CPB Memorandum

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Are houses overvalued in the Netherlands?

The movement of the level of house prices in the Netherlands between 1980 and 2007 is explainable fairly well by fundamental supply and demand factors. Empirical research has shown that the overvaluation of approximately 10% that existed in 2003 shrunk to approximately 0% in 2007. This was not caused by downward correction of house prices, but by the circumstance that the increase of the actual house price between 2003 and 2007 lagged behind the increase of the long-term value of the house price. Therefore, this does not confirm the IMF's recently published research results, indicating that approximately 30% of the house price increase between 1997 and 2007 cannot be explained by fundamental factors.

1 Introduction

Statements are regularly made on the strength of research about the extent to which house prices in the Netherlands are said to be overvalued. These statements draw considerable attention if they highlight high overvaluation, because the implicit message is that house prices might very well have to be adjusted downwards in the future. With the growing importance of home ownership for the development of the Dutch economy in general and private consumption in particular, there has been a substantial increase in the significance of the development of house prices. The considerable media attention is thus explainable by the circumstance that a fall in house prices may substantially impact on the personal lives of individuals.

Various articles published in the early years of this decade concluded that house prices in the Netherlands were overvalued and, partly on that basis, they predicted that the (real) price of a house would fall sharply. Our Macro Economic Outlook 2004 reviewed some of these published articles.[1] Very recently this question attracted renewed attention following an analysis conducted by the IMF (2008).[2] Based on econometric research for numerous countries, the IMF calculated that approximately 30% of the house price increase in the Netherlands between 1997 and 2007 cannot be explained by the development of fundamental factors, the highest percentage except for Ireland. This was said to make the Netherlands one of the countries with the greatest risk of a fall in house prices.

Three years ago the CPB conducted an analysis to identify the factors that determine how the price of a house in the Netherlands develops.[3] The analysis revealed that in 2003 house prices were approximately 10% overvalued. Following the recent attention given to this question, the analysis conducted then was brought up to date. This memorandum reports on the updated analysis. Section 2 re-estimates the long-term equation published earlier by using the latest data.[4] There was also an examination of to what extent the fundamental factors were responsible for the movement in house prices. Section 3 deals with the degree of overvaluation in 2003 and 2007. Section 4 sets out conclusions.

[1] CPB (2003), Macro Economische Verkenning/Macro Economic Outlook 2004, blz. 73

[2] IMF (2008), World Economic Outlook, Chapter 3, Washington

[3] Johan Verbruggen, Henk Kranendonk, Michiel van Leuvensteijn and Michel Toet (2005), Welke factoren bepalen de ontwikkeling van de huizenprijs in Nederland?, CPB Document 81, The Hague.

[4] Due to revision of the National Accounts, some series for the more distant past have also been adjusted slightly.

2 Which factors determine the price of a house in the Netherlands?

This section is based on CPB Document 81. Refer to that publication for an in-depth validation of the estimated equation and a description of the empirical results of other parties.

Based on theoretical considerations and the empirical results of other parties, we used an error correction model to explain the real house price, i.e. the nominal house price deflated by the consumer price index (CPI). The series for house prices comes from the Kadaster and concerns the average selling price of private homes.[5] To determine the factors that influence the level of the real house price, we used a specification of supply and demand factors. It follows from the research published in 2005 (CPB Document 81) that the level of house prices can be explained reasonably well by using the following fundamental factors:

- *Real disposable labour income:* income obtained from social security benefits was disregarded in this income term, because people drawing benefits exert hardly any influence on the demand for owner-occupied homes;[6]
- *Real interest rates*: long-term interest minus the development of the consumer price index;
- *Real other financial assets of households*: this concerns the financial assets of households excluding share capital, minus non-mortgage debts. Houses do not form part of the financial assets. The series concerns the average size during the year, deflated by the CPI;
- *Total housing stock*: the original series concerned the year-end situation. We have included in the equation the average housing stock, defined as the average of the housing stock at the end of this year and the previous year.

The long-term equation was estimated on an annual basis and in natural logarithms. The sample period was enlarged by four years and now covers 1980-2007. The found result is shown below (robust standard errors stated in brackets):[7]

[5] The Kadaster series includes all sold homes and is not corrected for composition effects. CBS (Statistics Netherlands) and the Land Registry have recently started publishing the Price Index of Existing Owner-Occupied Homes ('PBK'),which does make a correction for composition effects. However, there is not a sufficiently long time series of the PBK.

[6] Labour income in 2006 has been corrected for the statistical effect of introduction of the new healthcare insurance system in the Netherlands.

