

The demand for more expensive owner-occupancy in the Netherlands: will there be rain after the sunshine?

Abstract

The share of owner-occupied dwellings in the Dutch current dwelling stock grew considerably during the 1980s and the 1990s. The share of owner-occupied units was 39% in 1977, rising to 45% in 1989 and reaching 52% in 1999. Meanwhile, the share of non-subsidized units in newly constructed owner-occupancy housing doubled from the mid-1980s onwards, reaching about 70% in the second half of the 1990s. These developments generated a sharp rise in the number of more expensive owner-occupancy units (minimum sales value of about 198,000 Euro, 1999 prices) in the dwelling stock. In spite of this increase in supply of owner-occupied dwellings, the annual average house price rose gradually from the mid 1980s and then rapidly from 1995 onwards, because the demand for owner-occupied dwellings was growing constantly and faster than the supply in this period as well. This was also the case in the more expensive part of the owner-occupancy sector.

In this contribution we discuss the possibilities of explaining at the macro level the development of the size of the demand for more expensive owner-occupied dwellings in the Netherlands between 1975 and 1995. By applying time series analysis we established the extent to which the annual percentage of households that moved to such a dwelling can be explained by demographic (age structure) and socio-economic (income) developments and by developments on the housing market such as house prices, rents, mortgage interest and the supply of (new) dwellings. This analysis was also applied to the annual percentage of households predisposed to move to more expensive owner-occupancy.

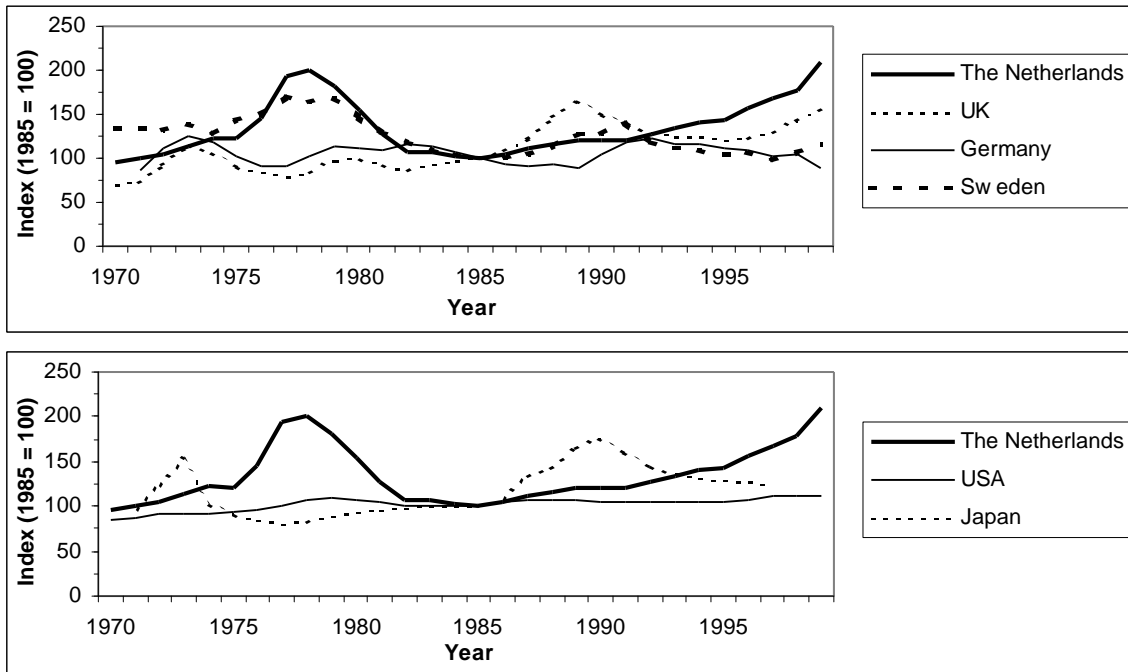
On the basis of the resulting models we have forecast some possible trends in the demand for more expensive owner-occupied dwellings in the near future by using three scenarios. The steep growth of this demand seems likely to change to a minimal growth or stabilization in the first few years of this century. However, there are some opportunities and threats, not controlled for in this prediction, that could change this future development.

1 Introduction

This contribution is based on part of a research project undertaken in the context of a PhD programme in which the focus was the developments of the *nature* and the *size* of the demand for more expensive owner-occupied housing in the Netherlands during the 1970s, 1980s, and 1990s. The research study was instigated by the increasing rise in house prices at the beginning of the 1990s. At the end of the 1970s the Netherlands owner-occupied housing market underwent a similar boom with annual price rises of 30 to 40% (nominal). The demand for more expensive owner-occupied housing increased markedly in that period. This boom was then rapidly followed by a crisis situation on the owner-occupied housing market. The average sale price (nominal) fell rapidly by

10% per year, the construction of new owner-occupied housing came almost to a standstill and some owner occupiers found themselves in financial difficulties. Together with Belgium (and to a lesser extent Sweden), the Netherlands was the only Western country experiencing such a development at that time and where such an extreme situation took place in the last decades of the 20th century (see figure 1). The question which came to mind was whether the owner-occupied housing market was again entering a phase leading into another such extreme development.

Figure 1 Average selling price (corrected for inflation) in a number of Western countries, for the period 1970-1997, index (1985 = 100)



Source: Boelhouwer, 1999.

To answer the above question, the research project concentrated on the upper part of the owner-occupied housing market. Subsidized owner-occupied housing was excluded, since market forces would operate more freely elsewhere. By *more expensive owner-occupied housing* we mean *all owner-occupied housing with a sale price of at least 125,000 Euro in the basis year 1993 (from 197,000 Euro in 2000)*. About 25% to 30% of the owner occupancy sector in the Netherlands belonged to this section.

An understanding of the underlying processes is naturally of importance in assessing whether the demand development in the 1990s resembled demand development in the second half of the 1970s. Three research questions were formulated as follows:

What factors influenced the development of the size of the demand for more expensive owner-occupied housing in the period 1975-1997? To what extent can the demand for these dwellings be explained by the developments in the factors concerned during the period indicated? And which developments in the demand for more expensive owner-occupied housing are possible in the period 1998-2005?

No longitudinal data are available which refer to the demand for (more expensive) owner-occupied housing in the Netherlands. Moreover, in our opinion neither the revealed preferences nor the stated preferences of households provide a more reliable or better indicator for this demand. We therefore investigated both the realized demand and the potential demand for more expensive owner-occupied housing in addressing the second and third research question.

