing out short-term fluctuations.

Step 4. Model for quantity of housing services
Finally, in the last step, we relate the quantity of housing services for the actual tenure situation to household characteristics such as income, age, household composition, the user cost of a unit of housing services for the household, and current household income. Here current income is used, because households tend to move more within than between sectors. This makes short term income fluctuations more important here than in the tenure choice decision (see also Goodman, 1988). We use two regression equations, one for each sector (owning and renting). Since the tenure choice and the choice for the quantity of housing services may be related we model both decisions in steps 3 and 4 simultaneously using an endogenous switching regression model (see for instance Charlier, Melenberg & Van Soest, 2000).[4]

4.2 Data

The analysis is based on the Dutch Housing Needs Survey (*Woningbehoefteonderzoek*), a survey carried out in 2002 among approximately 75,000 households (representative for the population of the Netherlands). Questions are included on the characteristics of the dwelling

[3] For each of the 46 Dutch housing regions we regress the *WOZ*-value per dwelling on a number of house characteristics, such as the surface area, age of the dwelling and the level of urbanisation (see Zabel 2004). Then the regional price per housing service is calculated as the predicted price of 'the average dwelling' per region, where 'the average dwelling' is a fictitious dwelling with national average values for each characteristic.
[4] The models account for unmeasured variables that may influence both the tenure choice and the quantity decision (selectivity bias) by including the inverse Mills' ratio in the quantity equations.

as well as of the household such as income, household composition and education level. In addition the survey contains information on subsidies and levies concerning housing. Selections were performed to exclude observations with missing or extreme values on the number of rooms in the dwelling, *WOZ*-value, income and financial regulations, rent, and (remaining) mortgage. That still leaves us with over 58,000 observations.

For some of the variables in the model imputations are required. To compute the user cost, we need the market values of all dwellings in 2002. The *WOZ*-values at hand are an estimation of the market values, but have 1999 as date of reference. We convert these *WOZ*-values for 1999 to 2002 values by using regional indices of market values.[5]

As mentioned in Section 4.1 we use the permanent income of the households as well as the current income. Only current (2002) income is available in our data. To construct a permanent income variable we performed a regression analysis of the logarithm of (household) income on household characteristics and job features like the number of working hours. The analysis yields an explained variation of 64%. Age has the well-known parabolic effect and the level of educational attainment has a positive effect increasing to 33% for the highest level. Problems with health decrease income slightly (maximum 8%). The effect of region varies, but is mostly smaller than 5%.

4.3 Empirical results of the behavioural model

Step 1: Quantity of housing services
In the first step of the model, price indices are constructed measuring regional price differences. The capital Amsterdam and its surroundings face the highest price; a peripheral Southwestern region faces the lowest price. The quantity of housing services per dwelling is calculated by dividing its *WOZ*-value by the price index of the relevant region. On average a detached single-family dwelling provides the most housing services. Flats and terraced houses provide much less housing services. Owner-occupied dwellings usually provide more housing services than rental dwellings.

Step 2: User costs of housing services
The user cost per housing service is considered to be the price that is relevant for the households. On average owner-occupied dwellings have a lower price per unit of housing than rental dwellings. The variations in the prices are fairly high, especially for rental dwellings. This is at least partly caused by governmental policies that mitigate rent increases, thus facilitating relatively low rent levels when a household remains in the same dwelling for a longer period. This policy obfuscates the relationship between rents and the value of the property, on which the quantity of housing services is based.

Step 3: Tenure choice
As expected, households are more likely to live in an owner-occupied dwelling, the lower its cost relative to that of a rented home. In addition, the higher the household permanent income, the more likely the household is to live in an owner-occupied dwelling. Couples with children, middle-aged households or households with a higher education level also more often live in owner-occupied dwellings. The literature that is comparable with our analysis

[5] The regional indices are calculated by comparing estimates of owners of the current (2002) market values with given 1999 values per region.

generally yields lower price and income effects (see Ermisch *et al.*, 1996; Goodman, 1988; Jaén & Molina, 1994).

