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Ageing, Homeownership and Mortgage Choice in the Netherlands

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Summary
This paper analyzes the development of homeownership and the demand for mortgage debt in the Netherlands in the Netherlands over the period 1981-2002. over this period a number of product innovations occurred in the mortgage market and homeownership gradually increased, especially among the elderly. We use the life cycle model of consumption and saving as our main framework of analysis and derive clear predictions with respect to the appreciation of various newly developed mortgage types from a simple simulation version of the model. Empirical information from a number of housing surveys documents substantial changes in the market shares of various mortgage types and their connection with mortgage interest deductibility. As earlier research for other countries suggests, we find that the life cycle model does a better job in explaining tenure choice in the first part of the life cycle than in the last part. However, we find a surprisingly large demand and increasing for mortgage loans among the elderly and notice that this is focused on interest only mortgages. This suggests that elderly households are willing to consume at least part of their housing equity – as is suggested by the life cycle model, even though they are reluctant to move to another house.

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1 Introduction

Housing – and in particular owner-occupied housing – has important consequences for the allocation of resources over a household's life cycle. The reason is that most households who buy a house finance their purchase with a mortgage and therefore engage in long term financial obligations that force them to accumulate equity in their home. In the context of an imperfect capital market with limited other possibilities to borrow, this tends to decrease consumption expenditure in the first stage of the life cycle. Also at a later stage of the life cycle credit constraints may cause difficulties for households who want to consume part of the equity contained in their home. Reluctance to move to another house and limited availability of reverse mortgages may induce elderly households to consume less than they would like. These issues were highlighted in a classical paper by Artle and Varaiya (1978). They used a simple version of the life-cycle model of consumption and saving and concluded that credit constraints would induce households to rent at the beginning and end of their life cycle even though owner-occupied housing is always cheaper then renting.

It is the purpose of the present paper to consider housing tenure and mortgage type choice for Dutch households in the period since 1980. There are several reasons why this is interesting. An important one is that there have been a number of product innovations on the mortgage market. Some newly introduced mortgage types have rapidly gained a substantial market share, which suggests that they have important benefits for consumers. One wonders whether this could be explained on the basis of a life cycle model *à la* Artle and Varaiya. Another interesting aspect is that the Dutch income tax system allows complete deductibility of paid mortgage interest. One may conjecture that this has affected the development of the new mortgage types. Moreover, a recent change in the Dutch income tax has introduced a separate treatment of labor and capital income, while an exception is made for housing. This introduces a difference between the effects of financing the house with equity or a mortgage loan that has potentially important consequences for financing the owner-occupied house.

A second main reason for studying choices with respect to housing tenure and mortgage type from a life cycle perspective is the ageing of the Dutch population. If elderly household would return to the rental part of the housing market *en masse* as is suggested by the analysis of Artle and Varaiya (1978) - and was to some extend supported by the empirical evidence at the time their article was written - this would potentially have substantial consequences for the share

of owner-occupiers among Dutch households, which has shown an upward trend over the last decades. On the other hand, if the currently middle-aged households, two third of which are owner occupiers, would stay in their homes – as does not appear to be unlikely – this raises the question whether they would be able to consume their housing equity if they wished to do so.

The ongoing process of ageing currently causes some concern about the sustainability of the public finance and the pension system in the Netherlands, see for instance CPB (2006). Information about the claims of present and future elderly households on pensions and public expenditure and their contribution to taxes is important for an assessment of the situation and the development of appropriate policy. Homeownership is an important aspect of such an assessment. As we will see, an increasing share of the elderly households owns the house in which they live, and for them the house is usually their most important asset. As such the home is an important potential source of additional income.

Moreover, since mortgage interest is fully deductible from taxable income, homeownership has important consequences for income tax revenues. As will be documented below, the amount of mortgage interest paid by Dutch households has increased substantially in recent years, indicating much larger sizes of mortgage loans. One of the reasons of this development is the increased popularity of second mortgages and interest-only mortgages. The growing amount of paid mortgage interest deducted from taxable income contributes increases the vulnerability of public finances: adjustable mortgage interest rates imply that an increase in long term interest rates results in lower tax revenues. At the same time, a lower amount of equity accumulated in the owner occupied housing stock may increases the vulnerability of individual households for economic 'shocks.' In this paper we document these developments and interpret them by means of a simple life-cycle model.

The paper is organized as follows. In the next section we discuss the housing and mortgage markets in the Netherlands and the characteristics of the various mortgage types. In section 3 we investigate the attractiveness of the various types of mortgage loans by means of a simple life cycle simulation model. In section 4 we turn to the empirical evidence provided by a series of Housing Needs Surveys. We will document the patterns of homeownership, outright ownership and mortgage type choice among subsequent cohorts of Dutch households and interpret them on the basis of the life cycle model. Section 5 concludes.

2 The markets for housing and mortgage loans in the Netherlands

A characteristic feature of the Dutch housing market is the strong dichotomy between the rental sector – which consists largely of social housing with regulated rents and long waiting lists – and the owner-occupied sector where prices are determined by market forces. Regulated rents and the presence of a means-tested rent subsidy cause rental housing to be the preferred tenure choice for households who cannot afford (semi-) detached housing (which is scarcely provided by housing corporations) and households with low incomes. Owner occupation is especially attractive for household with higher incomes, since the benefits of mortgage interest deductibility are larger with a higher marginal tax rate. It is therefore not too surprising that many Dutch households start their housing career in rental housing and move to owner-occupied housing when their income has increased and families are formed. This is not to say that restrictions associated with mortgage loans do not play a role in this process. However, the relevant restriction in the Netherlands is not the downpayment constraint that figures prominently in the Artle-Varaiya analysis.

The market for mortgage loans in the Netherlands is well developed. Mortgage terms are often long in comparison to other European countries: 30 years is no exception. For many households it is possible to finance 100% of the price of their home by a mortgage loan. Banks are willing to engage in such a contract because repayment of the loan is guaranteed by a mortgage insurance, the National Mortgage Guarantee.[1] Households with such a guarantee pay a small premium, but (more importantly) they also benefit from the bank's willingness to charge a lower mortgage interest rate in return for the increased certainty offered by the insurance. As a consequence, participation in the National Mortgage Guarantee is widespread.[2] However, this guarantee is only provided when mortgage payments at the time of buying the house do not exceed a particular percentage of net household income. This introduces an alternative restriction to which we will refer as the mortgage qualification constraint.