The next section elaborates the theoretical framework of housing choice and housing markets. In section 3, the data and the analysis techniques are described. Section 4 presents the explanatory model for the realized demand for more expensive owner-occupied housing in the period 1975-1993, while the explanatory model for the potential demand development is described in section 5. With the aid of both models an estimate was made of the size of the realized and the potential demand in the period 1994-1997. These estimates are set against the observed developments, which leads to an adaptation of both models. This testing of the models is described in Section 6.

The prediction of the possible developments in the size of the demand in the period up to 2005 is the essential feature of section 7. This prediction is based on the adapted explanatory models and three formulated scenarios. Section 8 presents the most important conclusions and some discussion of the research results.

2 Housing choice and housing market

Three choices are made in the course of the decision to move into a particular dwelling or housing unit, and each choice is inextricably tied to the other two. The choices relate to the timing of a move, whether to buy or to rent, and the level of housing services (Laakso and Loikkanen, 1992; Elsinga, 1995). Thus, opting for a more expensive owner-occupied dwelling is a combination of the last two choices.

We assume that the choice of a more expensive owner-occupied dwelling in general can be related partially to people's household lifecycle, socio-economic, and housing market positions. This relationship between the demographic and socio-economic characteristics of households and dwelling choice has been demonstrated in many investigations (Leslie and Richardson, 1961; Kendig, 1984; Clark & Onaka, 1985; Haurin, 1991; Clark et al., 1994; Mulder & Hooimeijer, 1995).

At an earlier stage, on the basis of analyses at household level, we were able to establish connections between certain demographic household characteristics (composition of the household and age of the head), socio-economic characteristics (income of the household), and housing market position (starter, tenant, or owner-occupier) and their (propensity to) move to a more expensive owner-occupied dwelling (Boumeester, 1996). The analyses also revealed that these connections were dependent on the (housing market) circumstances under which the housing choices had to be made.

Moving behaviour is not only an expression of a household's preference; it is also a reflection of the constraints on the housing market (Thorns, 1980; Dieleman & Everaers, 1994; Mulder & Hooimeijer, 1995). The availability and accessibility of the preferred dwelling are involved. With respect to the availability of more expensive owner-occupied housing, the primary supply of such dwellings is of importance. This supply includes the newly constructed dwellings in the more expensive owner occupancy segment and existing dwellings which become available when households leave the housing market. In this case, the secondary supply (dwellings which become available through the filtering of households) is less important. When households already living in a more expensive owner-occupied dwelling move, mostly another dwelling in this segment is involved. The newly constructed supply has a crucial part to play as the starting point of house moving chains, certainly in the Netherlands situation where the owner-occupied housing market is tight.

Opportunities to obtain a mortgage largely determine accessibility to an owner-occupied dwelling. This is certainly true in the Netherlands, where people do not normally save up to buy a home (Elsinga, 1995). The accessibility of the (more expensive) owner occupancy sector is, in addition to the level of a household's income, strongly determined by the types of mortgage on offer and the criteria applied with respect to the loan-to-income ratio and the collateral value of the dwelling.

Households have to make financial sacrifices to acquire a home of their own. Their expenditure on housing also determine how much they can save and how much disposable income they have (Henderson & Ioannides, 1989; Forrest et al., 1990). On the one hand, the purchase of a home is a decision in the realm of consumption, while on the other hand, it is an investment decision. A home of their own is perceived as a 'savings account' for old age, and as an attractive investment property, because real estate keeps up its value relatively well (Megbolugbe & Linneman, 1993; Boelhouwer, 1999). A potential purchaser will certainly take into account the circumstances on the housing market (interest rates and price developments).

According to expectations, at the macro-level, the size of the demand for more expensive owner-occupied housing will be determined in part by the supply of (newly constructed) dwellings and the sale price (development). Under the conditions of free market competition, the homogeneity of the good and complete market transparency, the confrontation of supply and demand leads to a gradual adaptation of the equilibrium price. A demand surplus would lead to a temporary price rise, so that supply would be increased and a loss of demand would occur. This expansion and rise would put further pressure on the price, so that a new equilibrium price would be reached (MacLennan, 1983; Van der Schaar, 1991).

The owner-occupied housing market is far from perfect; the relationships between demand, supply and price can be seriously distorted. Some imperfections inherent in the housing market are the heterogeneous character of the dwellings offered and those in demand, the attachment of dwellings to a particular location, and geographic differences in the housing supply. The completion time for the housing construction process also leads to problems in adjusting supply and demand. These imperfections can generate substantial price fluctuations, the effects of which are particularly noticeable in the short and medium-long term. In the long term, these fluctuations will average out at around the equilibrium price (Abraham & Hendershott, 1996; Boelhouwer, 1999).

An external factor which contributes to the imperfections of the housing market is the policy of the government and of large institutions (government policy on new construction and spatial planning, the fiscal treatment of house ownership, and the conditions for borrowing capital, for example). This institutional policy can have both a restrictive and a stimulating influence on the demand for and the supply of dwellings. Although there is evidence here of a more structural influence, changes in policy can lead to substantial short term fluctuations (Van der Schaar, 1991; Muellbauer & Murphy, 1997).

Finally, the price mechanism on the (owner occupancy) housing market is also disturbed by what is referred to in the literature as *speculative demand*. This has a particularly strong effect in the short term and in housing market areas with an uneven demand-supply ratio. The term *speculative demand* suggests that the demand for owner-occupied housing is also influenced by the development of sale prices in the recent past. A price rise will lead households to hasten their move to buy so as to gain maximum profit from the capital gains opportunities. Conversely, a price fall will lead households to postpone (temporarily) their purchase decision to avoid loss of capital (Reichert, 1990; Abraham & Hendershott, 1996; Meen, 1998; Boelhouwer, 1999).

Various factors can thus play a part in the explanation of the development in the size of the demand for more expensive owner-occupied housing during the period 1976-1993. Demographic, socio-economic and socio-cultural factors can be cited as a more structural explanation for this demand development. The institutional factors also belong to the structural category. With the exception of the socio-economic factors, which can also be of influence in the short and medium-long term, these factors have a long-term effect on demand development. Radical changes in the policy indicated could also play a part in the short term.

In addition, there are three factors referring to the dynamic of the housing market which are also capable of contributing to the explanation of the demand development of more expensive owner-occupied housing in the short and medium-long term. These factors are: the supply of both newly constructed dwellings and dwellings in the existing stock; the sale price of dwellings (both actual amount and yearly mutation); house rents.

