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# DEVELOPMENT OF HOUSE PRICES IN THE NETHERLANDS

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[Paper first received, April 1996; in final form, November 1996]

**ABSTRACT** *This contribution concerns the development of prices in the owner-occupied sector in the Netherlands. The analysis focuses on the development over two decades, from 1975 to 1995. That period may be divided into a number of phases of growth and stagnation, as defined by fluctuating house prices. Some explanations for these fluctuations are offered here. These include the influence of regulation by government and other major institutions; demographic developments; developments in the supply of owner-occupied dwellings; developments in a number of economic variables; and the dynamics of the market. Then an attempt is made to estimate how prices will develop in the future. It should be kept in mind that this forecast is based on statistical relations that were calculated with reference to the past. In the event those relations change in the future, the model estimated here would not yield good predictions.*

## 1 Introduction

As in many Western European countries, housing policy in the Netherlands has entered a stage of privatization. Since the early 1990s, construction subsidies have been phased out at an accelerated pace. In this way, housing has become increasingly liable to market forces. In the context of privatization, the owner-occupier sector has become more and more important. As the rented sector was being deprived of government support, owner-occupied dwellings formed an increasing share of the country's housing stock. This is one reason why the proportion rose from 42 percent in 1980 to 48 percent in 1994 and will continue to rise over the next few years. Approximately 70 percent of the housing production in the second half of the 1990s will consist of owner-occupied dwellings. At that rate, more than half of the country's households will soon own their own home.

In view of the growing size of the owner-occupied sector, it is important to understand the relation between demand and supply in this sector. This paper considers a key element in that relation: the development of prices in the owner-

occupied sector. The analysis focuses on the development over two decades, from 1975 to 1995. This period may be divided into a number of phases of growth and stagnation, as defined by fluctuating house prices. The following sections offer some explanations for these fluctuations. On that basis, an attempt is made to estimate how prices will develop in the future.

An explanation of house prices may be couched in terms of five main factors:

- the influence of regulation by government and other major institutions;
- demographic developments;
- developments in the supply of owner-occupied dwellings;
- developments in a number of economic variables;
- the dynamics of the market.

Before discussing these factors, however, the next section will give some background on the development of house prices over three decades, from 1965 to 1995. The trend is shown to be differentiated according to dwelling type. First, we offer a number of possible univariate explanations for changes in the development of prices in the owner-occupied sector. This is followed by a multivariate analysis in Section 5. Using the outcomes, section 6 of this paper considers possible developments in house prices in the near future. The paper ends by putting these developments into perspective.

## **2 Development of house prices, 1965-1995**

In the course of three decades, house prices in the Netherlands have developed in three phases. Each phase (1965-1973, 1974-1982, and 1983-1995) has its own particular character (Figures 1 and 2).

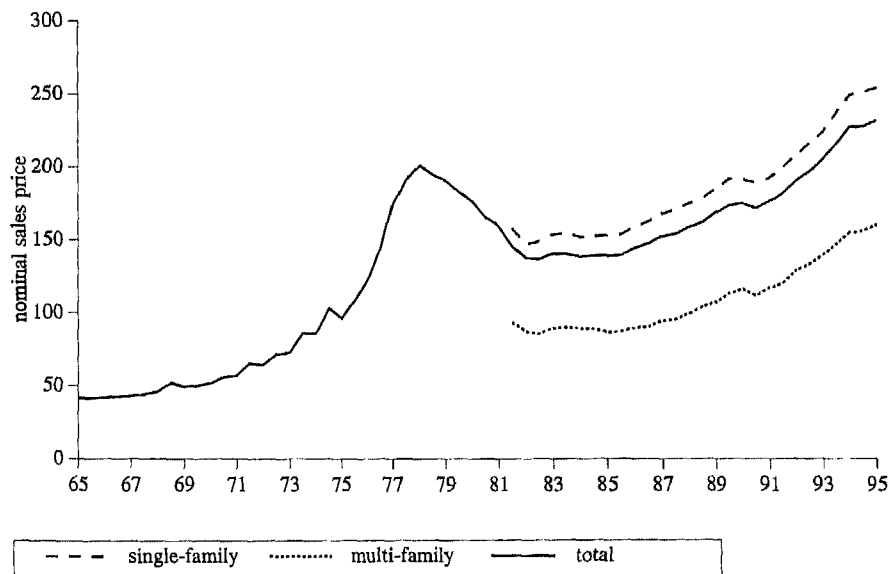
In the first phase, nominal prices rose gradually, lagging behind construction costs and wage increases (Engberts and Happel, 1980, p. 26; Van der Schaar, 1987). Correcting these figures for inflation, however, it appears that relative prices remained virtually unchanged during this period.

The second phase consists of two periods. Since the developments in both periods are very closely related, we consider them as one single phase in the development of the market for owner-occupied dwellings.

While the second phase covers the years 1974 to 1982, the first period in this phase runs from 1974 to 1979. Each year in that period was characterized by a very substantial average increase in both the nominal and the relative prices. The average annual increase in nominal prices was as high as 23 percent. The nominal price development reached a peak at the end of 1978. At that time, the average price level was Dfl. 198,600.

The subsequent period in the second phase started in the first quarter of 1979 and continued until 1983. During that period, the prices declined annually by 7.4 percent on average. The market bottomed out in the last quarter of 1982, at an average price of Dfl. 137,900. The decrease was steady in this period too. The recession in the homeowner market lasted four years.

**Figure 1 Nominal price development of all owner-occupied dwellings in the period 1965-1995 and of single-family and multi-family dwellings in the period 1982-1995 according to the NVM system of information exchange**



Source: NVM system of information exchange, CBS.