The restrictiveness of the mortgage qualification constraint depends on household income and the associated marginal tax rate and on the before-tax mortgage payments at the start of the mortgage term. The various mortgage types that are available in the Netherlands differ markedly

[1] When the household fails to pay mortgage interest, the National Mortgage Guarantee takes over ownership of the house.

[2] This appear to be an important difference with the situation in the US. See Cao (2005) for a comparison between mortgage insurance in both countries.

in this respect. In what follows, we will describe the major mortgage types and pay attention to this aspect, as well as to some other characteristics that are relevant for the purposes of this paper. We discuss the various mortgage types roughly in the order in which they appeared on the market.

Linear mortgage

The linear mortgage loan is perhaps the simplest design of a mortgage loan one can imagine. In each period a fixed share of the original loan is repaid. The size of the outstanding loan, and interest payments, are therefore linearly decreasing over time, hence the name. As a consequence mortgage payments are highest in the first period after the loan has been taken. Since many households are credit constrained at the time when they buy their first home, this is an inconvenient characteristic which makes the mortgage qualification constraint more restrictive than with other mortgage types. This is probably the main reasons why the popularity of this type of mortgage loan has decreased over time. Since interest payment decreases linearly over time, so does the associated tax benefit. If the marginal tax rate is constant over time, net mortgage payments also decrease linearly over time.

Annuity mortgage

The annuity or fixed-price mortgage is characterized by fixed total mortgage payments (interest plus repayment) over the whole term of the loan. In the first period of the loan's term less is repaid than with the linear mortgage, which makes the mortgage qualification constraint 'bite' less. The lower repayment in the early periods implies of course that interest payments decrease less rapidly over time than with the linear mortgage. This helps to keep total mortgage payment constant over time. Repayment increases nonlinearly and is concentrated in the last stage of the mortgage term. This means that the tax benefit associated with the interest payment decreases slower than with the linear mortgage until the end of the term. Since gross mortgage payment is constant over time, net mortgage payment increases, especially towards the end of the loan's term. Even though this may not cause severe problems, as household income is often higher then, this is a less attractive aspect of this mortgage type.

Life insurance mortgage

The life insurance or savings mortgage loan is a combination of a life insurance that pays out at the end of the term of the mortgage, and a mortgage loan that does not have to be repaid until the end of its term. In practice the life insurance is used as a savings account on which sufficient means have to be accumulated to redeem the loan in due time, hence the name savings mortgage loan. There would be no point in developing such a combination of life insurance and mortgage loan, if this did not enable the borrower to use a tax facility that exempts the interest that accumulates on life insurance premiums from income taxation.[3] The life insurance premium itself is not deductible from taxable income, but no income tax has to be paid over the money it pays out. Since the return on the life insurance savings account is higher than the net interest rate that has to be paid on the mortgage loan, the homeowner benefits from not repay the loan until the last minute.

Even though the tax facility for life insurances existed long before the life insurance mortgage loan was developed, it became popular only after the combination with a mortgage loan was introduced. When this first happened, no guarantee could be offered to the homeowner that the life insurance would pay out a sufficient amount of money to repay the loan. However, improvements in mortgage design facilitated by the Dutch financial markets soon enable the lenders to provide such a guarantee.

Even though we noted that the life insurance is in fact used predominantly as a savings account, it really *is* a life insurance. This is of some importance for the attractiveness of this type of mortgage loan. If the homeowner or – in case of shared ownership – one of the homeowners dies before the term of the loan ends, the life insurance pays out. Usually, the payment is also in that case equal to the full size of the loan.[4] This type of mortgage loan therefore helps to prevent the combination of a lower household income and high housing costs after the death of a spouse. This may be expected to increase the attractiveness of this type of mortgage loan for double income households. On the other hand, the life insurance aspect makes this mortgage type clearly less attractive for elderly households. For them the life insurance premium will be much higher than it is for young homeowners, and mortgage payments (including the life insurance premium) may therefore well be higher for this type of loan than for an annuity mortgage.

[3] In the absence of this tax facility, a savings mortgage loan would be equivalent to an annuity mortgage loan, except for the life insurance aspect.
[4] This is not always the case. Life insurance mortgage contract differ in these aspects.

Mortgage payments for the life insurance mortgage are constant over time. In contrast to the annuity mortgage, this is true for gross as well as net mortgage payments. The tax exemption for interest on life insurance savings tends to make mortgage payments for the life insurance mortgage lower than those for the annuity mortgage. However, the premium must also reflect the mortality risk of the homeowner(s) and this works in the opposite direction. Note, however, that the life insurance aspect implies that the mortgage is 'purchased' in combination with another commodity for which the consumer might be willing to pay a price.

Investment mortgage

The life insurance mortgage separates the mortgage loan (which is left unchanged until the end of its turn) from savings for its eventual amortization. This is also the case with the investment mortgage loan. Now periodic investments in assets are used to accumulate sufficient capital to repay the loan in due time. These investments usually take place in risky assets, which promis higher average returns. In this mortgage type the equity premium therefore plays a similar role as the tax exemption in the life insurance mortgage. However, an important difference between the investment and life insurance mortgages is that investments in risky assets cannot guarantee the accumulation of a sufficient amount of capital at the time the term of the loan is completed. It may therefore happen that during the term new appointments have to be made on the size of the required monthly investments so as to be reasonably sure that repayment can be realized in due time.

Like the life insurance mortgage, the investment mortgage makes maximum use of mortgage interest deductibility as no repayments are made until the end of the term. Retuns on investments in equity are not exempt from income taxation. However, capital gains were not taxed in the Netherlands until 2002, while dividend and received interest had to be added to taxable income. The tax reform of 2002 introduced a difference between labor income and returns from capital. The latter are taxed at a 30% rate on the basis of an assumed annual return of 4%. It should be noted that the interest paid on mortgage loans is deducted from taxable labor income for which a higher marginal tax rate (often 50%) is relevant. This difference between the tax treatment of housing and other assets increases the attractiveness of the investment mortgage and, more generally, postponing repayment of the mortgage loan by investing instead in other assets.

Interest-only mortgage

The separation between the loans and the provision made for its repayment becomes complete with the interest-only mortgage loan. With this type of mortgage loan there are no compulsory repayments. Its term is undetermined. Households are therefore free to repay some of the loan or to remain its size unchanged. Sometimes it is even possible to re-borrow money that had been repaid earlier.

It must be noted however that homebuyers – and especially first-time homebuyers – are usually not enabled to finance their home completely with an interest only mortgage. In general banks appear to be reluctant to engage in such constructions, but nowadays they frequently offer the possibility of a combination of mortgage types. This means that part of the loan has to be repaid, for instance, as an annuity, whereas the remainder is offered as an interest only mortgage. Other combinations are also possible and their popularity is increasing.