Step 4: Quantities of housing services
Owner-occupiers tend to be less sensitive to the user cost than tenants. The price elasticity for owner-occupiers equals –0.19 and for tenants –0.50. Also (current) income is positively related to the quantity of housing services. This relationship is stronger for owner-occupiers than for tenants (income elasticity of 0.37 and 0.24 respectively). On the market for owned houses the household characteristics are less important than on the market for rental dwellings. Since the tenants generally have lower incomes than owner-occupiers, they cannot afford to pay equal attention to housing preferences. Moreover, households will generally tend to opt for a rented home if they have the intention to stay there for a relatively short period, and then they may be less concerned with the characteristics of the dwelling (housing services).
In the literature on owner-occupiers we find mostly comparable price and income elasticities. Zabel's (2004) results almost coincide with ours. Ermisch *et al.* (1996) present an income elasticity of 0.5 and a price elasticity of –0.4, both being somewhat larger than our elasticities. Goodman (1988) comes very close to our income elasticity but has a clearly higher price elasticity (-0.5). Jaén & Molina (1994) produce the highest values: income elasticity over 0.6 and price elasticity of almost -1.0. The literature on tenants' behaviour is scarcer, because virtually no authors use the rent per housing service as price variable. The models of King (1988) and Jaén & Molina (1994) come closest to our approach, using prices for renters that are slightly different. Their work yields price elasticities of –0.5 and –1 respectively[6], quite well corresponding to our result. Jaén & Molina also present an income elasticity of 0.7, which is clearly higher than our value of 0.24.
The results of the model in Steps 3 and 4 indicate that there are unobservable factors positively affecting the choice to buy a dwelling which also increase the quantity of housing for owner-occupiers. We may think of psychological factors such as risk aversion. This result is also found in the literature (*e.g.* Rapaport, 1997). A similar, but smaller effect is found for tenants.

5 Simulations

5.1 Set-up

Using the empirical results of the behavioural model discussed in the previous section, we simulate the effects of reforms of the financial regulations on the housing situation of the Dutch households. If a reform takes place, it generally will have an impact in the short term: households now face different housing costs. Usually they are unable to change their housing situation in the short run, since there are costs of moving, both in terms of money and time. The direct impact of financial reforms may therefore be seen as a direct change in the price paid by households. At the longer term households will adjust their housing situation to the new financial rules, in line with the elasticities found with the model. They may change their tenure choice or the size and quality of the home. For instance a reduction of the rent subsidy obviously increases the costs for low-income households that receive rent subsidy. For owner-occupiers, the situation remains the same. In time, the rent-subsidy receivers may decide to reduce their costs by moving to a smaller and cheaper rental dwelling. Alternatively,

[6] The last elasticity has a large standard deviation of 0.5.

they may choose to buy, if the relative price of renting to that of owning becomes high enough.

In order to measure both direct and indirect effects of reforms we present three situations:

1. the base situation (before reforms);
2. the situation after reforms but before adjustment of the housing situation (short term effects);
3. the situation after the households adjust their housing situation to the reforms (long term effects).

The *base situation* describes the actual housing situation in 2002. However, a model only approximates reality. Differences between the model outcomes and reality should not be included in the effects of the simulated reforms. Therefore, we use a simulated version of the situation in 2002 as the base situation. For this simulated version, we 'predict' the tenure choice for each of the households, using the tenure choice equation. This yields a probability of being an owner-occupier and a tenant respectively for each household. For both situations we use the relevant quantity equations of the model to predict the consumed amount of housing services. Then the number of owner-occupiers is calculated as the mean probability of being an owner-occupier times the population size. The quantity of housing services consumed by an owner-occupier is similarly calculated, taking the probability of being an owner and the corresponding quantity of housing services into account. The total costs of owning a dwelling are also calculated corrected for the probability of owning. Analogous calculations are performed for tenants.

The second situation shows the *direct cost effects* of changes in the regulations. We simulate the changed financial regulations, without changing either the tenure choice or the consumption of housing services. Given the probabilities of owning and renting a dwelling and the quantity of housing services calculated in the base situation the adjusted total costs are calculated for owner-occupiers and tenants. The differences between the cost of this situation and the base situation are seen as the direct effects of the reforms, or in other words changes in the purchasing power of households in the short run. By adding up the effects for individual households, it also yields information on the direct effects on the macro subsidy amounts.

The third situation estimates the *indirect effects* of the financial reforms by taking into account the changes in the choice of the households if their user costs change. For each household the user costs of the actual dwelling and the alternative housing situation are adjusted as is done in the second situation. Then the adjusted relative prices of owning and renting a dwelling can be calculated and the tenure choice equation can be predicted anew. Again this yields probabilities of owning and renting a dwelling. Similar to the base situation we then calculate the relevant quantities and costs of housing. In predicting the quantities of housing services, we only adjust the prices of housing services. All other factors are kept constant.