The third phase in the development of house prices was longer. It ran from 1983 to 1995. This phase is characterized by a much more gradual development. That is, the market did not overheat, whereby a steep drop in prices was averted. The market rebounded in the period from 1983 to the third quarter of 1990. During the first three years of this period, the fall in nominal prices came to a halt. The prices remained virtually constant in nominal terms, whereas the relative prices kept declining somewhat. It was only in 1986 that prices started to creep up in real terms.

After the third quarter of 1989, the prices dropped for a short time (during the crisis preceding the Gulf War). From the second quarter of 1991 to the second quarter of 1994, prices picked up again. That increase was considerably greater than the one that took place in the period 1983-1990. In the last two years, the price development has been somewhat unstable. This is partly due to strong fluctuations in the mortgage interest rate. For instance, the price development flattened out as interest rates rose in 1994. The price increase was resumed in 1995, when interest rates were at a record low. Prices increased steeply in the second half of 1995, rising by six to seven percent. The rate of increase even reached ten percent in the first half of 1996.

**Figure 2 Relative price development for all owner-occupied dwellings in the period 1965-1996 and for single-family and multi-family dwellings in the period 1982-1996 according to the NVM system of information exchange**



Sources: NVM system of information exchange, CBS.

In light of these developments, it is fair to say that the period 1974-1983 was a very special time in the development of house prices. Both before and after this period, the prices of owner-occupied dwellings developed very steadily. Even when new dwellings of better quality were added to the stock, the relative prices rose only slightly. Accordingly, there was a 60 percent increase over three decades (1965-1995), which amounts to an annual increase of only two percent. A considerable share of this increase may be ascribed to better quality due to the new construction. Home ownership usually leads to a modest build-up of equity over a long period of time (about 30 years). It turns out that investment in the owner-occupied sector at least retains its value over a 30-year period. Particularly in times of high inflation, this makes it attractive to buy a house. Depending on the point in time at which the purchase is made, of course, there may be capital gains or losses.

### 3 Differentiation in the development of house prices

The figures cited above were compiled by the Netherlands Central Bureau of Statistics (CBS) and the Netherlands Association of Realtors (NVM) and its prede-

cessors. The disadvantage of using these time series is that they have not been corrected for changes in the composition of the set of annual transactions. The composition of the set of dwellings sold may change radically from one year to the next, and the development of prices may differ across market segments. The difference between the sets will show up in the figures. At this point, we will briefly discuss the problem of changing composition.

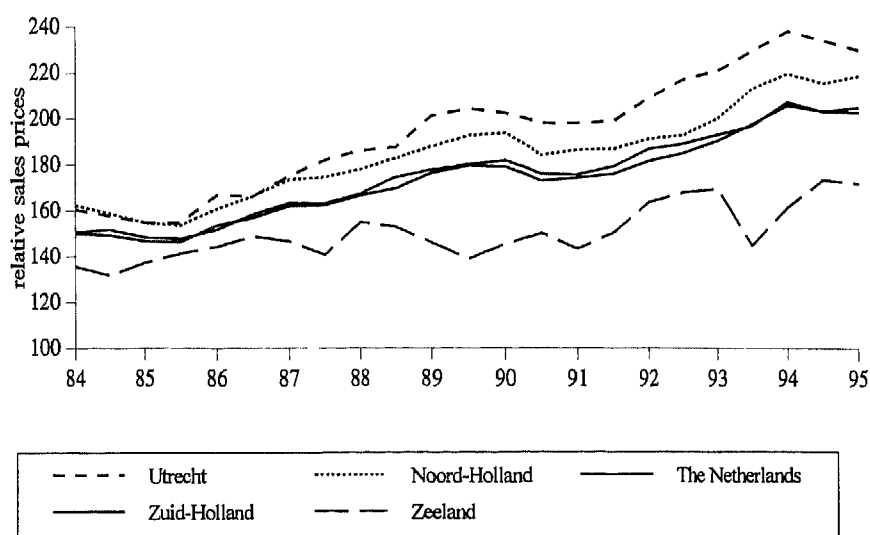
The development of prices since 1982 for single-family and multi-family homes is depicted in Figures 1 and 2. It is immediately clear that prices for both of these segments of the homeowner market are hardly different from the development in average prices in the owner-occupied market. There is one difference, however. The average price for single-family houses during this period is structurally much higher than for dwellings in multi-family buildings.

A similar result also shows up in the development of prices at the provincial level (Figure 3). Even at that level, large differences in price are apparent, while the development through time is fairly comparable. The figures for Zeeland seem somewhat anomalous. There, the development in prices is much more erratic than for the country as a whole. Yet in view of the limited coverage of Zeeland by the NVM data base, figures derived from that source are less reliable for this province.

In order to compare the price levels across regions, Conijn (1993) carried out a hedonic price analysis. He based that analysis on data from the Housing Demand Survey (WBO) 1989/1990. Initially, 34 housing market areas were distinguished; these were the 30 areas covered in the WBO plus the four big cities. In a hedonic price analysis, the price of a heterogeneous good (in this case, the dwelling) is related to relevant characteristics of that good. Each individual characteristic raises or lowers the price. The size of this contribution is determined in the hedonic price analysis. Price differences between heterogeneous goods may thus be explained in terms of the differences in the degree to which the characteristics are manifest in the goods in question. The underlying technique for that exercise is regression analysis. On the basis of these regression analyses, we examined the possibilities of clustering the housing demand areas, because the price level was the same after correction for the different housing characteristics (see Conijn, 1995, p. 73).