The series of mortgage types that have been discussed show a gradual development towards designs that minimize mortgage payments in the first period and to soften the forced savings requirements implied by the mortgage contract by allowing the owner occupying households more freedom in making arrangements for repaying the loan. Both developments culminated in the interest-only mortgage.

As stated above, the various types of mortgage loans have been discussed roughly in the order in which they appeared on the market. The subsequent introduction of new types of mortgage loans is a type of product innovation that should be expected to be in the interest of the households making use of these loans. To verify this idea, we will in the next section develop a simulation model that allows us to assess the significance of these mortgage loan types in a life cycle context.

3 Analysis

The setting

In this section we present the results of a simulation model that has been constructed analogously to Artle and Varaiya's (1978) model. We use this model to evaluate the various types of mortgage loans in a life cycle context. For this purpose we will consider a household that buys a

house of given price and quality, but is able to use various types of mortgage loans. The price of a house is 200,000 euros. If a similar house were rented, the annual rent would be equal to 7,500 euro. This relatively low rent is assumed to reflect the effects of rent control and subsidized construction of rental housing in the Netherlands. We will always assume that the term of the mortgage is 30 years (except in the case of the interest-only mortgage). The mortgage interest rate is assumed to be equal to 5%. Mortgage interest paid is deductible from taxable income at a marginal tax rate of 50%. For the life insurance mortgage loan we determine the life insurance premium as the sum of the amount that should be saved in order to repay the loan if it was known that the owners would stay alive until the end of the term of the loan, and a 'pure' life insurance premium of 1,200 euro per year. For the investment mortgage, we assume a certain (after tax) rate of return of 8%.

Implied housing costs

Figure 1 shows the payments (including forced savings) for housing implied by the various types of mortgage loans. The lines in the picture refer to *net* payments, implying that deductibility of paid mortgage interest has been assumed. As noted earlier, the after tax payments for housing implied by the linear mortgage are also linearly decreasing over time whereas the annuity mortgage loan has net housing costs that increase over time. Even though the payments for the annuity loan start at a level that is considerably lower than that associated with the linear mortgage, they ultimately become higher than the first-period net payments of that loan. The housing costs associated with the life insurance mortgage loan start at a higher level than those implied by the annuity mortgage, because of the life insurance component included in the payment. The difference in the development over time between the life insurance and annuity mortgages is the result of the non-taxation of interest on the accumulated savings for the life insurance. The investment mortgage loan implies lower housing costs than the life insurance mortgage because of the higher returns on stocks. The interest-only mortgage has – of course – the lowest implied housing costs because there are no forced savings. It should be noted that the deductibility of mortgage interest payments is the main reason why mortgage payments compare so favorably to the low rent payments, even though the mortgage payments the homeowner also – in all cases but one – to accumulate equity in the house to such an extent that owns it outright after the 30^{th} year.

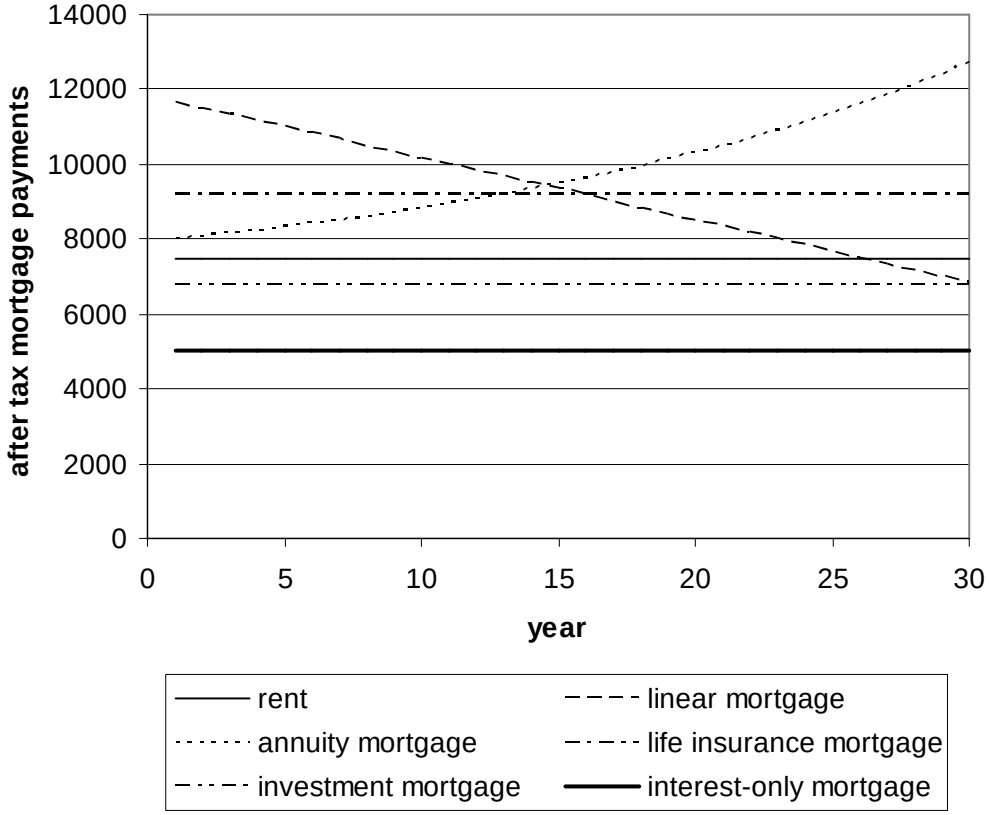

Figure 1 Net housing cost of renting and various types of mortgage loans

A simulation model

Our simulation model is based on the life cycle analysis of owning and renting provided by Artle and Varaiya (1978). We assume the household utility function per period to be of the CRRA type:

$$u_t = \begin{cases} c_t^{\,1-\sigma}/(1-\sigma) & \text{if } \sigma \neq 1, \\ \ln(c_t) & \text{otherwise.} \end{cases} \qquad (1)$$

The rate of time preference is ρ and lifetime utility of the household is therefore given as:

$$U = \sum_{t=1}^{T} \frac{u_t}{(1+\rho)^t}. \qquad (2)$$

We consider a household with a logarithmic utility function that lives for 60 years. Net income in the first year is equal to 26,000 euro, and it increases with 1,000 euros per year until period 25. Then income remains stable at 50,000 euro annually until year 45, when it decreases to 35,000

and remains constant at that level. We assume that ρ is equal to 0.05. There is no utility from bequests.