Note that the transition path of the adjustments made by the households to a new situation can not be investigated with the behavioural model. For that, we would need a model explaining moving behaviour of households rather than the actual situation. The behavioural model describes the demand side of the housing market. We are aware of the fact that financial reforms may also affect the supply side of the market. Since the model is not designed to estimate the effects on the supply of dwellings, we implicitly assume that in the long run, supply adjusts to demand. However, we do take into account that the prices of housing may

be affected by the financial reforms. For each of the simulated reforms we estimate the changes in the market value of dwellings, based on a study of Boelhouwer & De Vries (2005). They conclude that in the long term the market value of dwellings is determined by the ratio of net interest payments (after taxes) and net household income.

5.2 Simulation results

We simulate the impact of the three reforms introduced in Section 2:
(1) a conversion of rents to market rent levels,
(2) restrictions on the mortgage interest tax relief for owner-occupiers, and
(3) conversion of the fiscal system for owner-occupiers to a general tax reduction.
The results of the simulations are summarised in Table II. First we present the direct effects for the households that are directly affected by the measures, without behavioural changes. Then we present the results of the simulation with behavioural changes, interpreted as the long run effects. The financial consequences for households are expressed in terms of the housing quotient: the fraction of the housing costs in the net household income.

Table II Consequences of simulated policy reforms (in percentage points, relative to base situation)

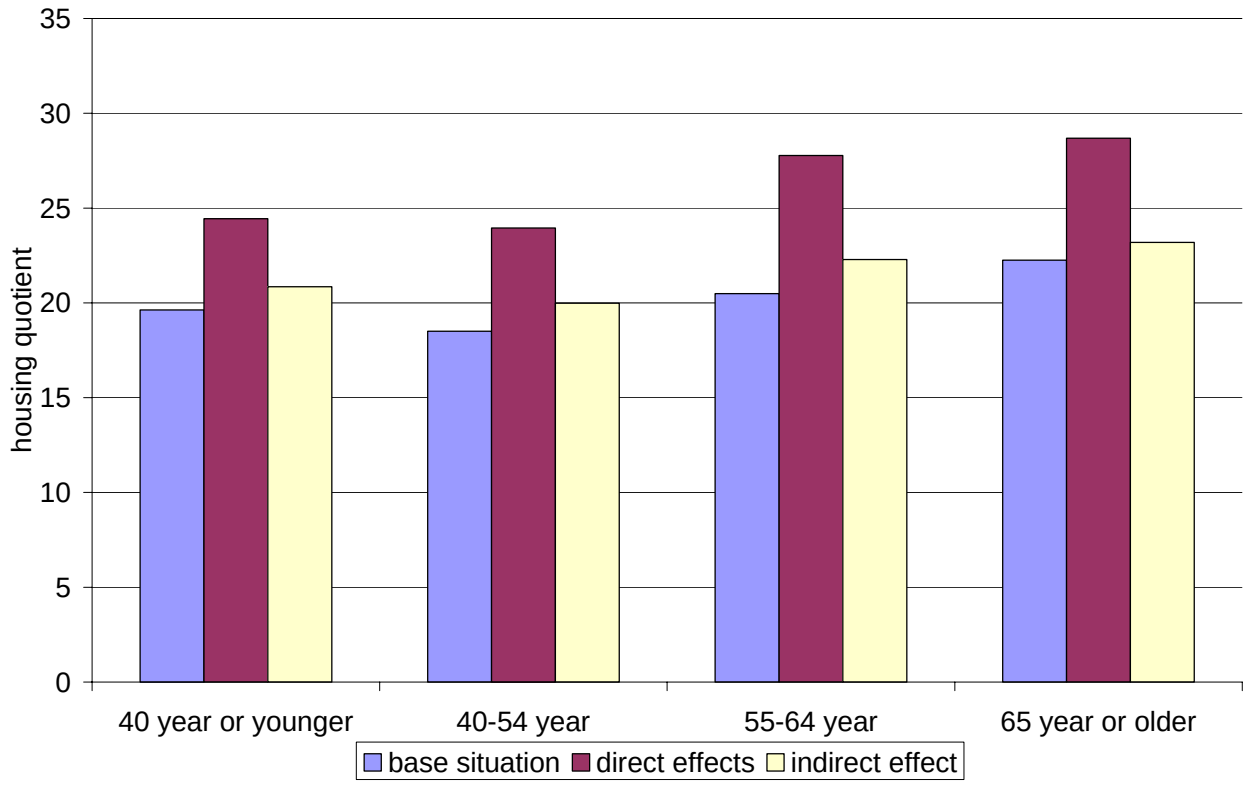
	simulation 1	simulation 2	simulation 3	
	conversion to market rents	restriction on mortgage relief	conversion of fiscal system to general tax reduction	
relevant group	tenants	owner-occupiers	all households	
base situation				
fraction of all households	45.8%	54.2%	100%	
housing quotient (per relevant household)[a]	20.2%	19.3%	19.7%	
direct effects				
housing quotient (per relevant household)[a]	+5.8	+0.8	-2.2	
government expenditure (in mln. euro)	-100	-1.450	0	
indirect effects			price –30%[b]	price –15%[b]
fraction of owner-occupiers	+1.4	+0.1	+2.1	+1.0
housing quotient (per relevant household)[a]	+1.3	+0.0	-4.5	-3.2
housing services (per relevant household)	-8.0	-0.2	+3.0	0.0
government expenditure (in mln. euro)	+200	-1.650	-50	-50