Ultimately, the exercise reduced the number of housing market areas from 34 to 11. Yet the clustering did not lead to a significant loss in explained variance (Table 1). As a reference category, we used the housing market area "Ommelanden, North Friesland and South Friesland." This area has the lowest sales value. A difference of, say, 10.8 percent in the housing area South Drenthe means that the sales price of a comparable house in this area is 10.8 percent higher than in the housing area Friesland. The result of the fitting procedure in the regression analysis reveals extremely large regional differences in sales price. After correcting for other explanatory variables, it proves that the most expensive owner-occupied dwellings in the Netherlands are in Amsterdam. The difference between the sales price in Amsterdam and that in the least-expensive provinces (namely Groningen, excluding the city, and Friesland) is 87.6 percent. The relatively small number of owner-occupied dwellings in Amsterdam and the overall attractiveness of Amsterdam's

**Figure 3 Relative price development for owner-occupied dwellings by province and for the Netherlands as a whole in the period 1984-1995**



Source: NVM system of information exchange.

**Table 1 Percentage difference in sales value of owner-occupied dwellings after correction for other explanatory variables, by region, 1989/1990**

Region	Effect on sales value in %
- City of Amsterdam	87.6
- Housing market areas South-Central Kennemerland and Bollenstreek-Leiden	73.5
- City of Utrecht and housing market areas of West Utrecht and The Hague, Westland	66.7
- City of The Hague and housing market areas of East Utrecht and the surroundings of Amsterdam	59.0
- Housing market areas of Veluwe and East of Zuid-Holland	44.6
- Housing market area of Rijnmond	36.1
- City of Rotterdam and housing market areas of Arnhem and West Brabant	29.2
- City of Groningen and housing market areas of Achterhoek, Nijmegen and others, Betuwe, North Noord-Holland, South Zuid-Holland, Central Noord-Brabant, Northeast, Noord-Brabant, Southeast Noord-Brabant	23.0
- Housing market areas North and Central Drenthe, IJssel Valley, Southern Limburg, Flevoland	16.9
- Housing market areas South Drenthe, Twente, Zeeland, and North Limburg	10.8
- Housing market areas Ommelanden, North Friesland, South Friesland	.. <sup>1)</sup>

Source: Conijn, 1993.

<sup>1)</sup> As reference category, the baseline for the percentage effects

residential ambience probably explain the special position of that city in the country's housing markets. Furthermore, as might be expected, the farther away a given housing market is from the Randstad, the lower the price level, generally speaking. The Randstad, which is in the western part of the country, includes the four big urban agglomerations: Amsterdam, Rotterdam, The Hague, and Utrecht. This is also where pressure on the housing market is greatest. Accordingly, the prices on the owner-occupied market have risen most steeply there. The region known as the Veluwe forms an exception to this pattern. The price level is relatively high there. The Veluwe is a very popular residential area because of its wooded and natural environment.

Since the end of 1995, the NVM information system also gives some insight into the development of prices for specific dwelling types. As might have been expected, the December 1995 price for a detached owner-occupied dwelling (Dfl. 376,700) was considerably higher than for a dwelling in the middle of a row (Dfl. 212,100). Despite the relative difference in price, the price increase is fairly similar for both dwelling types. The price of a dwelling in the middle of a row increased by 57 percent in the last seven years, while the price of a dwelling at the end of a row increased by 51 percent. At the same time, the price of a detached dwelling rose by 49 percent.

#### **4 Explanations for the development of house prices**

In principle, the development of house prices could be explained in terms of many different variables, as long as they influence supply and demand in the owner-occupied sector. From this wide array of possibilities, we selected variables on the basis of insights gleaned from a study of the literature (among other sources, we consulted Bik et al., 1984; Engberts and Happel, 1980; Everaers and Dieleman, 1993; Hooimeijer, 1993; Kersloot and Dieleman, 1988) and a number of theoretical considerations. The selected variables may be subsumed under five main headings:

- the influence of government and other key institutions;
- demographic developments;
- developments in the supply of owner-occupied dwellings;
- the development of a number of economic variables;
- the dynamics of market forces.

Each of these main headings can be broken down into multiple explanatory variables. In that way, insight can be gained in the direct correlations between any given variable and the development of prices in the owner-occupied sector. There are additional ways to deal with quantitative variables such as the development in rents or interest rates. It is possible to depict the correlation graphically. Furthermore, statistical indicators such as the correlation coefficient can give direct insight into the relation. This is not so easy for other variables like government policy or demographic developments. Those variables may induce a temporary shock effect. This is

what happens, for example, when the eligibility norms for a mortgage are adjusted. Alternatively, these variables may exert their influence very gradually over a long period of time; in that case, it is hard to determine the reciprocal relations. An example of the latter situation is change in household composition.

This section expands upon these direct correlations. The most important relations are highlighted.

#### *Influence of regulation by government and other key institutions*

The government has much less leverage in the market for owner-occupied dwellings than for rented dwellings. Government intervention in the development of the homeowner market is much less effective than market forces. Economic conditions are crucial to that development. Nevertheless, the government certainly exerts some influence (both directly and indirectly) on supply and demand in the owner-occupied sector. The direct vehicles of influence include fiscal treatment and subsidy policy as well as eligibility norms for a mortgage guarantee.

The influence of government policy has been reactive rather than proactive in recent years. Over time, the main thrust of government policy has been to follow the course set by developments in society at large (see also Heerma, 1993). Of course, there have certainly been some exceptions. The most significant initiative took place around 1972, when certain monetary controls that had been exercised by the Netherlands National Bank since 1966 were abolished. The commercial banks were then able to expand their mortgage portfolios. Then in 1973, in the wake of this deregulation, municipal guarantees on mortgage loans were also made available for dwellings in the existing stock. Finally, the eligibility criteria for a mortgage were made much more lenient, greatly increasing the demand for owner-occupied dwellings. From that point on (1974-1992), institutions and the government had only a limited degree of influence on the development of the market for owner-occupied dwellings.