3 Data and method

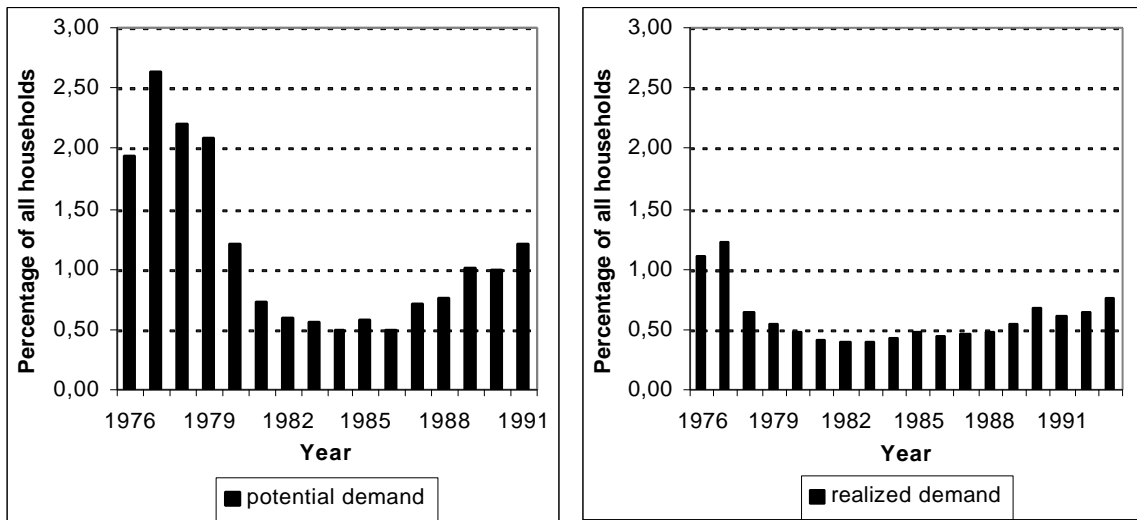
As reported in the introduction, we define the housing market segment of more expensive owner-occupied housing as *all owner-occupied dwellings with a sale value of minimal 125,000 Euro (price level 1993)*. For the years considered, we have corrected this bottom limit by the level of inflation.

The two national surveys¹, the WBO and the NRO, facilitated the determination on an annual basis of the number of households (already living independently) that had moved to a more expensive owner-occupied dwelling, or had the intention to move. These numbers were then related to the total number of households in the year

¹ The Housing Demand Survey (WBO) was a sample survey held every four years between 1977 en 1993. The National District Survey (NRO) was a sample survey, with housing and mobility included in the topics, undertaken annually during the period 1976-1991,.

concerned. The dependent variable in this research, the size of the *realized* demand, can then be described as *the percentage of all households per year that moved to a more expensive owner-occupied dwelling*. The size of the *potential* demand is *the percentage of all households with the propensity to move to such a dwelling*. Figure 2 shows the development of this demand on the basis of both the revealed preference and the stated preference.

Figure 2 Volume of the potential and the realized demand for more expensive owner-occupied dwellings in the Netherlands, for the period 1976-1993



Source: WBO 1977, 1981, 1985, 1989 and 1993; and NRO 1976-1991.

From figure 2 it can be seen that the development of the demand for more expensive owner-occupied housing broadly follows the development of the Netherlands average sale price. The high level of the realized and the potential demand at the end of the 1970s was followed by a strong reversal in the first half of the 1980s. This fall was relatively stronger for the potential demand than for the realized demand. The size of the demand for more expensive owner-occupied housing then rose continually again. The potential demand at the end of the 1970s was clearly greater than the realized demand. This difference then fell back strongly in the first half of the 1980s: the percentages became almost equal. After 1985, the potential demand again increased more than the realized demand. The owner-occupied housing market became correspondingly more tense.

From various other sources, we constructed a database with possible explanatory variables indicated in the literature. The factors concerned include population composition, average household income, mortgage interest rate, new construction production, the composition of the existing housing stock, average sale prices, and average rents. No complete data series was available for a factor of steadily increasing importance, namely households' assets.

Thus, the analyses are applied to a continuous response variable and several explanatory variables of a continuous or categorical nature. The use of a multiple regression technique is the evident option. The time factor (through imperfections on

the housing market and through speculative effects) plays an important part in modelling the development in the size of the demand. To be able to include time effects in the explanatory analyses adequately, we used a specific form of multiple regression technique: *time series analysis*.

A time series model can be interpreted in much the same manner as a standard regression model. Through the trend correlation, higher values for R^2 are usually reached more quickly in time series analyses than in standard regression analysis. In addition, in smaller samples R^2 is often estimated a little too high. It is therefore better to make use of the 'adjusted' R^2 (Draper & Smith, 1981). Moreover, the residue analysis ought to receive more attention in the time series method, because of the greater chance of autocorrelation within time series models.

Two points of a methodological nature need to be discussed here. First, the number of measurement points we had available may be considered rather limited for time series analyses. In addition, we used a dependent variable of which the observed values lie per definition in the interval 0-100. The values of the response variable to be estimated with a time series model do not hold to this limitation. The elimination of this inconsistency by the transformation of the observed values (naturally logarithmic), would mean an undesirable loss of information. Moreover, exceeding the upper limit (100) was not expected, considering the observed values (< 10). We therefore decided to use the non transformed dependent variable. Explanatory models which estimated a negative value for some year were deemed unusable.

There is no specific explanatory model readily available from the (inter-) national literature for the course followed by the demand for more expensive owner-occupied housing. In the studies we identified the models are restricted to the explanation of the choice for an owner-occupied or a rental dwelling and/or the choice for the quantity of housing services often without a time dimension (Hendersson & Ioannides, 1986; Laakso & Loikkanen, 1992; Dieleman & Everaers, 1994; Elsinga, 1995). Although explanatory models have been constructed on the basis of time series analyses, they are for sale price development, for example (Reichert, 1990; Abraham & Hendershott, 1996; Meen, 1998; Boelhouwer, 1999). The analyses we undertook had then a strongly explorative character.

4 Modelling the potential demand (1976-1991)

Making use of the Time Series options in the Regression Module of SPSS, we first determined some alternative explanatory models for the development of the potential demand for more expensive owner-occupied housing. Various possible explanatory variables (in various transformations, in both nominal and real terms, with or without a delay of the effect) were assessed for their explanatory power. The following points of departure moderated the final choice of the best model:

?? presence of a 'constant' in the model;

?? for the same influence, preference for an explanatory variable in real terms to one in nominal terms;

- ?? the size and direction of the partial correlation coefficients to be statistically significant and meaningful with respect to content;
- ?? absence of high multicollinearity;
- ?? absence of autocorrelation;
- ?? preference for a parsimonious model.

This procedure led to an estimated equation with, in addition to a constant, three explanatory variables: house prices; mortgage interest; a demographic factor (the series of data used are included in Appendix 1). A further (graphical) examination of the residuals revealed, however, evidence of an autocorrelation between the residual on time 't' and the residuals in the three years foregoing. This observation reduces the reliability of the explanatory model. The accuracy of the partial correlation coefficients determined is then brought into doubt.