[7] This concerns the 'Newey-West standard errors', whereby a correction has been made for heteroskedasticity and autocorrelation. The co-integration test ('Johansen test') has been met.

$$\ln\left(p_{hu} / p_{cpi}\right) = \underset{(0.18)}{1{,}53} \ln\left(LDA / p_{cpi}\right) - \underset{(1.00)}{5{,}94}\left(r_l - \overset{\circ}{p}_{cpi}\right) + \underset{(0.24)}{1{,}63} \ln\left(W^{g}_{nof} / p_{cpi}\right) - \underset{(0.24)}{2{,}83} \ln(wv) - \underset{(0.53)}{6{,}60}$$

R^2 (corrected) = 0.97

DW = 1.11

Se = 0.07

where:

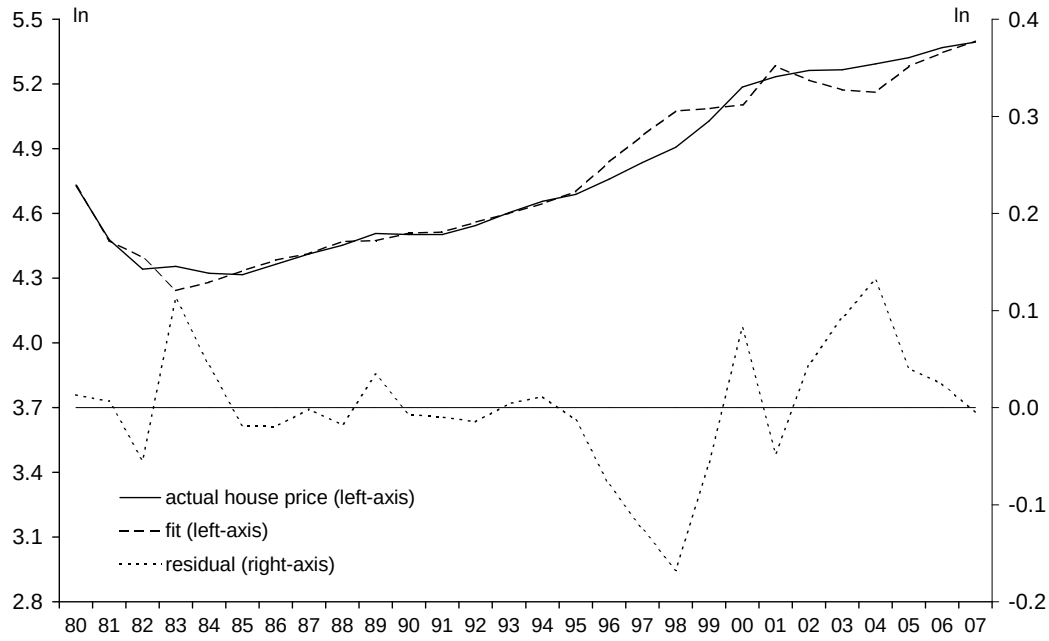
p_{hu}	=	house prices (average selling price of private homes)
p_{cpi}	=	Consumer Price Index (CPI)
LDA	=	disposal labour income
r_l	=	long-term interest rate (10-year government securities)
W^{g}_{nof}	=	nominal net other financial assets of households (average)
wv	=	volume of total housing stock (average)

Figure 2.1 shows the movement of actual house prices (in natural logarithms) and estimated long-term value. The unexplained part, the residual, is interpretable as an indication of the degree of overvaluation or undervaluation of the actual house price. Below, we will first deal with the movement of house prices, followed in the next section by the degree of overvaluation.

Firstly, it follows from the figure that for a few years in succession the actual real house price may be above or below the long-term level.[8] Therefore, there does appear to be a strong adjustment to that level, which corresponds with findings in earlier studies. CPB Document 81 made a credible case showing that the adjustment of the actual level to the long-term level occurs asymmetrically. An undervaluation of the house price is adjusted more quickly than an overvaluation, which points towards downward price rigidity. It can further be seen that real house prices fell in the early 1980s and subsequently moved upwards slightly. From the early 1990s, the real house price exhibited a sharp increase that did not end until the late 1990s. In the current decade, the real house price exhibits a moderate increase.

[8] This pattern can also be seen in the Durbin-Watson statistic of 1.11. A value lower than 2 is not uncommon for long-term equations in levels. The LM test shows that there is no questiobn of serial correlation in the estimated equation.

Figure 2.1 Actual and fitted value of the real house price in the Netherlands, 1980-2007



We have calculated in table 2.1, using the re-estimated long-term equation, what the explanation is for this development (in Δln).[9] According to this table, the increases in the 1980s of the real interest rate and housing stock combined with the small increase of real disposable income caused the fall in the real house price. In nominal terms, there was an extremely small increase of the house price, by less than 0.2% per year. In this period the increase in the housing stock came to more than 1.1 million homes, or approximately 25%. Based on the estimated equation, the real house price would have been substantially higher without this increase.

House prices increased sharply in the 1991-2000 period, i.e. nominally by an average of 9.7% per year and in real terms by an average of 7.1% per year. By far the largest part of the increase was caused by the circumstance that households became more prosperous, which is reflected by a sharp increase in real disposable income and household income. This was caused in part by the increasing workforce participation of women. Another significant factor was the low real interest rate. Without the pressure exerted by the increase in the housing stock by more than 0.7 million homes in this period, the real house price would have been significantly higher still

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[9] The long-term equations were estimated in natural logarithms (ln). The contributions in table 2.1 are therefore expressed in Δln, but this is only an approximation for percentage-wise movements. This applies particularly to major changes. The movement in real house prices between 1991 and 2000 was 98%, in natural logarithms a movement of 68.4.