A more recent financial impetus for the owner-occupied sector came in the 1990s when the norms for a municipal guarantee were relaxed. Since 1992, the second income in a household has been taken into full account. This formed a major stimulus to home ownership. Until then, only a portion of the second income was taken into account, and only for eight years. The vigorous growth in the number of dual-earner households led to a considerable expansion in the demand for owner-occupied dwellings, particularly in the more expensive segment. Unfortunately, it is hard to quantify the effect of a measure like this one. It is, however, possible to draw a link to the upward trend in price increases that started in 1992.

The relaxation of the norms for obtaining a municipal guarantee was not the only important impulse. The sharp decline in subsidies in the rented sector was also critical. The multi-year operating subsidies for new construction were abolished. And subsidies in the existing housing stock were gradually terminated; the intention was to quickly reach a rent level that covered the cost price. These two measures have made renting more expensive over the past few years. In view of the rising cost of renting, more and more households see the financial benefits of taking the



step from renting to home ownership. This trend will probably continue in the coming years. Unfortunately, it is hard to describe a shift of this type in quantitative terms.

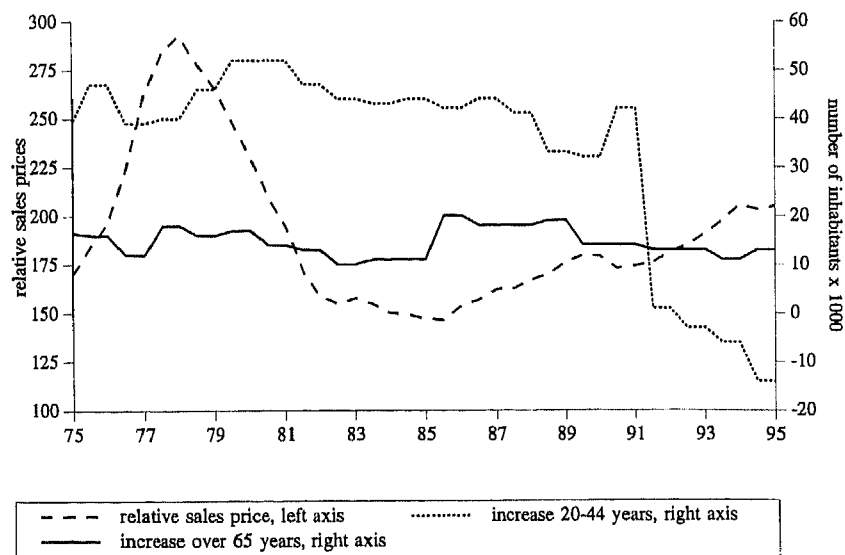
#### *Demographic factors*

Unlike the effect of the market, the impact of demographic development generally shows up in the long run. An high annual growth of the amount of households will usually force up the house prices. The ultimate effect is also determined by the amount of yearly built new houses and the conversion of rented dwellings to the owner-occupied sector.

Accordingly, the heightened demand for dwellings, especially in the owner-occupied sector, and the expansion of that sector in the course of the past several decades are closely related to changes in the number and composition of households. Specifically, the postwar baby boom has brought large groups of young people onto the market since the early 1970s. Some of those looking for housing found their way to the owner-occupied sector. Others filtered rapidly from a rented to an owner-occupied dwelling. In the meantime, households have been getting smaller. Thus, the number of households has grown faster than the population. Throughout the period 1971-1994, the number of households rose by 2.5 percent per year.

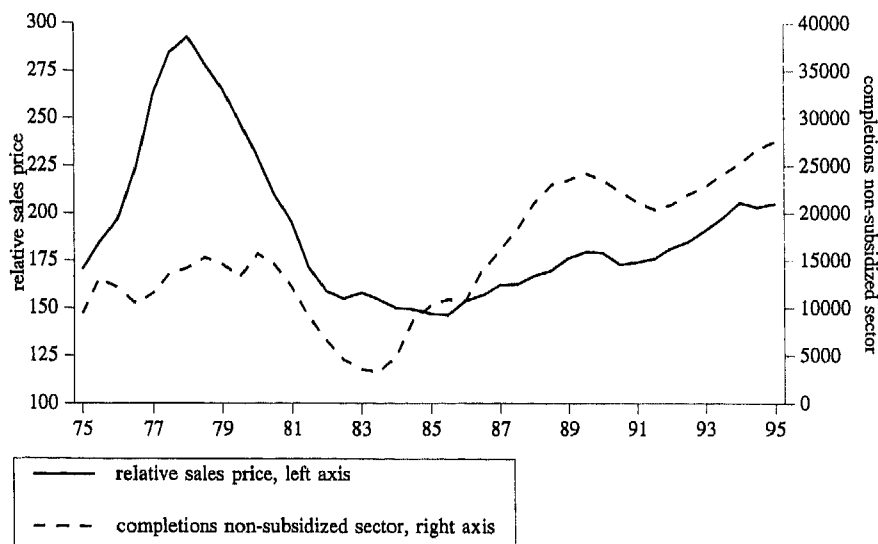
In explaining the demand for owner-occupied dwellings, the composition of the households is at least as important as the growth in the number of households. The acquisition of a house is related to the point in time when people start living together and when they have children. They only take the step to home ownership when the household situation has reached a certain degree of stability. The demand for owner-occupied dwellings is largely determined by two flows. One is the flow of households into the owner-occupied sector; the other is the flow of households out of that sector. The demographer Hooimeijer (1993) concludes that both of these flows are highly age-specific. The balance of first-time buyers and people leaving the homeowner market creates a very large flow into home ownership among people in their twenties. It creates a moderate net flow to home ownership of people in their thirties and a small flow of people in their forties. The balance is even for people in their fifties and negative for the population aged 60 or older. On the grounds of this regularity, Hooimeijer goes on to infer that the demographic trend in the 1980s was highly advantageous to the development of the owner-occupied sector. The sizable cohorts born in the 1950s and 1960s entered the housing market in the 1970s. When the recession hit in the early 1980s, they put off the decision to buy a house. In combination with the strong growth in the number of households whose head was between 25 and 45 years of age, this postponement is largely responsible for the success of the owner-occupied housing market in the second half of the 1980s. Figure 4 depicts the growth in a number of age categories in relation to the development in house prices. As mentioned earlier, the demographic change in the period 1975-1994 was gradual. Therefore, short-term fluctuations in the development of house prices cannot be explained by these series. The graph does demonstrate that the number of potential buyers (people aged 20-44) rose substantially between 1975