A frequently applied solution for this situation is the transposition of the time series model into an ARIMA model. The ARIMA (AutoRegressive Integrated Moving Average) analysis technique is available as an application within the SPSS. The ARIMA model can be perceived as a specific time series model in which the observed autoregressive process is taken into account in the estimation of the model. After the original series of data for both the dependent and the independent variables were corrected by means of a transformation for the determined autocorrelation, the explanatory model was again estimated. The partial correlation coefficients then obtained were more accurate than those originally determined.

The final equation obtained is as follows:

$$PD = 2.696 + 0.027 * P - 0.181 * I - 0.013 * D$$

whereby:

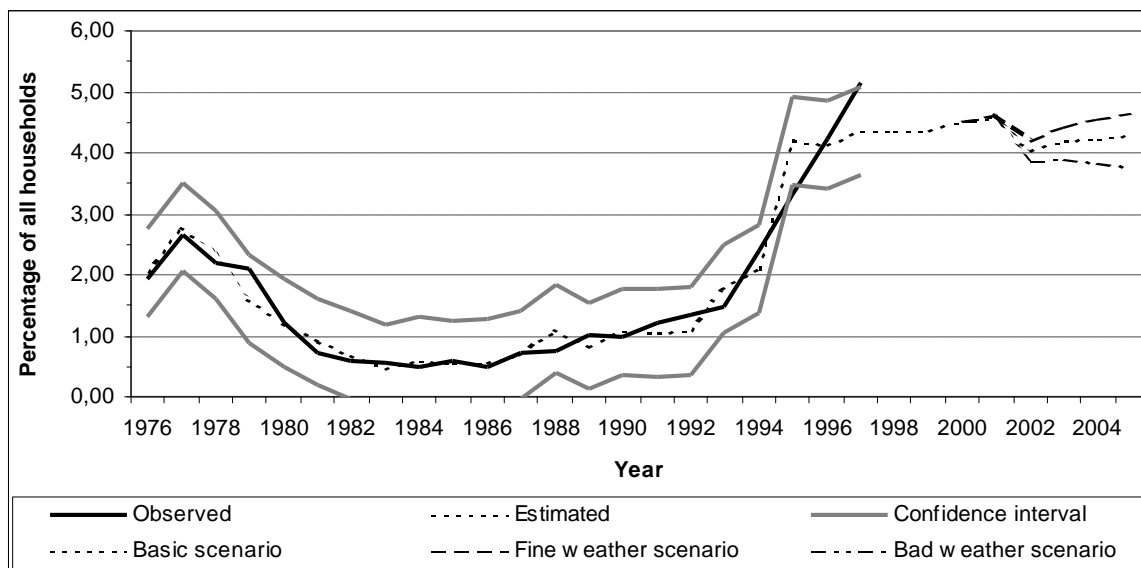
- PD = percentage of all households willing to move to a more expensive owner-occupied dwelling;
- P = annual percentage of mutations of the average sales value, in real terms (1 year delay);
- I = annual average mortgage interest, in real terms;
- D = annual increase in the number (x 1,000) of persons aged 35-44, advanced mean (1 year delay).

With this model (further model data are included in Appendix 2), more than 90% of the variance in the potential demand for more expensive owner-occupied housing from the period 1976-1991 can be explained (adj. $R^2 = 92.5\%$). The fit of the model can be said to be reasonable, as the size of the standard error of the estimate (SEE) makes clear. The graphical representation of the analysis results also confirms this conclusion (see figure 3). With the exception of 1988, the estimated development follows the observed development fairly accurately. In addition, the points of change in the development were also well predicted.

The positive correlation between the sale price development and the size of the demand is probably a consequence of the speculative demand and can be traced back in part to the capital gains of owner occupiers. A rise in the mortgage interest rate leads (other things being equal) to a reduction in households' borrowing capacity and thereby to a smaller potential demand. Proceeding from the fact that households in the age range

35-44 years are relatively less inclined to move to a more expensive owner-occupied dwelling, an increase in this population group leads to a lower potential demand.

Figure 3 Observed and estimated potential demand for more expensive owner-occupied dwellings in the Netherlands, for the period 1976-1997, and a forecast of potential demand on the basis of three scenarios, for the period 1998-2005



Source: NRO 1976-1991; and WBO 1977, 1981, 1985, 1989 1993 and 1997.

The standardized B coefficients indicate that the partial influences are all of similar strength. Over the whole period, the three factors contribute more or less equally to the explanation of the size of the potential demand for dwellings from the more expensive owner occupancy segment. Further examination of the partial effects on an annual basis (not reported here) made it clear that the influence of the sale price development was particularly strong in the period 1976-1983. The influence of the mortgage interest rate led to exceptions at the end of the 1970s and in the years 1986-1988. The strong growth of the number of people in the age group 35-44 years led to a growing negative contribution to the demand development in the period up to 1985. This contribution then gradually decreased again. The effect of the post-war baby boom can be clearly seen here.

However, as stated above, the model is based on a limited number of observations (N = 16). Moreover, the autocorrelation found between the residues leads to the suspicion that another important, explanatory factor has remained outside the model.

5 Modelling the realized demand (1976-1993)

The procedure described in the previous section was also undertaken for the realized demand for more expensive owner-occupied housing. A time series analysis again leads to an explanatory model with a constant and three independent variables, including sale

price and mortgage interest rate. The newly constructed supply of non-subsidized owner-occupied housing is included in the model here in place of a demographic factor; so the model only consists of housing market (related) factors. But again, there was evidence of an autocorrelation between the residues, in this case between a residue at time 't' and the residues in the four previous years. After transforming the time series model into an ARIMA model the following estimated equation is obtained:

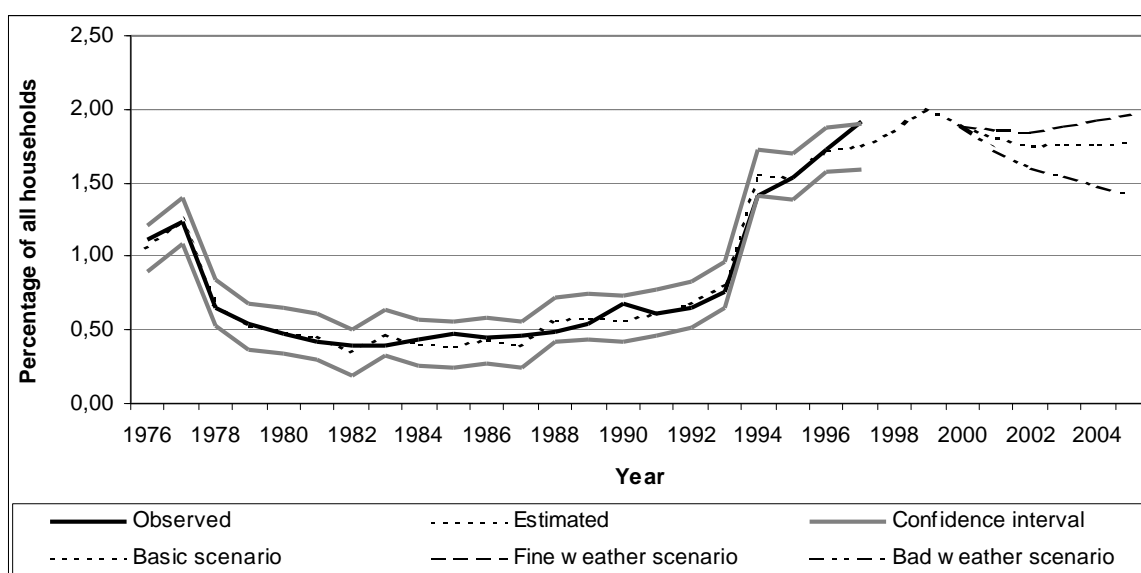
$$RD = 0.719 + 0.014 * P - 0.054 * I + 0.007 * S$$

whereby:

- RD = percentage of all households that have moved to a more expensive owner-occupied dwelling;
- P = annual percentage of mutations of the average sales value, in real terms;
- I = annual average mortgage interest level, in real terms;
- S = annual number (x 1,000) of newly constructed non-subsidized owner-occupied dwellings, advanced mean (1 year delay).

Additional model data are given in Appendix 2. These indicate that the percentage of the variance explained (adj. R²) also lies well above the 90% level. The greatest contribution to this explanation is provided by the percentage mutation of the average real sale price (no delayed effect here). The standardized B coefficient of this variable is by far the highest. The contribution of the average mortgage interest rate (real) and of the supply of newly constructed housing in the unsubsidized owner occupancy sector turn out to be of the same order, but in opposite directions. A larger number of newly constructed owner-occupied dwellings result, with a delay of a year, in a greater

Figure 4 Observed and estimated realized demand for more expensive owner-occupied dwellings in the Netherlands, for the period 1976-1997, and a forecasting of the realized demand on the basis of three scenarios, for the period 1998-2005



Source: WBO 1977, 1981, 1985, 1989 1993 and 1997.

realized demand. This effect comes about both directly (through the moves to the more expensive new owner-occupied dwellings) and indirectly (filtering effects). On an annual basis the partial effect of the newly constructed supply appears to have followed the economic conditions on the owner-occupied housing market. The partial contribution first increased until 1980, fell gradually in the period 1980-1985, and then again rose sharply. The effect is not unexpected, considering the scarcity on the Netherlands (more expensive) owner-occupied housing market in the period observed. The partial effects on an annual basis of the sale price development and the size of the mortgage interest rate on the size of the realized demand give a picture similar to that for the potential demand.

The size of the realized demand for more expensive owner-occupied housing in the period 1976-1993 can be estimated reasonably well with this explanatory model, as the low SEE and the practically parallel course followed by the observed and the estimated development of this demand (see figure 4) demonstrate. But again, the number of observations was somewhat limited. Moreover, it is very presumable again that another important factor has been omitted from the model.

6 Testing the models for the next period (1991-1997)

While the research was being carried out, the Housing Demand Survey 1997 (WBO1997) became available. As a result, it also became possible to determine the number of moves to a more expensive owner-occupied dwelling for the years 1994-1997 on an annual basis. In addition, we used the information from this WBO1997 and the WBO1993 to estimate the course taken by the potential demand in the period 1992-1997. By comparing the observed size of the potential demand and the realized demand in the period indicated with the development estimated with the help of both explanatory models, we could test the power of prediction of these models.

The prediction of the future development of demand on the basis of the estimated equation would actually only yield reliable results if the previously identified relationships in the model did not change in the following years. Moreover, the circumstances concerning other possible influential factors which were not, or could not, be included in the model, must conceivably also remain unaltered. The great unknown on this point remains the development of assets at household level. In addition, we also know that in 1992 the two-earners' mortgage was introduced. This allows a second income in the household to be included completely and without any supplementary conditions in the determination of the maximum obtainable mortgage loan.

The model for potential demand predicts in the first instance a line continuing to rise to 1.7% in 1994. After that, according to expectations potential demand should fall slightly to 1.4% in 1997. The level at the end of the 1970s would not be reached again. In reality however, the potential demand grew enormously from 1993. In 1997, more than 5% of all households had the intention of moving to a more expensive owner-occupied dwelling. This percentage was twice as high as in 1977.

A comparable situation arose with respect to the realized demand for dwellings in the more expensive owner occupancy segment. On the basis of the estimated equation,

after 1993 a rise in this demand was to be expected to 1% in 1996, after which a slight fall would occur. The data from the WBO1997 indicate however that the realized demand in the period 1993-1997 actually grew more strongly, to almost 2%.

The predictive power of the models described in the previous sections is therefore poor for the developments in the middle of the 1990s. We assume that the reason for this does not really lie in changes in the mutual relationships between the dependent variable and the independent variables. In our opinion, the differences between the predicted and the observed developments are the result of altered circumstances outside the model, namely the strongly expanded financing opportunities for households in the period from 1993. The introduction of the two-earners' mortgage and the continued growth in the number of two-earner households signify for many people a substantial expansion in their opportunities to borrow capital. Even when mortgage interest rates and household incomes remain the same, a more expensive owner-occupied dwelling becomes accessible for more households.

The extension of the previously determined time series models with a dummy, enabling a distinction to be drawn between the period before 1993 and the period from 1993 onwards, provided an adequate solution permitting the changed circumstances after 1993 to be taken into account in the prediction. For the best estimate of the results for the realized demand for the period 1976-1997, the effect of this dummy ought to be delayed by a year. Households thinking about moving need two years to express their changed financing opportunities in house moving plans.

The model data for the extended explanatory models are included in Appendix 2. The partial correlation coefficients in the explanatory model for the potential demand in the period 1976-1991 and in the extended model for the period 1976-1997 hardly differ. However, the autoregressive process does appear to be absent in the extended model. The explained variance (adj. R^2) is equally large for both periods. The SEE is certainly higher in the extended model than in the original model. This is mostly caused by the somewhat larger residuals in the period after 1992, for which we only have available an indication of the observed development. With respect to the realized demand, the differences in model data between the original and the extended model can be said to be minimal. In the extended model, there is no further evidence of autocorrelation between the residuals.

The developments in demand estimated with the extended models for the years 1993-1997 are now much better in line with the observed developments (see figures 3 and 4). By adding the dummy to the original explanatory models, we have at our disposal two time series models that are good, both statistically and in terms of content. The development of the potential and the realized demand for more expensive owner-occupied housing in the period 1976-1997 (including the observed break in the trend) can be reasonably well explained. These models also serve in the following section as the basis for the prediction of the demand development in the period 1998-2005.