All houses are assumed to be identical. Households are unable to borrow except for a mortgage loan, but they can save. This household has the opportunity to borrow the house, using one of the mortgage types discussed in the previous section to finance it. It may itself determine the time to buy, subject to the mortgage qualification constraint that net mortgage payments should not exceed 25% of net income. It may also sell the house at any time it likes. When it does, it must repay the outstanding loan immediately from the revenues, which are assumed to be equal to the price at which it was bought.

It may be noted that an annual rent of 7,500 euro is insufficient to cover the opportunity cost of the value of a house at the prevailing interest rate of 5%. Moreover, the value of a house is four times the maximum annual (net) income of the household and eight times net household income in period 1. Note also that we did not introduce a bequest motive into the model. This means that the household does not intend to have any wealth left in period 60.

Figure 3 shows the optimal consumption paths associated with renting and buying with the various mortgage types. When the household rents throughout its life cycle it consumes all its income until period 21. Then it starts saving for retirement. Consumption remains constant until period 60. The household would rather like to borrow during the first stage of its life cycle so as to keep consumption constant over all 60 periods, but the inability to borrow is the reason why consumption equals income during the first 21 years.

If the household is enabled to buy the house while using a linear mortgage to finance this purchase, it becomes an owner-occupier in period 21. To avoid a drop in consumption immediately after becoming an owner-occupier, the household saves in the preceding years. After becoming a homeowner, the household's consumption tracks the development of income for some years, but there is no saving for retirement. The reason is that the sale of the house in year 37 provides sufficient liquid wealth to increase consumption and maintain that higher level after retirement in year 45. A main effect of buying the home is therefore that consumption of lifetime resources shifts somewhat to later stages of the life cycle. Even though the household accumulates a considerable amount of wealth during the period it owns the house, its consumption is lower than when it would remain a renter only in the periods 20 to 27. Lifetime utility of the household increases through homeownership. However, it is not optimal for the

household to buy the house immediately after the mortgage qualification constraint allows it to do so. The relatively large mortgage payments during the first years of homeownership make it more attractive to postpone this decision for some periods.

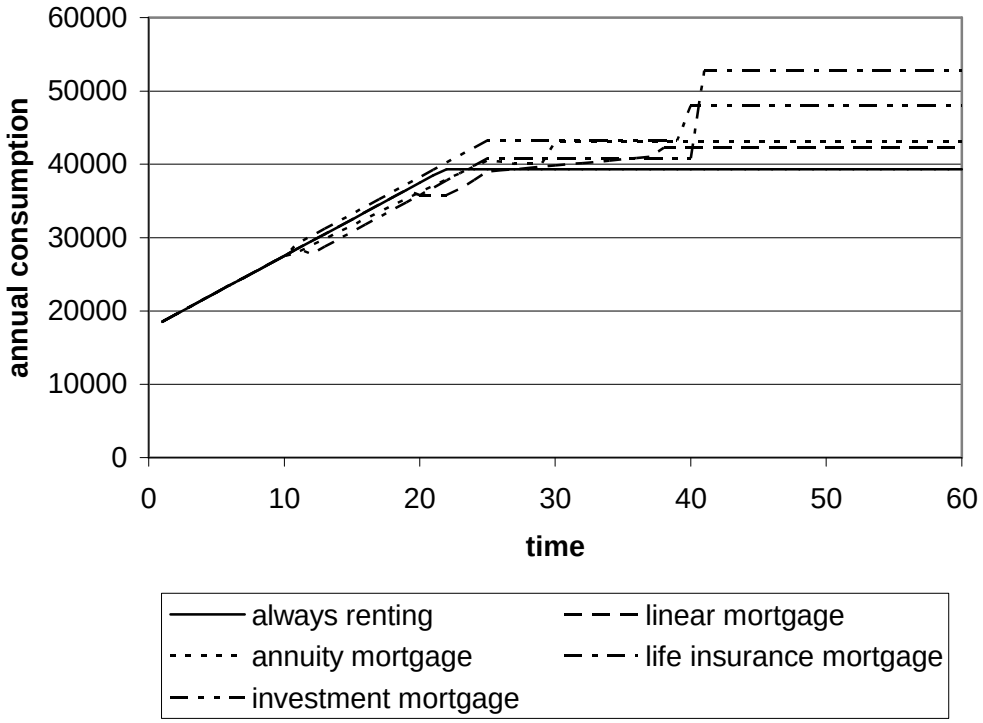

Figure 2 Optimal consumption paths

When the household uses the annuity mortgage, it buys the house as soon as the mortgage qualification constraint allows it to do so. The relatively small difference between rent and first-year mortgage payments allows the household optimally to do this without any saving in preparation for homeownership. However, increasing net mortgage payments now make continuation of homeownership unattractive after period 29. The net revenues of this sale are high enough to allow the household to maintain a higher level of consumption from that period onwards that it could reach with the linear mortgage. Life time utility of the household is also higher with this type of mortgage loan.

If the household is offered the possibility to finance the house with a life insurance mortgage, it also decides to become an owner-occupier as soon as this is possible. Now the return to the rental sector only takes place in period 40, that is, just before the original loan could be

completely repaid by the revenues of the life insurance / savings account. Consumption is somewhat lower than with the annuity mortgage immediately after the purchase of the house, but the upward jump in consumption that occurs after selling the house is considerably larger because much more equity has been accumulated. Life time utility is higher than with the annuity mortgage.

If the household makes use of the investment mortgage, it will also buy the house as soon is it is allowed to do so. Since net mortgage payments are now lower than the rent, consumption now *increases* because of the purchase of the house. Consumption at the end of the life cycle is now somewhat lower than with a life insurance mortgage. Nevertheless, the higher consumption level in earlier years causes the household to prefer this type of mortgage loan over the alternatives.

The consumption pattern that results when the interest-only mortgage could be used is not indicated in Figure 2, but it is trivial. Since net mortgage payments are in this caser equal to 5,000 euros, which is less than a quarter of net household income in period 1, the household will immediately purchase a house. There is no equity accumulation and for this reason the household will remain in the owner-occupied sector until the end of its life cycle. Consumption therefore tracks that of a renting household, but at a higher level. Clearly, the household would prefer this alternative over all others. However, we noted above that it is unlikely that banks will offer a household the possibility to finance the purchase of a home completely with an interest-only mortgage.