**Figure 4 Semi-annual growth in number of persons 20-44 and over 65 years of age and the relative price development in the period 1975-1995**



Sources: NVM system of information exchange, CBS.

**Figure 5 Number of completed dwellings in the non-subsidized sector with a lump-sum contribution and non-subsidized dwellings and the relative price development in the period 1975-1995**



Sources: NVM system of information exchange, CBS.

and 1990. In absolute numbers, this group grew by over a million (that is, 1,286,000) persons, an increase of 27 percent.

In 1987, however, this trend was broken. Since then, the population between 20 and 44 years of age has been increasing more slowly. The effect is that since 1992, that age group has also been declining in absolute numbers. Until then, this age group had been growing by about 40,000 persons per year. Meanwhile, the proportion of elderly people kept on rising steadily.

Because of the demographic trends, the demand for owner-occupied dwellings will gradually decrease in the long run and will temper the growth in house prices. However, it is very difficult to give a quantitative estimate of this effect. On the basis of these demographic developments, the total demand for owner-occupied houses could decrease substantially in the long run.

#### *Developments in the supply of owner-occupied dwellings*

In addition to the growth in the owner-occupied sector, it is also relevant to study changes in the supply of new owner-occupied dwellings. Only then do the developments in the market for owner-occupied dwellings become clear, particularly with regard to developments in house prices. The development in the number of dwellings in the non-subsidized sector, including dwellings with a lump-sum subsidy, provides insight into the development of the market for owner-occupied dwellings. Thus, the following discussion is restricted to this particular category of newly built housing. Figure 5 indicates that the number of dwellings completed in the non-subsidized sector follows the development of prices in the owner-occupied sector though at some distance. The decline in the number of completions in the non-subsidized sector bottomed out in 1983, when only 6,551 dwellings were produced. But a year after the relative decline in price came to a halt, the slump turned into a rapid growth in house prices. In 1994, the 53,343 completions marked the highest point yet.

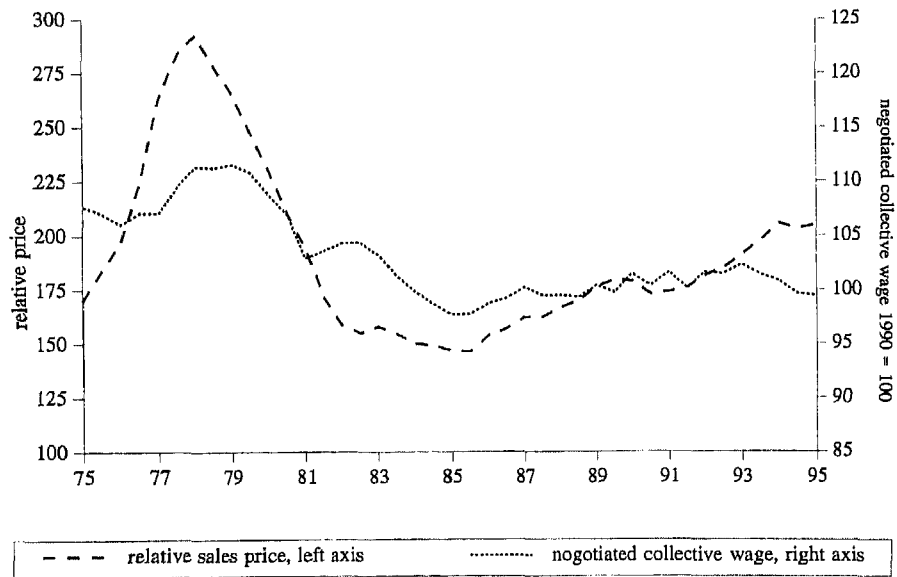
#### *Development of economic variables*

The fourth heading under which we may look for an explanation is that of economic variables. We included the following ones in our analysis: development of wages; development of mortgage interest rates; inflation; development of construction costs and development of rents. Unlike the demographic developments, these factors exert their influence directly in the short and medium term. The development of interest rates and wages in particular is closely related to the development of house prices.

Figure 6 suggests a clear relation between the development of the disposable income and the development in house prices. In keeping with this relation, the expansion of the owner-occupied sector in the 1970s was mainly facilitated by the vigorous growth in income and the widespread expectation of continued income growth.