7 Forecasting the demand for more expensive owner-occupied dwellings (1998-2005)

Assuming that the correlations between dependent and independent variables remain the same, it is possible to predict the development of demand in the near future on the basis of the (newly) estimated equations. In addition to these, we also need to have the future values for the independent variables included in the models. For the years 1998-2000 we used actual values, which were already known. We worked out three scenarios for the period 2001-2005. For all three scenarios we assumed the same inflation level (4% in 2001 and after that 2.5%), the same annual new construction production (81,000 dwellings), and an identical population development. The scenarios differ on the other hand with respect to the expected development in sale price, development of mortgage interest rates, and the share of non-subsidized owner-occupied housing in new construction.

In the *basic scenario* the average sale price (nominal) rises yearly by 3.5%; a rise just above the inflation level. The nominal mortgage interest rate is fixed during the whole period at 6%. The share of unsubsidized owner-occupied housing gradually rises from 72% in 1999 to 78.5% in 2005.

The *fine weather scenario* assumes a more favourable situation. The yearly rise of the nominal sale price increases further from 6% in 2001 to 10% in the year 2005, while the nominal interest rate percentage falls in the same period by 0.25% per year. The share of the non-subsidized owner occupancy dwellings in new construction rises more strongly than in the previous scenario, namely to 85% in the last year.

The *bad weather scenario* is based on clearly less favourable future developments. We assume an increasingly larger price fall of the average sale price (from 0% in 2001 to -10% in 2005). In addition, the mortgage interest rate is adjusted upwards by 0.25% per year. We assume further that, through these unfavourable developments, the share of the unsubsidized owner occupancy dwellings in the total new construction is reduced by about 2% per year to 60% in the year 2005.

The series of data for the independent variables in the three scenarios resulting from the above assumptions are included in Appendix 1. A graphical representation of the prognosis results for the potential demand and the realized demand can be found in figures 3 and 4 respectively.

The observed development shown in figure 3 of the potential demand in the period 1992-1997 is, as reported, only a best possible indication of the actual development. Data on an annual basis are only available for 1993 and 1997. This must be borne in mind in the examination of figure 3. According to our prognosis, the potential demand for more expensive owner-occupied housing continued to rise steeply to the year 2001. In the year 2002 a brief relapse follows in all three the scenarios. The much smaller rise in the average sale price in 2001 compared with the previous years is the cause of this.

In the basic scenario, the demand then rises again to a limited extent; the size of the demand in 2001 will not be reached again before the year 2005. However, this is the case in the more favourable fine weather scenario, which anticipates a slightly stronger recovery of the potential demand from 2002. Should the average sale price continue to fall during the whole period, than the size of the potential demand for dwellings in the more expensive segment will also slowly become smaller from 2003. The difference in

size between the most favourable and least favourable scenarios amounts in 2005 to almost 1% of all households in the Netherlands. In the least favourable scenario, the demand falls by one fifth in comparison with the demand in the fine weather scenario.

According to this prognosis, the realized demand for more expensive owner-occupied housing rose after 1997 relatively more strongly than the potential demand. The highest point in the demand development actually arrived earlier, namely in 1999. In all three scenarios the sale price is assumed to rise much less than was the case at the end of the 1990s. Through this we see the realized demand fall in size from 1999. The extent of this fall, and the length of the period through which it continued, differs in the various scenarios.

In the basic and fine weather scenarios, a recovery of the realized demand takes place from 2002. In the first scenario described there is evidence of stabilization in the remaining years. In the most favourable scenario the realized demand again increases, so that the level of 1999 is almost reached again in 2005. Should the circumstances on the owner-occupied housing market remain unfavourable (the bad weather scenario), the size of the realized demand becomes steadily smaller. In 2005 the level of 1994 would then be attained again. In that case, the realized demand would only amount to three quarters of that in the most favourable scenario.

8 Conclusions: the sun still shines

In this paper, we have established that the development in the size of the potential demand for more expensive owner-occupied housing in the Netherlands during the period 1976-1997 can to an important extent be explained by the development in sale price, the development of the mortgage interest rate, the growth of the number of people between the 35 and 44 years, and the introduction of the two earners' mortgage in 1992. The size of the realized demand appears also to be largely capable of being explained by means of the same factors with, instead of demographic development, the newly constructed supply of non-subsidized owner-occupied housing as an explanatory factor.

Given the assumptions made in the prediction of future development, both the potential and the realized demand for more expensive owner-occupied housing seem at the moment to have reached a certain maximum. In the years to come a stabilization or a very small rise of the size of this demand is to be expected, provided that no negative developments (such as a continual decline in sale prices or rise in mortgage interest rates) take place.

Nevertheless, this conclusion requires some nuances. With the explanatory models used we cover an important share of the factors which influence the development of the demand for more expensive owner-occupied housing. But we are under no illusion that we have placed all the possible effects on demand development completely under control. Not all the indicated categories of possible explanatory factors (demographic, socio-economic and socio-cultural developments, the dynamic of the housing market and developments in the institutional policy) are satisfactorily represented in the explanatory models. Some uncertainties concerning future demand development must remain. We will therefore consider some possible opportunities and threats for the

demand for more expensive owner-occupied housing, which are not (or could not be) included in the explanatory models.

In the prognosis, we have assumed a constant policy with respect to the provision of mortgages, both in terms of the mortgage types and the criteria used for size of income and collateral value of the dwelling. A restriction of the prevailing criteria would have a negative influence on future demand: directly, because of a more limited borrowing capacity; indirectly, through a downward adjustment of the sale price .

In the period studied, the fiscal treatment of owner occupancy has undergone hardly any change. The application of the imputed rent and the (unlimited) deduction of the mortgage interest rate by the income taxation could, in contrast with the past, in the years to come be called into question. A substantial deterioration in fiscal treatment would strongly influence the demand for more expensive owner-occupied housing in a negative sense. The expected fall in demand would be direct (through a substantial rise in housing costs) as indirect (via a fall in sale price) in nature.

The supply of (more expensive) owner-occupied housing in the existing stock is difficult to operationalize and has therefore remained outside the analyses. In the years to come, the housing supply in the existing stock would seem to become increasingly important for the development of demand for more expensive owner-occupied housing. Housing associations are expected to sell about 50,000 social rental dwellings. These sales could lead to a reduction of tension on the owner-occupied housing market and thus to a smaller rise, or possibly even a fall in sale prices. In addition, the increase in owner occupancy and the aging of the Netherlands population have also led to more older homeowners. In the relatively near future, the movement of older households from the owner occupancy sector and the decease of some older owner occupiers will result in a larger supply of existing (more expensive) owner-occupied housing. More opportunities for households to convert their house moving plans into actual moves would then arise.