a The housing quotient is defined as total user costs per dwelling as a fraction of net household income. Here we present the (weighted) averages.
b In one scenario we assume a market price reduction of 30%, in the alternative scenario a price reduction of 15% was applied.

1. Conversion of rents to market rent levels
The direct effect of converting all rents to market rents is large. The rent will increase for about two thirds of the tenants (over 2 million households) and decrease for the remaining one third of the tenants (1 million). On average, the housing quotient of tenants will increase from 20.2% to 26.0%. In particular the housing quotient increases for low-income households, households in which the oldest person is between 55 and 65 years old and single parent families. When the rent changes the amount of rent subsidy also may change. For some households the market rent rises above the maximum rent level that allows for rent subsidy. They lose their subsidy altogether. For other households the subsidy increases with the rent level, but mostly not enough to offset the cost increase fully. Overall, the rent subsidy will decrease by 100 million euro.

In the long run many tenants would prefer a cheaper rental dwelling. This means that they reduce their consumption of housing services, because rents are directly related to *WOZ*-values in this scenario. They may choose a smaller dwelling, a less maintained dwelling or a dwelling in a less well-off neighbourhood. A small part of the tenants (1.4% of all households) may choose to buy instead of staying in their rental dwelling. If the housing market can accommodate the change in preferences, the increase of the housing quotient may be limited to 1.3 percent points instead of the direct effect of 5.8 percentage points. Recently the supply of smaller, cheaper rental dwellings has diminished, implying that it is not likely that the increased demand can be satisfied. The consequences of the rent conversion are now compensated to some extent by the system of rent subsidies. In the new situation the expenses on rent subsidy would be 100 million euro *higher* than in the base situation. In addition the new owners would receive about the same amount in the form of tax reduction. This means that, in the long run, the conversion of all rents to market rents may lead to an increase of government expenses by 200 million euro each year, instead of the reduction corresponding to the short run situation.
In the long run (as was found in the short run) the changes will be especially large for the lower income groups, households over 55 years of age and single-parent families. See figure 1 for the differences between the age groups.

Figure 1: Average housing quotient of tenants by age group, conversion to market rents