The results of the simulation exercise are clear: the preference order over the various alternatives is: interest only > investment > life insurance > annuity > linear > renting permanently. Since the more preferred mortgage types were usually introduced on the Dutch mortgage market after the less preferred ones, this clearly suggests that the product innovation on the mortgage market were to the benefit of consumers.

It must, of course, be noticed that the results presented in this section are dependent on the specific parameters values that have been chosen. Some experimenting with these values suggests that the suggested preference order is relatively robust. One potentially important limitation of these exercises is that they do not address the effects of uncertainty. For instance, the role of owner occupied housing as a hedge against rent risk has recently been stressed by Sinai and Souleles (2005). This aspect could be studied in the framework developed above by introducing

uncertainty about the future development of rents and the sales price of the house. However, it seems unlikely that this will change the results with respect to the preference order of the mortgage types. It might, however, change the preference for owning over renting depending on the relative volatility of house prices and rents and on the value of the risk aversion parameter σ. Income risk could also be introduced, but it consequences for tenure and mortgage type choice appear to be also limited.

4 Empirical evidence

In this section we describe the development of homeownership, mortgage ownership en mortgage interest payments among different cohorts on the basis of a series of Dutch Housing Needs Surveys. The Housing Needs Survey (abbreviated in Dutch as WBO) is carried out every four of five years and contains information about housing, income and demographics of a large sample of the Dutch population. Here we use the WBOs of 1981, 1985, 1989, 1993, 1998 and 2002 (the most recent one that is available). The cohorts we distinguish refer to five-year intervals for the year of birth of the oldest member of the household who is an owner or a renter of the house.[5] The oldest cohort we distinguish consists of households with an eldest member born in 1900-1900, the second oldest to households whose eldest member was born in 1905-1909, et cetera. We will usually refer to cohorts by the midpoints of these intervals, e.g. 1902 for the oldest cohort.

Homeownership

Homeownership rates have increased steadily in the Netherlands over the past half century. Around 1980 there was a temporary dip in this development when house prices collapsed, but the upward trend reappeared soon. Figure 3 shows the development of the homeownership rate for various cohorts in the period 1981-2002. The upper panel refers to the cohorts born before the end of the second World War, the lower one to the postwar cohorts. The trend in the homeownership rates is downward for the older cohorts, and upward for the younger cohorts. Moreover, for the prewar cohorts older cohorts have lower homeownership rates, whereas for the postwar cohorts the reverse is the case.

[5] The earlier version of the WBOs use the terminology ‘head of the household’ and ‘partner of the head’ but the more recent versions avoid this.

The figure shows a broad similarity with the stylized life cycle model for homeownership of Artle and Varaiya (1978) which predicts that households rent in the early and finals stages of their life cycle, while being owner-occupiers in midlife. It must, however, be noted that the decrease in homeownership rates at the end of the life cycle is relatively small and does not necessarily signal a wish to consume housing equity. Indeed, one of the stylized facts of the relationship between ageing and housing demand is that the elderly do not want to reduce their housing equity, cf. Venti and Wise (1990).

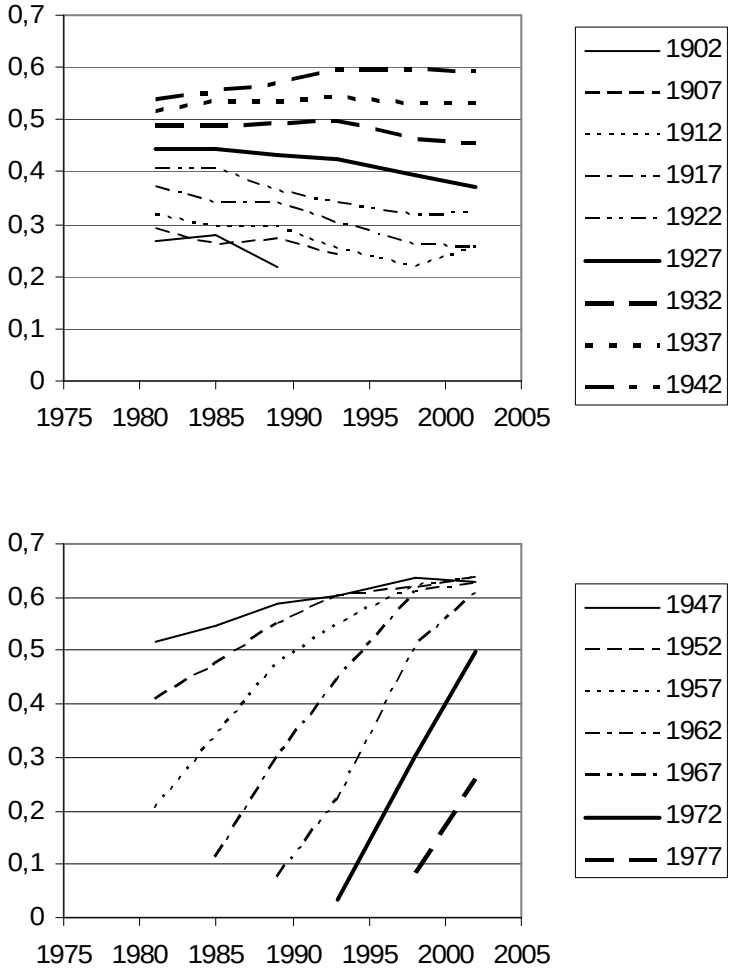

Figure 3 Homeownership rates per cohort 1981-2002. (Source: various WBOs).

The upper panel of Figure 3 strongly suggests that homeownership rates among subsequent cohorts of elderly households are increasing and this is confirmed by cross section

analysis of the relationship between homeownership and age for the various WBOs (see Rouwendal, 2006). The lower panel of the figure shows that homeownership rates among the postwar cohorts were rapidly increasing over the period 1981-2002, which is consistent with the Artle and Varaiya story.[6] The upward sloping lines become steeper for younger cohorts, suggesting that it has become easier to enter the owner occupied part of the housing market. Even though this may appear somewhat surprising, given the substantial increase in Dutch house prices over the 1990s, it must be kept in mind that there was also a gradual decrease in real mortgage interest rates over that period, as well as an increase in the share of two-earner households. As a consequence, affordability of owner occupied housing did not change much in this period.[7]

Figure 3 also suggests that there exists something like a saturation level for homeownership just above 60%. Homeownership rates move to that level faster for younger cohorts. Once that level is reached, homeownership rates tend to decrease only slightly with age.