In the prognoses formulated, we have implicitly assumed that, in the years to come, housing preferences of households types will not change with respect to the period studied. The owner-occupied dwelling appears also to attract the interest of younger households, while older households remain living in the owner occupancy sector longer. The prognoses would then be rather on the low side.

The birth cohort 1945-1950 forms a clear exception to the usual very gradual demographic developments. In the period studied, this post-war baby boom had a negative effect on the development of the potential demand for more expensive owner-occupied housing. From 1985 this cohort has reached the age group 45-64 years, for which it is known that people more often live, or wish to live, in a more expensive owner-occupied dwelling. This development could also lead in the next few years to even more demand for such dwellings.

In the analyses undertaken, considerable uncertainty about future demand is generated by the great unknown factor of households' assets. Through the increase in the number of homeowners and the continual rise in sale prices, more households have acquired a substantial amount of assets in the form of a positive equity of their dwelling. In addition, more private individuals have become active in investing their savings, which has been particularly profitable in the last few years. Moreover, through the growing owner occupancy among the elderly, the inheritance of dwellings will play an

increasingly important part in the financial position of middle-aged households. The consequence of these developments for the size of a household's assets, and thus for the development of demand for more expensive owner-occupied housing, remains unclear.

When we consider the prognosis results and take into consideration the opportunities and threats outlined above, we can state that in the years to come it is still not going to rain too heavily. A situation like that at the end of the 1970s (with a very strong fall in sale prices, high mortgage interest rates, extreme reticence on the part of mortgage lenders, and a minimal supply of newly constructed housing) is not about to reappear. The demand for more expensive owner-occupied housing seems for the time being to be developing in an upward direction. The sun will keep shining, but perhaps a shower of drizzle can fall here and there.

References

- Abraham, J.M., & P.H. Hendershott, 1996, Bubbles in Metropolitan Housing Markets, **Journal of Housing Research**, 7, nr.2, pp.191-207.
- Boelhouwer, P.J., 1999, with. A.A.A. Marien & P. de Vries, **Koopprijsontwikkeling in internationaal perspectief**, DGVH/NETHUR-Partnership 5, Utrecht (NETHUR).
- Boumeester, H., 1996, The choice for expensive owner-occupancy in the Netherlands, **Netherlands Journal of Housing and the Built Environment**, 11, nr.3, pp.253-273.
- Clark, W.A.V., & J.L. Onanka, 1985, An empirical test of a joint model of residential mobility and housing choice, **Environment and Planning A**, 17, pp.915-930.
- Clark, W.A.V., M.C. Deurloo & F.M. Dieleman, 1994, Tenure Changes in the context of micro-level family and macro-level economic shifts, **Urban Studies**, 31, nr.1, pp.137-154.
- Dieleman, Frans M., & Pieter C.J. Everaers, 1994, From renting to owning: life course and housing market circumstances, **Housing Studies**, 9, nr.1, pp.11-25.
- Elsinga, M., 1995, Een eigen huis voor een smalle beurs: het ideaal voor bewoner en overheid?, **Volkshuisvestingsbeleid en bouwmarkt 23**, Delft (Delftse Universitaire Pers) dissertation.
- Forrest, Ray, Alan Murie, & Peter Williams, 1990, **Home ownership, differentiation and fragmentation**, London (Unwin Hyman).
- Haurin, Donald R., 1991, Income variability, home ownership and housing demand, **Journal of Housing Economics**, 1, nr.1, pp.60-74.
- Henderson, J. V. & Y.M. Ioannides, 1986, Tenure choice and the demand for housing, **Economica**, 53, pp.231-246.
- Henderson, J. Vernon, and Yannis M. Ioannides, 1989, Dynamic aspects of consumer decisions in housing markets, **Journal of Urban Economics**, 26, nr.2, pp.212-230.
- Kendig, Hal L., 1984, Housing careers, life cycle and residential mobility: Implications for the housing market, **Urban Studies**, 21, pp.271-283.
- Laakso, Seppo, & Heikki A. Loikkanen, 1992, **Finnish homes; through passages or traps? An empirical study of residential mobility and housing choice**, paper presented at the International Research Conference: European Cities, Growth and Decline, The Hague.
- Leslie, G.R., & A.H. Richardson, 1961, Life cycle, career pattern and the decision to move, **American Sociological Review**, 26, pp.894-902.
- MacLennan, D., 1983, **Housing economics; an applied estimate**, London (Longman).
- Meen, G.P., 1998, **25 Years of house price modelling in the UK. What have we learnt and where do we go from here?**, paper presented at the ENHR Conference in Cardiff, 7-11 September 1998.
- Megbolugbe, Isaac F. & Peter D. Linneman, 1993, Home ownership, **Urban Studies**, 30, pp.659-682.
- Muellbauer, J., and A. Murphy, 1997, Booms and bust in the UK housing market, **Economic Journal** 107, pp.1701-1727.

- Mulder, Clara H. & Pieter Hooimeijer, 1995, Moving into owner-occupation: compositional and contextual effects on the propensity to become a homeowner, **Netherlands Journal of Housing and the Built Environment**, 10, nr.1, pp.5-25.
- Reichert, A.K., 1990, The impact of interest rates, income and employment upon regional housing prices, **Journal of real estate finance and economics**, 3, nr.4, pp.373-391.
- Schaar, J. of der, 1991, **Volkshuisvesting: een zaak van beleid**, Utrecht (The Spectrum bv).
- Thorns, D.C., 1980, Constraints versus choices in the analysis of housing allocation and residential mobility, in: Ungerson, C. & V. Karn, (red.), **Housing; a consumer view**, London (Saxon House).