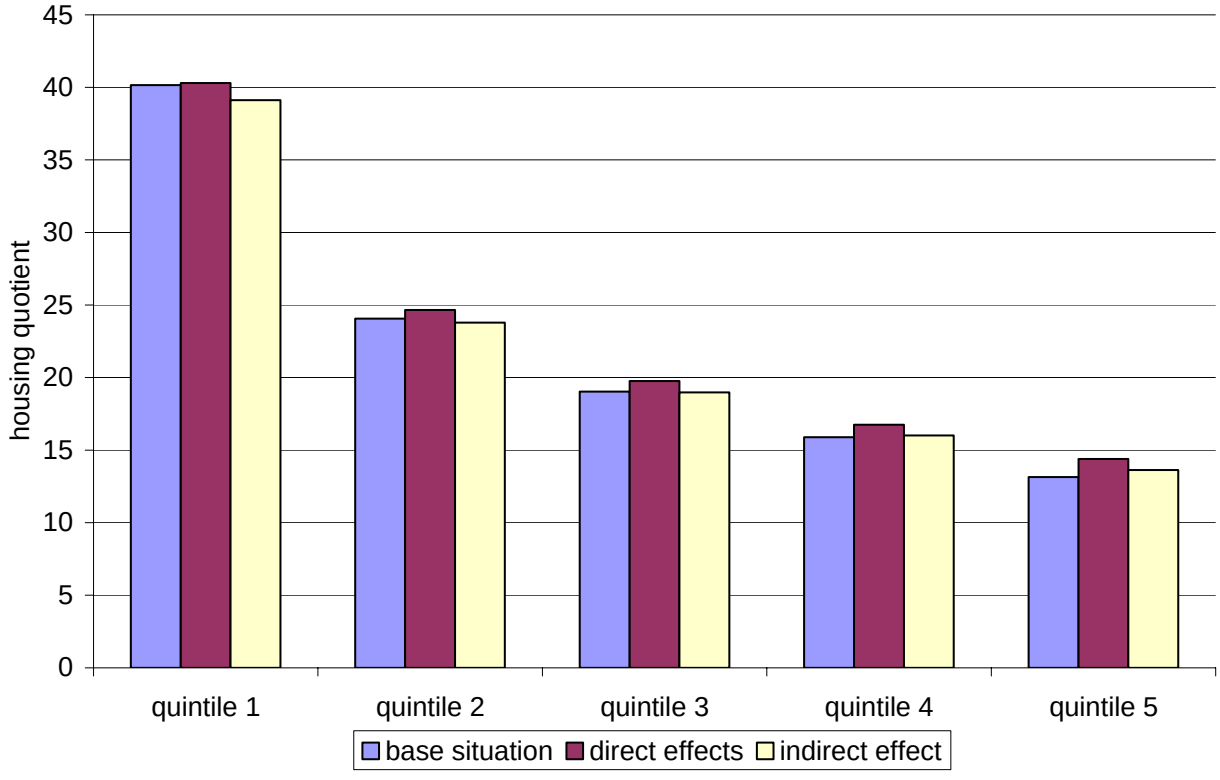
2. Restriction on the mortgage interest tax relief for owner-occupiers
In this simulation the higher income households can no longer deduct their mortgage interest against their marginal tax rate (mostly 42%). For all households we apply the tax rate of the lowest income group: 14.5% for the elderly (aged over 65 years) and 32.35% for other (younger) households. In the short run, if households do not change their housing situation,

this leads to an average increase of the housing quotient for owner-occupiers by 0.8 percent points.

In the long run, the reduced tax relief will reduce the market prices for dwellings, because the demand curve is lowered. Boelhouwer & De Vries (2005) conclude that a reduction of 6% is to be expected in this situation. Taking into account this price reduction for the owner-occupiers together with the behavioural changes of the households, the impact is much smaller. On average the housing quotient and the housing services hardly change compared to the base situation. The model indicates that annual government spending may decrease by about 1,650 million euros in the long run.

The model also indicates that the effects do not differ much between groups of households. Of course the effects are larger for high income households than for low income households. Usually, high-income households live in larger and more expensive dwellings with a higher mortgage. In addition their marginal tax rate is higher. This means that the change in the deduction tariff simulated here is larger than for low-income households (see figure 2).

Figure 2: Average housing quotient of owner-occupiers by income class, restriction on mortgage tax relief



3. Conversion of fiscal system for owner-occupiers to general tax reduction.
In the short run the replacement of the fiscal treatment of the own home by a general lump sum tax reduction leads to increasing costs for owner-occupiers (0.7 percent point).[7]