Mortgage ownership

The amount of money involved in the purchase of a house is usually a multiple of annual household income and few households have an amount of wealth that is sufficiently large to enable them finance the house without taking a loan. Almost all first time homeowners therefore have a mortgage loan. A traditional characteristic of such a loan is that a fixed schedule of repayment in part of the contract. This has the important implication that the household is obliged to build up equity in the home. When the mortgage term is finished, the household automatically is outright owner of the house. In the Netherlands the payback period often equals 25 or 30 years, which is long in comparison to other countries. Moreover, mortgages may be renegotiated when a move to another house takes place. Nevertheless, one expects that most homeowners with a traditional type of mortgage loan will sooner or later become outright owners. An additional reason for this conjecture is that many households regard their home as part of their arrangement for old age: being an outright owner implies the possibility to consume housing services without

[6] It may be noted that in the Netherlands downpayment constraints are less important than in many other countries. It is, nevertheless, common to start a household as a renter and switch to owner occupation after some time.

[7] The ration of mortgage payments to income when the house is completely finance by a mortgage loan provides a rough indicator of housing affordability. A recent study concludes on the basis of this indicator that housing affordability did not change much over the period 1985-2005. See Renes et al. (2006).

out-of-pocket costs. Indeed, this may be one of the reasons why households regard homeownership at old age as more attractive than renting.

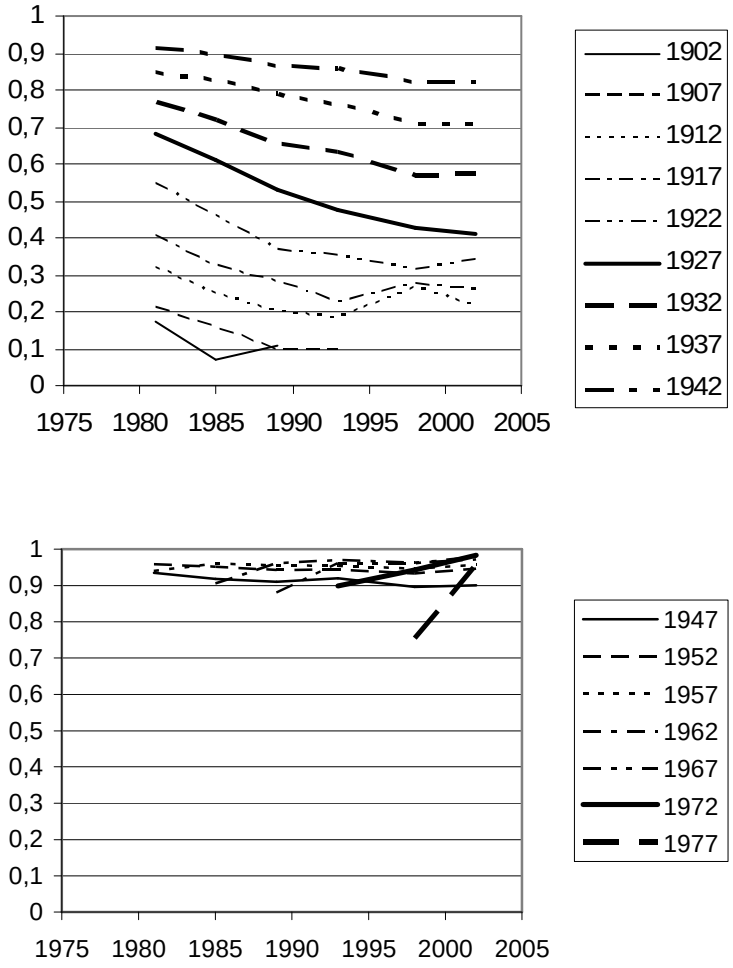

Figure 4 Mortgage ownership rates among homeowners per cohort 1981-2002. (Source: various WBOs).

The upper panel of Figure 4 shows the development of mortgage ownership rates among the prewar cohorts in the period 1981-2002. The lines are indeed downward sloping, but they become noticeably flatter for the younger cohorts. Moreover, the younger cohorts tend to have higher mortgage ownership rates. The figure shows that complete repayment of the mortgage loan has become exceptional for the cohorts born after 1930.

The lower panel of Figure 4 confirms this impression. Only the line referring to the 1947 cohort shows a slightly downward trend. For the younger cohorts the lines increase initially and

then become flat. Even though this will partly have been caused by the long repayments terms common for Dutch mortgages, it seems likely that in the future mortgage ownership rates among elderly Dutch households will remain much higher than they are at present. It will be shown below that an important reason behind this development is the increasing popularity of interest-only mortgages, which do not have a compulsory repayment schedule.

Mortgage payments

Next, we consider the development of mortgage interest payments over time. The traditional mortgage types with a compulsory repayment schedule imply that an increasing part of the loan is redeemed in the course of the mortgage term. As a consequence, mortgage interest payments tend to decrease over time. Since more recently developed mortgage types tend to postpone amortization it should be expected that, as a consequence, the downward trend in mortgage interest payments will have become less pronounced. One therefore expects mortgage interest payments decrease over time, less so among the younger cohorts. Mortgage interest payments will only increase after renegotiation or when a second mortgage is taken.

Figure 5 provides information about the amount of mortgage interest paid by homeowners with a mortgage of various cohorts in the period 1981-2002 that contrasts sharply with this expectation. The upper panel refers again to the older cohorts. Somewhat surprisingly, it shows substantial increases in the average amount of mortgage interest paid between 1989 and 1993 and again between 1998 and 2002. Since residential mobility among elderly households is small, this suggests that many households have renegotiated their mortgage loan or have taken a second mortgage during these periods. The fact that the increases occurred for all cohorts excepts the oldest old (the 1912 and 1917 cohorts) suggests that something happened in these two periods that induced many households to change the financial arrangements with respect to their house. Although it is tempting to relate the increasing in the period 1989-1993 to the relaxation of credit constraints for households with two workers, the fact that also many elderly cohorts increase mortgage interest payments in this period makes this unlikely to be the sole explanation. For the period 1998-2002 the change in the income tax system that occurred in 2001 is an obvious candidate (see Rouwendal, 2007).