Appendix 1

Table A.1 Data used in the Time Series analysis, for the period 1976-1997

| Year | House price ¹ | Mortgage interest ² | Supply new dwellings ³ | Increase number of persons aged 35-44 ⁴ | Dummy |
|------|--------------------------|--------------------------------|-----------------------------------|--|-------|
| 1976 | 18,57 | 2,01 | 20,33 | 18,91 | 0 |
| 1977 | 30,75 | 0,73 | 26,51 | 17,07 | 0 |
| 1978 | 3,92 | 5,35 | 29,52 | 15,91 | 0 |
| 1979 | -10,22 | 5,26 | 27,97 | 28,85 | 0 |
| 1980 | -14,68 | 4,51 | 27,74 | 43,08 | 0 |
| 1981 | -16,93 | 4,59 | 16,84 | 42,42 | 0 |
| 1982 | -14,39 | 5,46 | 8,08 | 71,65 | 0 |
| 1983 | 0,25 | 5,31 | 5,92 | 98,94 | 0 |
| 1984 | -4,62 | 5,05 | 4,63 | 82,10 | 0 |
| 1985 | -2,09 | 5,71 | 5,82 | 66,29 | 0 |
| 1986 | 5,07 | 6,98 | 9,08 | 56,24 | 0 |
| 1987 | 4,71 | 8,02 | 16,08 | 53,81 | 0 |
| 1988 | 4,04 | 5,82 | 24,68 | 55,44 | 0 |
| 1989 | 5,30 | 7,14 | 28,83 | 47,16 | 0 |
| 1990 | -0,69 | 6,56 | 31,35 | 35,24 | 0 |
| 1991 | 0,25 | 6,49 | 29,82 | 38,61 | 0 |
| 1992 | 4,91 | 6,23 | 34,24 | 12,69 | 0 |
| 1993 | 5,66 | 4,68 | 40,05 | -15,20 | 1 |
| 1994 | 5,20 | 4,81 | 46,83 | -0,51 | 1 |
| 1995 | 2,07 | 5,61 | 51,06 | 14,49 | 1 |
| 1996 | 8,71 | 4,50 | 51,40 | 22,43 | 1 |
| 1997 | 7,08 | 3,78 | 59,27 | 28,17 | 1 |

1: annual percentage of mutation of the average sales value, in real terms;

2: annual average mortgage interest level, in real terms;

3: annual number (x 1,000) of newly constructed non-subsidized owner-occupied dwelling, advanced mean

4: annual increase of the number (x 1,000) of persons aged 35-44, advanced mean.

Table A.2 Data used for forecasting, by three scenarios, for the period 1998-2005

| Year | Basic scenario | | | Good-Weather scenario | | | Bad-Weather scenario | | | All scenarios | |
|------|----------------|----------|--------|-----------------------|----------|--------|----------------------|----------|--------|--------------------------------|-----------|
| | Price | Interest | Supply | Price | Interest | Supply | Price | Interest | Supply | Increase 35-44 ⁴ | Dum my |
| 1998 | 7,11 | 3,20 | 62,41 | 7,11 | 3,20 | 62,41 | 7,11 | 3,20 | 62,41 | 30,54 | 1 |
| 1999 | 16,68 | 3,02 | 56,34 | 16,68 | 3,02 | 56,34 | 16,68 | 3,02 | 56,34 | 33,44 | 1 |
| 2000 | 12,49 | 3,35 | 58,97 | 12,49 | 3,35 | 59,86 | 12,49 | 3,35 | 56,70 | 38,48 | 1 |
| 2001 | -0,48 | 2,00 | 59,86 | 1,92 | 1,75 | 61,64 | -3,85 | 2,25 | 55,08 | 31,73 | 1 |
| 2002 | 0,98 | 3,50 | 60,75 | 4,39 | 3,00 | 63,42 | -4,88 | 4,00 | 53,46 | 21,88 | 1 |
| 2003 | 0,98 | 3,50 | 61,64 | 5,37 | 2,75 | 65,21 | -7,32 | 4,25 | 51,84 | 17,35 | 1 |
| 2004 | 0,98 | 3,50 | 62,53 | 6,34 | 2,50 | 66,99 | -9,76 | 4,50 | 50,22 | 14,07 | 1 |
| 2005 | 0,98 | 3,50 | 63,59 | 7,32 | 2,25 | 68,85 | -12,20 | 4,75 | 48,60 | 15,91 | 1 |

Appendix 2**Table A.3 Time Series model for the potential demand for more expensive owner-occupancy in the Netherlands, for the periods 1976-1991 and 1976-1997**

| Model information | period 1976-1991 | | | period 1976-1997 | | |
|-------------------|------------------|----------|---------------------------------|------------------|---------|---------------------------------|
| | b-coëfficiënt | t-value | B-coëfficiënt (standardized) | b-coëfficiënt | t-value | B-coëfficiënt (standardized) |
| constant | 2,696 | (16,01) | | 2,613 | (9,37) | |
| P{1} | 0,027 | (5,89) | 0,472 | 0,028 | (3,49) | 0,232 |
| I | -0,181 | (-4,46) | -0,476 | -0,177 | (-3,31) | -0,224 |
| D{1} | -0,013 | (-5,94) | -0,461 | -0,011 | (-3,28) | -0,250 |
| Dummy{2} | | | | 2,420 | (10,13) | 0,671 |
| ----- | ----- | ----- | | | | |
| ?1 | -0,642 | (-2,96) | | | | |
| ?2 | -0,606 | (-3,29) | | | | |
| ?3 | -0,779 | (-4,41) | | | | |
| N | 16 | | | 22 | | |
| R ² | 0,925 | | | 0,920 | | |
| SEE | 0,190 | | | 0,358 | | |

P = annual percentage of mutation of the average sales value, in real terms, 1 year delayed;

I = annual average mortgage interest level, in real terms;

D = annual increase of the number (x 1,000) of persons aged 35-44, advanced mean, 1 year delayed;

Dummy = (0= before 1993, 1 = 1993 and later), 2 years delayed.

Table A.4 Time Series model for the potential demand for more expensive owner-occupancy in the Netherlands, for the periods 1976-1991 and 1976-1997

| Model information | period 1976-1993 | | | period 1976-1997 | | |
|-------------------|------------------|----------|---------------------------------|------------------|---------|---------------------------------|
| | b-coëfficiënt | t-value | B-coëfficiënt (standardized) | b-coëfficiënt | t-value | B-coëfficiënt (standardized) |
| constant | 0,719 | (10,80) | | 0,702 | (8,18) | |
| P | 0,014 | (9,68) | 0,707 | 0,013 | (7,37) | 0,301 |
| I | -0,054 | (-5,71) | -0,400 | -0,055 | (-4,55) | -0,189 |
| S{1} | 0,007 | (5,21) | 0,317 | 0,008 | (4,55) | 0,254 |
| Dummy{1} | | | | 0,721 | (10,97) | 0,604 |
| ----- | ----- | ----- | | | | |
| ?1 | -0,768 | (-5,65) | | | | |
| ?2 | -1,095 | (-6,82) | | | | |
| ?3 | -0,748 | (-4,93) | | | | |
| ?4 | -0,846 | (-5,24) | | | | |
| N | 18 | | | 22 | | |
| R ² | 0,937 | | | 0,937 | | |
| SEE | 0,059 | | | 0,059 | | |

P = annual percentage of mutation of the average sales value, in real terms, 1 year delayed;

I = annual average mortgage interest level, in real terms;

S = annual number (x 1,000) of newly constructed non-subsidized owner-occupied dwelling, advanced mean, 1 year delayed;

Dummy = (0= before 1993, 1 = 1993 and later), 2 years delayed.