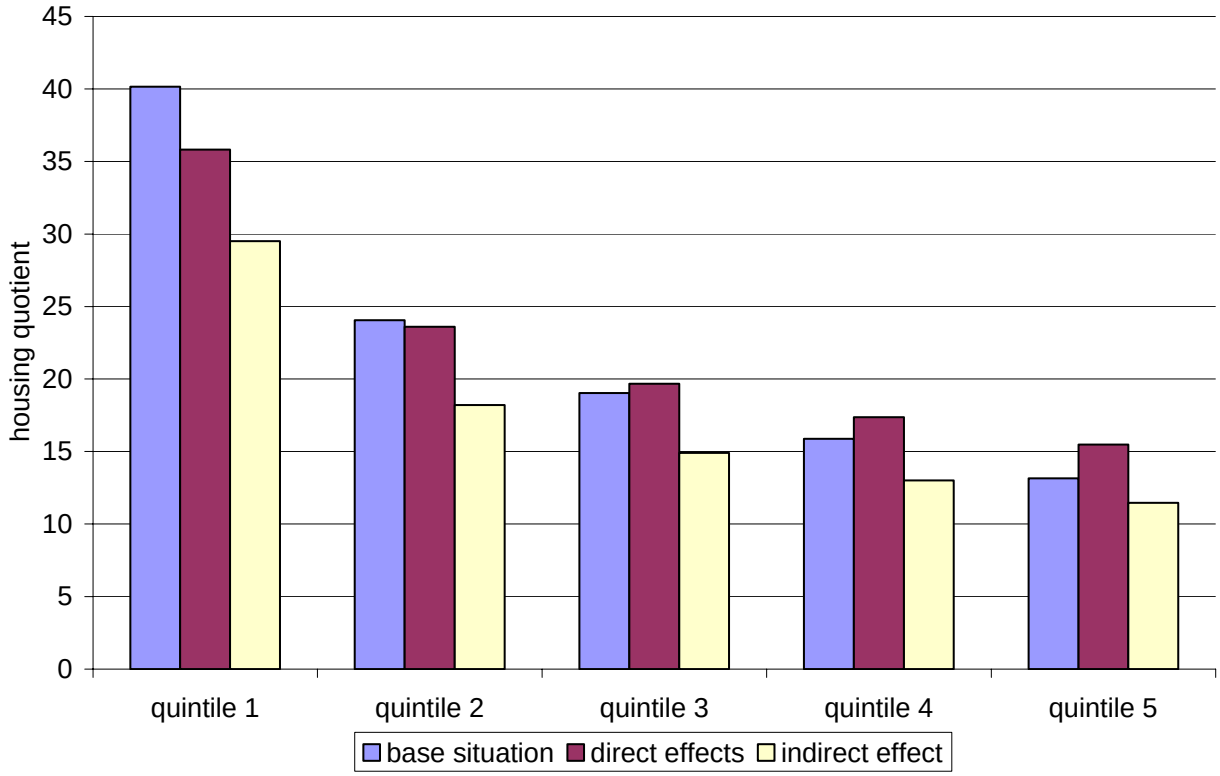
[7] The lump sum tax reduction increases income before housing. This is the way it is implemented in the behavioural model: both income and the relevant price variable (user cost) increase. However, in the figures we

Especially young households and higher income households are affected (2 to 3 percent points increase). The elderly owner-occupiers will benefit since their mortgages are usually small and their marginal tax rates are lower (small change of fiscal system) and they benefit equally from the lump sum tax reduction. All tenants benefit from the general tax reduction. This leads to a decrease of their housing quotient by 5.7 percent point. Overall, the average housing quotient decreases by about 2 percent points.

In the long run, households may change their housing situation to compensate the cost changes. In addition the change in the fiscal system may indirectly decrease the market prices of housing substantially. Based on calculations of Boelhouwer & De Vries (2005) we initially use a price reduction of 30%. This would lead to a decrease in user costs for the owner-occupiers (based on the new housing price) and a decrease of their housing quotient by 4.5 percent point on average. On the whole, more households tend to own a dwelling: the number of owner-occupiers increases by 2 percent point. This holds in particular for the elderly because of the relatively small impact of the abolishment of the fiscal deduction (because of small or no mortgages) and the relatively high impact of the lump sum tax reduction (because of low incomes). For all income groups the housing quotient decreases, but as expected the effects are larger for the low income households (-10 percent point) than for the high income households (-2 percent point) (figure 3). The government budget is not affected by this measure since the additional tax income is redistributed over the households by the general tax reduction.

Figure 3: Average housing quotient of owner-occupiers by income class, conversion of fiscal system to general tax reduction

treat the tax reduction as a reduction of housing cost, in order to keep income before and after the conversion the same.