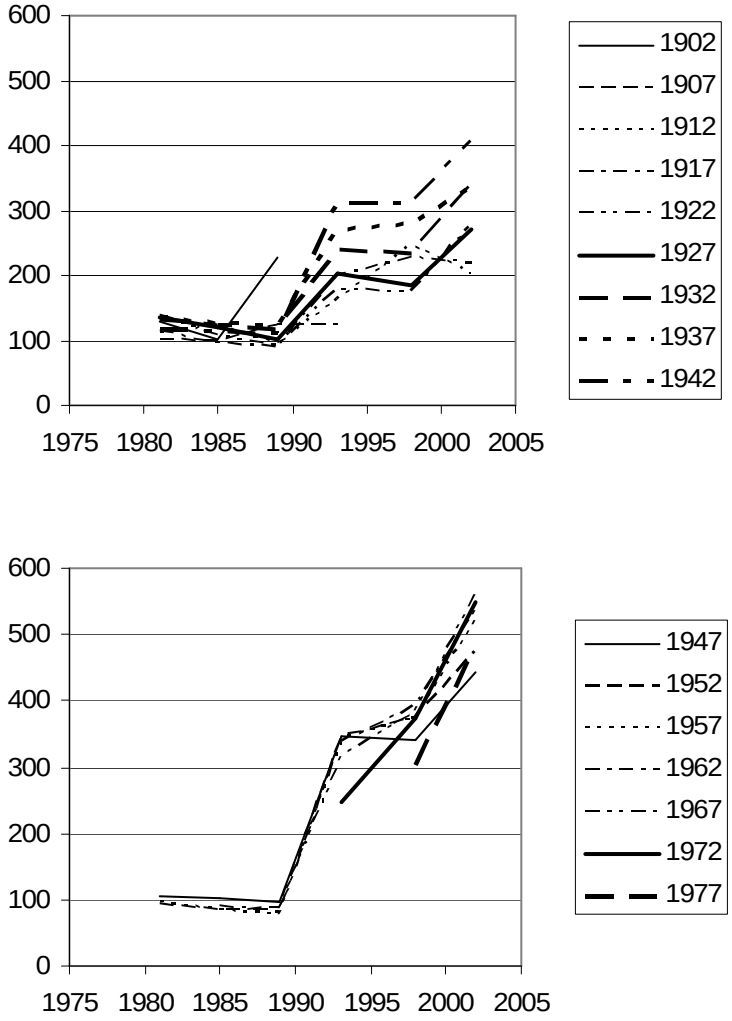

Figure 5 Mortgage interest payments of homeowners with a mortgage per cohort 1981-2002. (Source: various WBOs).

The lower panel of Figure 6 confirms the impression provided by the upper panel in that it shows substantial increases in mortgage interest payments for all cohorts between 1989 and 1993 and between 1998 and 2002, and a slight decrease in these payments over the period 1981-1989. There is, however, no decrease in mortgage interest payments in the period 1993-1998 among these younger cohorts.

Mortgage type choice

The analysis of the previous section suggested strongly that newly developed mortgage types allowed consumers to improve their allocation of resources over the life cycle. If this is indeed the case, and consumers realize this, one expects these new mortgage types to be able to gain substantial market shares. Figure 6 reveals that this is indeed the case. The frequencies indicated in this figure refer to all houses with a single mortgage and the show important developments.

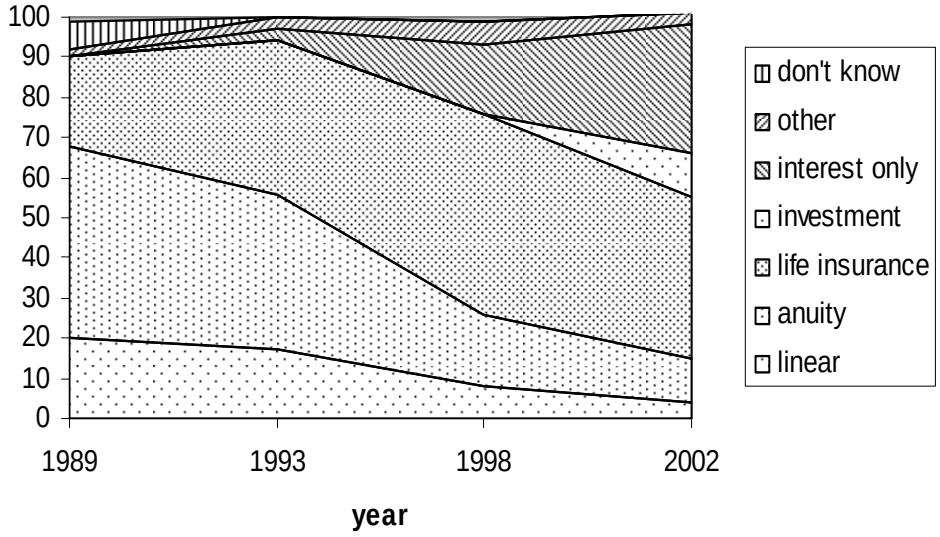

Figure 6 Mortgage types (Source: various WBOs).

The linear mortgage, which still had a market share of about 20% in 1989 (the first yearin which the various types of mortgage loans were distinguished in the WBO), was of negligible importance in 2002. In 1989 almost 50% of the homeowners had an annuity mortgage, but in 2002 its share was less than 20%. The decreasing market shares of linear and annuity mortgages was the mirror image of the growing popularity of the life insurance mortgage, but even this type of mortgage loan lost some of its market share between 1998 and 2002. The investment mortgage loan is also gaining market share in recent years, but the most impressive development since 1993 is the rapidly increasing popularity of the interest-only mortgage. This type of mortgage loan was distinguished separately for the first time in the 1993 version of the WBO and served 30% of the market in 2002.

Notice that the developments registered in Figure 6 refer to the total number of existing mortgages, not just to new mortgages. Changes in market shares of new mortgages must have been substantially larger to be consistent with this figure. We conclude therefore that consumers have reacted massively to the development of new mortgage type and in the way suggested by the theoretical analysis of the previous section.[8]

Interest-only mortgages

In Figure 7 we present further information the increasing popularity of interest-only mortgages. We already noted that it appears on the menu of possible mortgage types in the Housing Needs Surveys for the first time in 1993. In that year its share is small: 3.4%. Since then it has grown rapidly: in 1998 17,0% of the mortgages appear to be of this type and in 2002 this has grown to 31,8%. It should be recalled that these percentages refer to homeowners with a mortgage without compulsory repayment who do not have another mortgage loan. Since interest-only mortgages are popular as second mortgages, many households with two or more mortgage loans probablty also have such a mortgage. Figure 7 therefore provides a conservative picture of the increasing popularity of this non-traditional mortgage type.