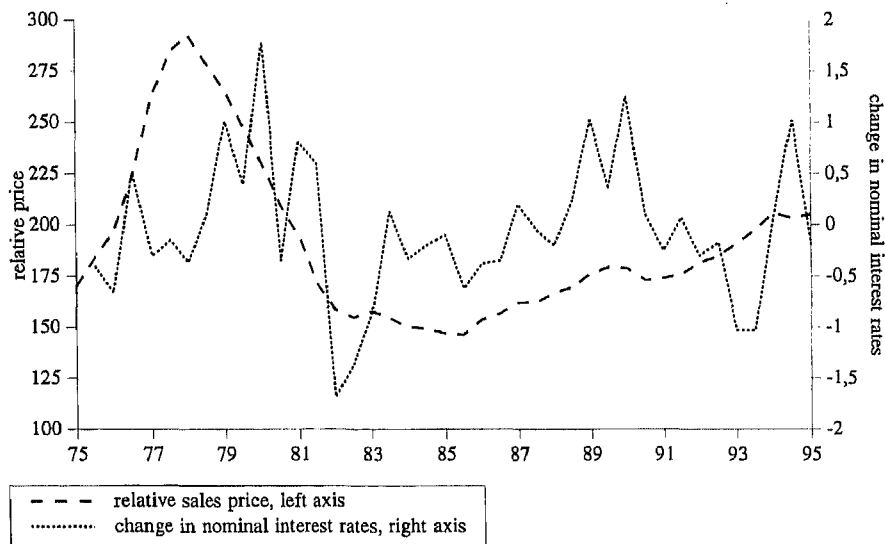
It is generally assumed that the development of mortgage interest rates is one of the key variables explaining the development of house prices. In that relation, both the mortgage interest rates and the percentage of change therein are critical. The nominal mortgage interest rate partly determines the maximum mortgage that any

**Figure 6 Negotiated collective wage and relative price development in the period 1975-1995**



Sources: NVM system of information exchange, CBS.

**Figure 7 Change in nominal mortgage interest rates and relative price development of owner-occupied dwellings in the period 1975-1995**



Sources: NVM system of information exchange, CBS.

household is able to get. Therefore, the nominal interest rate is a major determinant of the effective demand for owner-occupied dwellings.

Some influence may also be ascribed to the volatility of the nominal mortgage interest rate. As mortgage interest rates rise, potential buyers will hesitate to buy a house. Under those circumstances, the interest rates would most likely be considered relatively high. And when the rates drop, people are likely to rush to buy.

Figure 7 supports the assumption presented above that there is a strong relation between interest rates and house prices. The sharp drop in prices after 1980 coincides with a considerable increase in nominal mortgage interest rates. When the mortgage interest rates started to decline in 1982, the sharp drop in prices also flattened out somewhat. However, the substantial decline in mortgage interest rates that lasted until 1988 only led to a limited increase in prices. The rise in interest rates that started in the second half of 1988 and lasted until the second half of 1990 did not affect house prices. The fluctuations in interest rates during the period 1992-1995, in contrast, do correspond with ups and downs in price level.

#### *The dynamics of market forces*

The delayed influence of the development of house prices may be described in terms of the dynamics of market forces. In a period of large increases in price, the consumer will want to take quick action. In an expanding market, the sooner the decision to buy is made, the faster one can reap capital gains. This effect, which is partly psychological, will work in the opposite direction when a sizable decline in prices occurs. The consumer will then postpone the decision to buy for as long as possible in order to avert the loss of equity. Due to imperfections in the housing market, this effect will occur with some delay. The dynamics of the market were especially important in the period 1973-1983. These forces led to speculative price increases and caused the market to overheat. The bubble that this created in the market eventually burst, precipitating a drop in prices. In 1983, they were down to the real level of 1973 again. The changes in price were much less volatile during the remainder of the period. Therefore, the dynamics of the market had much less influence. Obviously, it is pointless to plot the price development in relation to itself on a graph. But since price development has its own dynamics, its eventual influence on house prices is included in the model. How this is done is described in the next section.

### **5 Development of house prices: a model-based analysis**

The previous sections revolve around the development of house prices from 1975 to the first half of 1995 and identify several possible explanatory variables. Those sections elucidate the direct correlation between the variable in question and the relative development of prices for owner-occupied dwellings. The present section elaborates upon that discussion in the form of an explanatory analysis. This analysis includes multiple variables at the same time.

Timing is critical to the development of house prices. The element of time is also extremely important in the analysis of the diverse relationships. When a relation is established between sales prices and mortgage interest rates, for instance, a simple correlation coefficient does not suffice. There are several reasons why. The relation may be subject to change in the course of time and may occur with some delay. Furthermore, the data may contain seasonal effects.

Time effects are taken into account here in the form of time series analysis. This method makes use of regression techniques. The factor of time always plays a key role in time series analysis. One must be continually alert to the fact that a change in a given variable in a particular period can also have an effect in a subsequent period. In addition, seasonal effects must be incorporated. A time series analysis should be evaluated statistically as well as in terms of content. The assessment of meaning looks into the values of the regression coefficients and the question whether or not the explanatory variables are really plausible. For instance, to evaluate the meaning, it is important to have insight into the explained variance. The  $R^2$  expresses the degree of exactness of the estimates.

The dependent variable was defined as the rate of change (or the annual percentage of change) in the development of house prices corrected for inflation (the relative or real price development). It covers the development in prices for all owner-occupied dwellings. All the quantifiable variables described in the previous section were taken as possible explanatory variables. Statistical transformations were used to determine the most suitable composition of the variable. The category of government policy was the only one from which no variables were derived. The reason is that these could not be turned into series. Subsequently, the variables were included in the explanatory model through a stepwise procedure.

A reliable equation (one that meets all statistical requirements) was obtained for the period 1977-1995. That period covers the sharp price increases that took place prior to 1979 as well as the subsequent decreases. Accordingly, the model reveals the overheated market that prevailed at that time. The following four variables ended up in the equation:

- a) delayed relative sales prices;
- b) real negotiated collective wages;
- c) nominal interest rates;
- d) real interest rates.