Table 2.1 Contributions to real and nominal cumulated house price development (in Δln) in three sub-periods

	contributions in Δln		
	1981-1990	1991-2000	2001-2007
Explanatory variables			
Real disposable labour income	16,6	48,9	14,0
Real interest rate	– 17,0	21,5	1,2
Other financial assets of households	39,3	22,7	30,0
Housing stock	– 59,4	– 33,7	– 15,6
Unexplained	– 2,0	9,0	– 8,8
Total (cumulated real change)	– 22,6	68,4	20,8
Inflation (CPI)	24,0	24,2	15,5
Total (cumulated nominal change)	1,5	92,7	36,3

Between 2001 and 2007 the annual house price increase of on average 5.3% nominally and 3.0% in real terms was significantly more moderate. In this period the increase in households' financial assets contributed relatively a lot to the house price increase. The level of the real interest rate no longer had an appreciable upward effect, while the effects of higher disposable labour income and the larger housing stock largely compensated for each other. In this period the housing stock increased slightly less fast than in the previous decades, so the downward pressure this exerted on house prices was less.

3 Overvalued?

CPB Document 81 observed that in 2003, according to the estimate published at that time, the actual (real) house price was approximately 10% above the long-term level. The re-estimated equation presented in section 2 produces the same result for 2003. It was stated in CPB Document 81 that an overvaluation did not mean that actual house prices in the subsequent years would have to fall by 10%. In reality this did not happen either. After all, the actual development of house prices is determined not solely by the long-term value, but also by various short-term factors. Moreover, the long-term value itself can again start to go up.[10] This latter phenomenon appears to have occurred. In 2001, for example, the real interest rate was exceptionally low, while in 2004 and 2005 the family financial assets developed relatively favourably. In 2006 and 2007, the substantial increase of employment opportunities had a strong upward effect on the long-term house price. The fact that after 2003 the long-term value

[10] The IMF (2008) also points out that an overvaluation does not automatically mean a downward price correction: "*Clearly, although a significant house price gap might be expected to be corrected over time, a decline in nominal house prices is only one way for this adjustment to occur*." (p. 114)

of the house price rose more strongly than the actual house price was also due to the relatively small increase in the housing stock.

These fundamental developments resulted in the degree of overvaluation shrinking after 2003. According to the equation presented in section 2, there was in 2007 absolutely no question any longer of overvaluation and the actual house price was virtually at the long-term level.[11]

The results we found differ from the outcomes recently published by the IMF (2008) for the Netherlands, which indicate substantial overvaluation. The principal reason for the differing research results lies in the fact that the uniform specification used by the IMF for all examined countries makes no allowance for the specific housing market situation in the Netherlands. The supply of new homes in the Netherlands is strongly regulated, so the housing stock increases less strongly than would otherwise be the case. This exerts an upward effect on the balance value of house prices in the Netherlands. The IMF specification makes no allowance for this supply factor, so the other estimated coefficients of the IMF specification will also be biased.[12]

4 Conclusions

The movement of house prices in the Netherlands between 1980 and 2007 can be explained fairly well by fundamental supply and demand factors. From the exercise described in this document it follows that in 2007 there seems to be no question of overvaluation or undervaluation of house prices; the actual house price corresponds almost with the long-term value. Our analysis did not confirm the results of recent IMF research (2008), which point towards a substantial overvaluation in the Netherlands in 2007. That does not mean that the (real) house price cannot fall. This applies in particular to sub-markets, but also to the average house price. Overvaluation might occur in a short space of time if real interest rates were to increase sharply and real disposable income and family assets were to develop less favourably. Moreover, the house price in the short term may differ (downwards) from the long-term balance value. Although earlier CPB research pointed towards the existence of downward price rigidity in the housing market in the Netherlands (see CPB Document 81), a downward price correction can never be ruled out entirely. The research results currently available do not point in that direction, however.

[11] Uncertainty obviously surrounds the outcome of such an estimate. Given the standard error of the regression (Se) of 0.07, there is a 95% reliability interval of 14% above and below the residual of almost 0% in 2007

[12] It also seems likely that the IMF did not correct disposable income in 2006 for the purely accounting consequences of introduction of the new healthcare insurance system in the Netherlands.

References

CPB, 2003, *Macro Economische Verkenning 2004*.

IMF, 2008, *World Economic Outlook*, April 2008, Washington.

Verbruggen, J.P., H.C. Kranendonk, M. van Leuvensteijn and M. Toet, Welke factoren bepalen de ontwikkeling van de huizenprijs in Nederland?, CPB Document 81, The Hague.