The Figure clearly shows – perhaps somewhat surprisingly - that the interst-only mortgage is especially popular among the older cohorts. For all these cohorts, except the oldest one, this mortgage type was held by over 40% of the households with a single mortgage. It should be noted that these households must have renegotiated the earlier type of mortgage loan, or have taken a new one. Since residential mobility is low among elderly people, a large share of these changes in mortgage arrangements must have occurred without residential mobility. The natural explanation for this development seems to be that elderly households experience a compulsory repayment schedule as a burden they would like to avoid. This fits neatly in the basic picture of life time consumption and homeownership that emerged from the Artle and Varaiya (1978) analysis. The only difference is that taking a mortgage loan without repayment obligations allows a household to consume part of its housing equity without having to move to the rental sector, whereas Artle and Varaiya assumed this to be impossible due to credit constraints.

[8] The lmited size of the markets hare of the investment mortgage loan may have been caused by its riskiness.

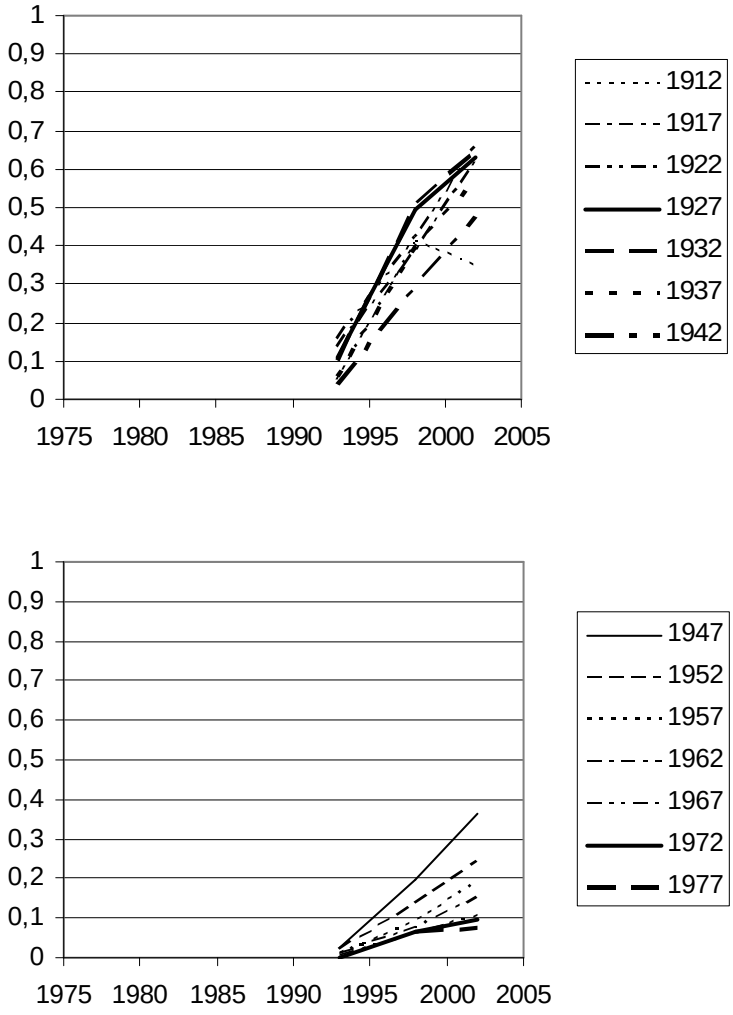

Figure 7 Share of interest-only mortgages among homeowners with a mortgage per cohort 1993-2002. (Source: various WBOs).

Summarizing our discussion of the Figures 3-7, it may be said that the period 1981-2002 showed large changes in housing market behavior. More people became homeowners and used a mortgage loan to finance their house. Newly developed mortgage types that made more intensive use of mortgage interest deductibility rapidly gained substantial market shares. These mortgage types tend to postpone repayments and therefore increase total outstanding mortgage debt and limit the accumulation of equity. Among the homeowners with a mortgage, interest payments have increased substantially around 1990 and 2000.

All these developments are also – and sometimes especially - relevant for elderly households. A much larger share of the cohorts passing the threshold age of 55 are now homeowners. A much large share of these homeowners now still have at least one mortgage loan. Also among the elderly, mortgage interest payments have increased substantially around 1990 and 2000. Finally, many of the elderly households now have a mortgage without compulsory repayment which is presumably used to increased consumption.

6 Conclusion

The previous sections presented a preliminary and incomplete analysis of some important developments on the Dutch housing market: product innovation on the mortgage market and increasing use of mortgages to finance housing and – presumably – other consumption. In this concluding section we address the question whether the life cycle model is able to explain these developments.

In general the answer to this question seems to be affirmative. The –admittedly - simple version of the life cycle model we used in our simulations seems to be in agreement with the increase in homeownership and with market responses to newly introduced mortgage types. A major discrepancy between the life cycle theory (as embodied in the simulation model, but also with more general versions) and the actual developments is that the former suggests that households have strong incentives to return to renting towards the end of the life cycle, so as to consume housing equity, whereas the actual developments show little movement from owning to renting. There are various possible explanations for this discrepancy. One is that households have a bequest motive for saving that was ignored in the present version of the simulation model. Another possibility is that housing provides insurance against rent risk (cf. Sinai and Souleles, 2005). Even though rents are regulated in the Netherlands, there has been an upward trend in real rents and further liberalization of the rental part of the market is a real possibility. The reluctance to move to the rental sector of the housing market may be reinforced by large psychological costs of mobility among elderly households: they may simply be unwilling to move to another place.

A third possible explanation is that the upward trend in homeownership rates among the elderly coincides with a much higher share of mortgage ownership among the elderly owner-occupiers. As we noted earlier in this paper, life cycle theory is consistent with permanent homeownership if it could be financed with an interest-only mortgage. The only reason for the

predicted return to the rental sector in the Artle-Varaiya model is that households want to consume housing equity. They would probably prefer to be able to consume (a substantial part of) this equity without having to move to another place, and one interpretation of the facts presented above is that this is exactly what happens among elderly homeowners in recent years. The increasing amounts of mortgage interest paid by the elderly and the rapid growth in popularity of the interest-only mortgage fits neatly in this story.

Several potentially important questions are left unanswered by the research of this paper. One is the absence of a market for reverse mortgages (see Caplin, 2000). One would expect a booming market for this type of mortgage, but its introduction on the Dutch market has met little success until now. A second issue is the potential increase in the vulnerability of owner occupiers for macroeconomic shocks now that their numbers and the size of their outstanding debts have increased considerably. An increasing share of the mortgages, currently about 30%, has interest rates that are periodically adjusted and the current low interest rates imply the possibility of a substantial relative increase in mortgage payment as a consequence of a 1 or 2 percent increase in long term interest rates. Such a shock may also be expected to have substantial consequences for house prices and income tax revenues. These and other issues have to be left for future research.

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