As we showed in the previous section, all these variables have a strong single correlation with the dependent variable. The collective wage level is compiled by the Netherlands Central Bureau of Statistics (CBS) on the grounds of the average development of wages in the private sector. The variable called nominal interest rates might need some clarification. A threshold effect arises in the development of nominal interest rates. When the nominal interest rate is high, the direct financing costs are relatively high at the time a household takes occupancy. This creates a threshold for less-affluent households. When the rate of inflation is high, a high nominal interest rate may be accompanied by a low real interest rate. For that reason, this effect is not entirely captured in the development of real interest rates.

In order to derive the most appropriate equation, the four variables were subjected to a number of statistical transformations. They also underwent a test for content. Ultimately, the following outcomes provided the best results. The percentage of change in the relative sales price was delayed by a half year. The real interest rate (nominal mortgage interest rate minus inflation) was first transformed in such a way that the semi-annual interest level can be compared with that of the preceding two years. When the real interest rate is lower than the average interest rates for the previous two years, prices go up. Moreover, there proves to be a delayed reaction of sales prices to interest rates. This delayed effect is seen most prominently when interest rates and sales prices are expressed as running semi-annual averages.

The change in the third variable, the nominal interest rate, was included as a running twice semi-annual average, while the real negotiated collective wage was included as the percentage of change in that wage level.

The individual relations between the independent variables and the percentage of change in the relative sales price can also be expressed in the form of correlation coefficients. This leads to the following values:

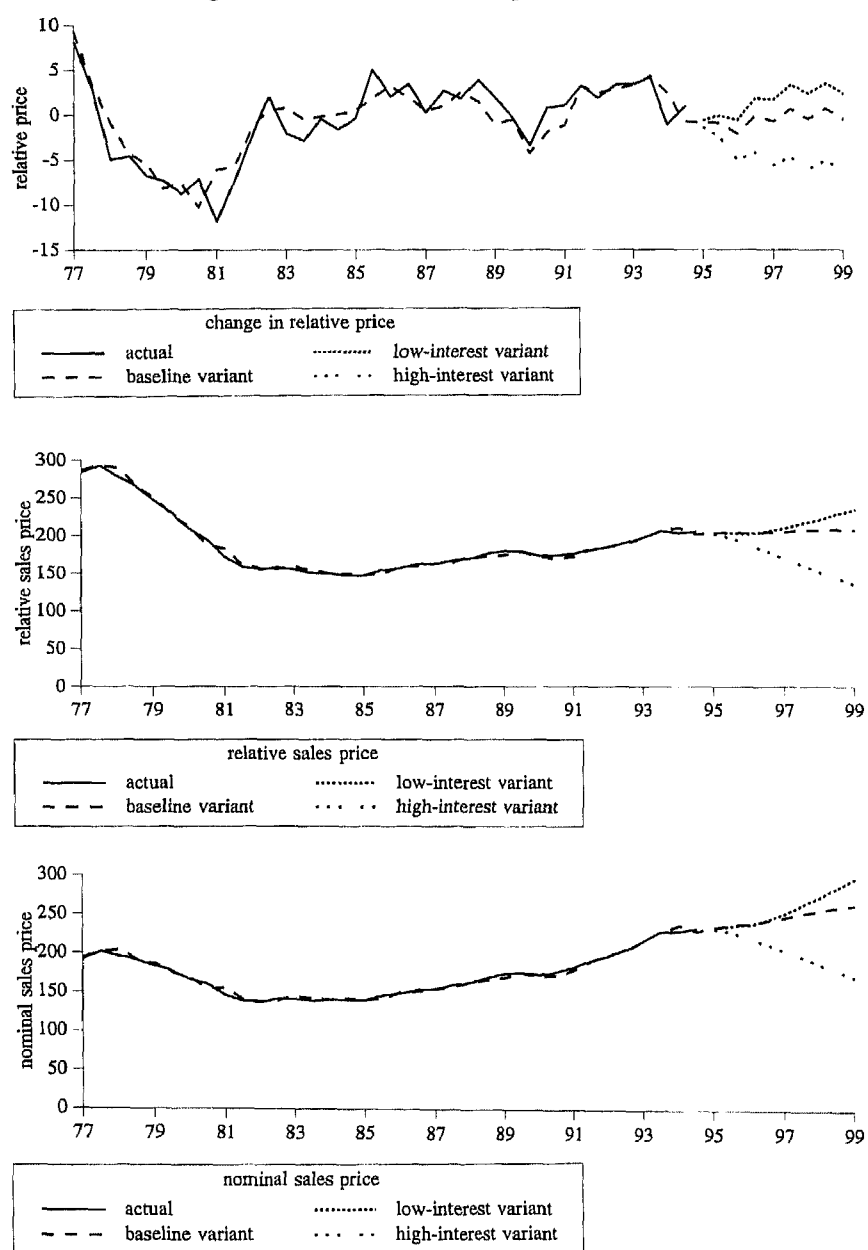
- a) percentage change in relative sales price delayed by a half year,  $R = 0.75$ ;
- b) percentage change in real negotiated collective wage,  $R = 0.46$ ;
- c) change in nominal interest rate, running,  $R = -0.39$ ;
- d) real interest rate with reference to the four preceding half years, running, delayed by a half year,  $R = -0.34$ .

The outcome of the final equation with all four of the explanatory variables and the percentage of change in the relative sales price is shown in Figure 8. In the second and third part of this figure we transformed the mutation to relative and nominal sales prices. In total, the model is able to explain 79 percent of the variance in actual change in the relative sales prices over the period under review. As may be derived from the graph, most of the turning points are explained reasonably well. Furthermore, the calibrated model follows the actual time series fairly closely.