The results of this simulation are rather sensitive tot the assumption on the decrease of the market prices. With a price reduction of 30%, the quantity of housing services increases by 3%. Given the rigid supply of housing, a lower price reduction of *e.g.* 15% could be more realistic. Then the demanded quantity of housing services would remain more or less the same. Assuming this price reduction leads to a smaller benefit for the owner-occupiers. Some groups, in particular high income and young households, do not benefit from the changes in that case. The percentage owner-occupiers may then increase by 1%.

Of course the transition path is crucial in such a large change of regulation. The disadvantages of a decreasing market price exist in particular for owner-occupiers that intended to move to a smaller, cheaper dwelling (with lower market price this will yield less profit), or are forced to sell their dwelling (because of a divorce or unemployment). In addition, in the short run, households that have recently committed themselves to a large mortgage may not be able to repay the mortgage with increasing housing costs. Therefore such a reform should be implemented gradually and with caution.

6 Conclusions

The results of the simulations show that adjusting rent levels to the market rents or abolishing the mortgage tax relief system for owner-occupiers will initially have substantial increasing effects on the total costs faced by households. However, when we account for the behavioural response to the measures and the resulting decrease of the market price of housing, the effects are less disadvantageous and may be even advantageous for the average household. Of course the impact differs between individual households.

We must also note that the costs of moving are not taken into account in the simulations. This would yield a threshold for moving, and may hamper the response of the households to the changes in the housing costs.

The results of the policy measures studied here may be of importance to policy makers. However, there is more to implement such a measure successfully, like insight in the supply of houses, careful implementation and good transitional provisions. Of course policy makers may have other considerations than the purely financial effects of policy measures. For instance, they may opt to protect vulnerable groups such as the elderly or single-parent families, or concentrate on desired housing conditions of households and the composition of population in specific neighbourhoods. Also other economic arguments like economic stability and long-term sustainability of the current system should be taken into account. Our results may form part of the considerations for housing policies.

Appendix Determination of the user cost per housing service

User costs for actual tenure situation
The prices relevant for households are the user cost per housing service. For the actual tenure situation the user cost can be determined straightforward. The *total user cost for a rental household* simply equals the rent minus received rent subsidy. For *owner-occupiers user cost* is more complicated to calculate. It includes the mortgage interest paid by the owner, the opportunity costs for the amount of equity in the home, the local property taxes and maintenance costs. In addition we include the depreciation of the dwelling (ageing) and the general increase of house prices (see Elsinga, Lamain & Mariën, 2005). The relevant financial regulations, i.e. the mortgage interest tax relief and imputed income from home ownership are also taken into account.

User costs of alternative tenure situation
The user costs for the alternative type of housing (a rental dwelling for an owner-occupier or an own dwelling for a tenant) are imputed. Two problems arise here. Firstly, we have to determine the quantity of housing services in the alternative situation, since user costs depend on the size and quality of the dwelling. Owner-occupiers usually live in a dwelling which is larger or of better quality (more housing services) than rental households, even if they have the same income and household composition. This is taken into account in the following way. We regress the number of housing services consumed on household characteristics (in particular income), region and the tenure situation. For each income class and region we compute the ratio of housing services of rental and owned houses. This ratio is used to convert the number of housing services between the two tenure situations.
The second problem concerns the calculation of the user costs in the non-chosen situation. We know the desired quantity of housing services, and hence the WOZ-value. For actual owners we now have to compute the rent for the alternative rental dwelling. This is done by regressing the rents of actual tenants on the *WOZ*-value and the duration the household has lived in this dwelling for each region separately. We include the duration variable to take account of restrictions on the rent increase. The regression result enables us to impute the alternative rent level for actual owner-occupiers. We predict the rent equation setting the duration at zero. This yields the user costs for the fictitious rental dwelling.
For the actual tenants we need to impute the user costs of the relevant alternative own dwelling. Based on the computed *WOZ*-value we can calculate most components of the user costs. However we still have to impute the part of the liquid assets the household would use to

finance an owner-occupied dwelling.[8] We used the average percentage of their capital that recently moved households put into their dwelling (68%). The remaining value (debt) is used to impute the mortgage interest, once again by a regression analysis of paid interest on the remaining debt and other household characteristics. The mortgage interest is also used to impute the effect of financial regulations for owner-occupied dwellings.
The unit cost per housing service of the alternative situation can then be derived by dividing the total user costs in the alternative tenure situation by the quantity of housing services in the alternative tenure situation.

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