## 6 Development of house prices in the near future

The explanatory model presented above makes it possible to predict the future development of house prices. It should be kept in mind that this forecast is based on statistical relations that were calculated with reference to the past. In the event those relations might change in the future, the model estimated here would not yield good predictions. For the explanatory variables used in the model, the future values should be inserted, adding to the general uncertainties mentioned above. The scenarios used here are based on forecasts in the Central Economic Plan 1995 (Centraal Planbureau, 1995). Those scenarios vary the interest rates each time. In the baseline scenario, the mortgage interest rate is fixed at 7.5 percent for the entire period. In the low scenario, interest from the first half of 1996 is adjusted downwards by 0.25 percentage points to 5.75 percent at the end of 1999. In the high scenario, it is adjusted upwards by 0.5 percentage points to 12.5 percent in 1999.

**Figure 8** Change in actual and estimated relative sales prices for owner-occupied dwellings in the period 1977-1995 and the expected development according to three scenarios for the period 1996-1998



Sources: NVM system of information exchange, CBS, OTB calculations.



**Table 2 Mortgage interest rates for the low-interest, baseline-interest, and high-interest scenario for the estimated percentage of change in relative sales price in the period 1995-1999 (%)**

Time Frame	Low	Baseline	High
First half 1995	7.88	7.88	7.88
Second half 1995	7.75	7.50	8.50
First half 1996	7.50	7.50	9.00
Second half 1996	7.25	7.50	9.50
First half 1997	7.00	7.50	10.00
Second half 1997	6.75	7.50	10.50
First half 1998	6.50	7.50	11.00
Second half 1998	6.25	7.50	11.50
First half 1999	6.00	7.50	12.00
Second half 1999	5.74	7.50	12.50

Source: OTB Research Institute.

For the entire period 1995-1999, the real wage development is set at zero and the annual rate of inflation at 2.5 percent.

Figure 8 and Table 2 express the current expectations for the development of wages, inflation, and interest rates. On the basis of our understanding of their effect on prices, these figures suggest that the relative sales prices will remain fairly stable over the coming years, hovering around zero. Only in the first half of 1998 will the relative prices rise by more than one percent (1.1 percent).

If the interest rates increase by 0.5 percentage points twice a year from 1996 on, prices will drop considerably. In that case, prices are expected to decline relatively by an average of 7.6 percent for 1996 and 9.9 percent for 1997. This relative decline will continue more vigorously over the following years: -10.8 percent in 1998 and -11.4 percent in 1999. In the meantime, mortgage interest rates will have risen to 12.5 percent in 1999.

Similarly, the relative prices will initially drop in 1996 by 0.8 percent, according to the low interest rate scenario. After 1996, prices will continue to climb; they will increase by 3.5 percent in 1997, 5.6 percent in 1998, and 5.8 percent in 1999.

## 7 Concluding remarks

The explanatory model presented above predicts the future development of house prices on the basis of statistical relations observed in the past. If these relations were to change in the future, the estimated model would obviously not yield reliable predictions. Furthermore, not all possible effects are included in the explanatory model. Accordingly, this paper recognizes five categories of possible explanatory variables. These are the influence of government measures and other key instituti-

ons; demographic developments; developments in the supply of owner-occupied dwellings; economic variables; and the dynamics of the market itself. The explanatory model is primarily based on the first category of variables and somewhat less on the fourth one. The dynamics of the market were operationalized in terms of the delayed influence of the development of house prices. The demographic development in the period under analysis was very steady. Therefore, demographics has had little effect on the development of prices. However, this does not mean that the influence of demographic variables will remain negligible in the future. As described earlier, on the grounds of the demographic characteristics, the demand for owner-occupied dwellings will decline considerably in the long run. For instance, the number of people between 20 and 44 years of age in the population has been declining since 1992. Until then, the number of people in this age group had still been growing by 40,000 per year. These developments will lead to new relations of supply and demand on the market for owner-occupied dwellings. In those new relations, the price effect is hard to estimate.

In addition to demographic changes, there are other effects that are hard to integrate into a statistical model. These include changes in the government policy. Moreover, no information is available on other effects, such as the composition of the set of dwellings sold. Furthermore, certain events could occur, the effects of which are not incorporated in the model. For instance, we might see:

- 1) steep rent increases;
- 2) less advantageous fiscal treatment of home ownership;
- 3) diminishing demand due to rising prices;
- 4) the sale of large numbers of rented dwellings (primarily in the social sector).

Over the coming years, rents are expected to rise annually by 3.8 to 4.5 percent on average. This increase is higher than the anticipated level of inflation. Therefore, the cost of renting a dwelling will increase more rapidly than other consumer costs. The amount of imputed rent to be added to the taxable income of owner-occupiers is adjusted periodically on the basis of the rent increases and the development of the sales price. Therefore, the effect on house prices appears to be limited. The fact is that home buyers are confronted with rising outlays for housing. That keeps the balance between owning and renting in a state of equilibrium.

A subsequent worsening of the fiscal treatment of home ownership does not seem likely. That is, the government program under the current cabinet does not disclose any such intent. The influence of the third possible occurrence (a decline in demand due to rising house prices) seems limited as well. The period 1974-1978 has shown that great price increases are possible without evidence of such an effect. A review of this period also shows that rapid price increases can set off a steep decline in prices in the course of time when economic conditions take a turn for the worse. Finally, there is still uncertainty about the behaviour of social landlords. After the grossing and balancing operation, whereby the current property subsidies were discounted and subtracted from the outstanding obligations, it was possible to sell off more social rented dwellings. In light of the greater supply of owner-occupied dwellings, a downward development in prices might be expected. Whether or not

this effect will actually occur remains to be seen. Actually, the housing shortage will grow in the coming years, so that an increasing demand for dwellings (especially in the owner-occupied sector) may be expected. Indeed, it seems that there is certainly some room for further price increases for the period after 1993.

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