House Price, House Quality and Economic growth

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Abstract:
The literature on housing markets suggest that periods of economic growth are characterised by a demand for better housing quality and increasing prices. The basic principles of the theory are that the short-run price fluctuations occur due to market imperfection, while over the long term, causality with such fundamentals as income will recover. Affordability of the higher quality then becomes a problem in the subsequent period of economic stagnation. This article seeks to identify the mechanism in which quality and affordability are weighed against each other, showing that the price-quality relationship changes with the economic growth. We do this against the background of the Dutch housing market. Our analysis shows that in a high-growth economy households search for better quality of property and are prepared to pay for it. In a stagnant economy the demand for quality takes second place to the demand for affordable homes. It also appears that appreciation of quality varies in particular between the low-growth phase and the medium-growth phase. The price-quality relationship barely varies between the medium-growth and high-growth phases.

Keywords:
House Prices; House Quality, Housing Market; Economic growth; the Netherlands

Jel Classification:
R21; E32; A12; D12

1. Introduction

The link between the demand for housing quality and the level of house prices are contingent on the time we live in. Theory based on the permanent income hypothesis suggests that aggregate consumption for housing in any particular period is a stable function of the average income over the current cycle (Abraham and Hendershott 1996; Malpezzi 1999; Meen 2002; Chen et al 2007; De Vries and Boelhouwer 2009). Over a long period the economic growth will certainly push up income and house price and increasing demand for better quality. As early as 1972, Fair drew attention to the significance of the long-run equilibrium between house prices and incomes. This equilibrium, as he states, stems directly from the premises of general price theory, which proposes that the demand for an object is a function of income and the price of the object or service in relation to other prices (Fair 1972). However, the demanded quality is not a constant, but is influenced by changes according to the economic growth. This can cause short-run fluctuations in the demand for housing quality and the price people are willing to pay for it. So there appears to be evidence of a long-run development that is fed by the relationship between price and income and a short-run development fed by the economic growth. Evidence indicates that both short-run fundamentals and long-run fundamentals have an impact on houses prices. In the short term, significant upward or downward movements ('shocks') appear, due to speculative or psychological effects (for example, see Reichert 1990; Levin and Wright 1997; Meen 1998; Hort 1998; De Vries and Boelhouwer 2009). The term 'bubble builder' is often used in this context and reflects upon the feeling that house prices are to high in relation with the house quality. The short-run mechanism can be observed in the way in which house buyers deal with

the price-quality relationship. In a growing economy, such as in the 1990s, house buyers seek better quality in housing and are prepared to pay for it. In a stagnating economy, such as in the early 21st century, the demand for better quality is outstripped by the demand for affordable housing.

The focus of this paper is the change in relationship between the house price and the demand for house quality caused by changes in the economic growth. For the period between 1995 and 2008 there are micro data available with which we can demonstrate connections between housing requirements, asking prices and the economic growth. We use the Dutch surveys of *House Buyers in Profile* (HBP), which were conducted in October – December of the years 1995, 1996, 1997, 1998, 1999 and January – March in 2002, 2004, 2006 and 2008. HBP was specifically set up to survey the dynamic in house-buying demand among households with above-average incomes (66% of Dutch households). It is based on a random sample of around 1300 potential house buyers. As the survey was conducted during periods of low, medium and high economic growth, we can make connections between the pattern of housing preferences and economic growth. With the use of HBP, we can answer three research questions. Firstly, *what is the relationship between the desired quality of housing and the economic growth?* Secondly, *what is the relationship between the demanded quality of housing and the asking price?* And last *does this causal connection change with the economic phase*?

The article is organised as follows. Section 2 analyses the Dutch situation at the macro level over a long time span. It shows the context within which house prices are determined in the given economic phase. This macro analysis is restricted to describing the factors that influence housing demand, and with that house prices. Section 3 contains a micro analysis in which the demanded quality, the demanded price and the economic growth relate to each other. In this, we use hedonic and multinomial logistic regression analysis. In this part of the survey, we establish whether the causal connection between the demanded quality, the composition of the household and the demanded house price changes in the course of time and whether these changes are contingent on the economic growth. We conclude with a summary (Section 4).

As far as we are able to discover, nothing has previously been published on this relationship. Survey results are often based on realised transactions in which connections are made between housing characteristics and the real house prices (e.g. Green & Hendershott 1996). Kiel and Zabel (2008) presenting a more extensive model which, besides housing characteristics, also includes the owner characteristics.

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2. Macro relationship between economic growth and the housing market

2.1 Economic growth

The Gross Domestic Product (GDP) is often used for the economic growth. Figure 1 shows the evolution of GDP and the House prices for the Netherlands.

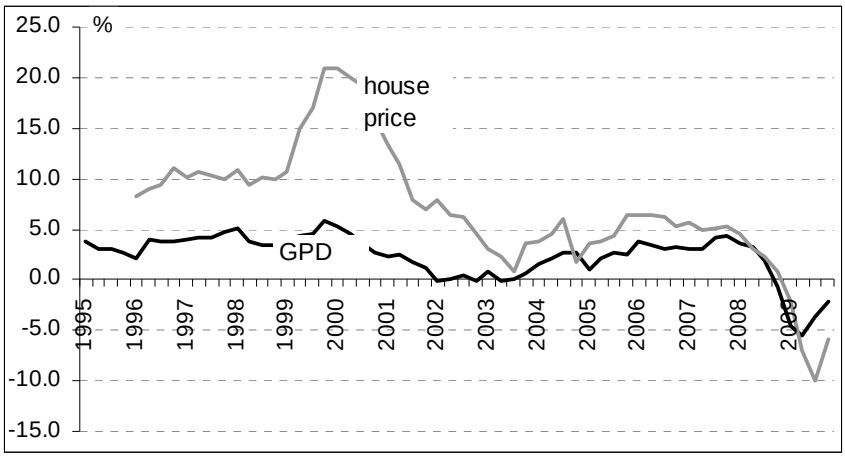

Fig 1. GDP the Netherlands, 1993-2009, %-change on corresponding period
Source: Statistics Netherlands

As far back as 1939, Schumpeter (Groot 2006, Liebregts 2008) distinguished four phases in the economic growth: Prosperity, Recession, Depression and Recovery. Prosperity occurs from the mid-point of the cycle to the peak of the economic period. During this phase, expectations in respect of economic development increase, debts rise, inflation is high, growth percentages of the economy peak and interest rates reach a high point at the end of the prosperity. In the Recession phase, from the economic peak back to the mid-point, psychological optimism in society continues to grow, along with the level of debt. Inflation and the economic growth percentages decline and housing prices peak. Interest rates will go down, the level of sustained liquidity is very high and there is a lot of financial speculation. During the Depression, from the mid-point to the lowest in the economic cycle, the mood in society becomes negative and there are periods of uncontrolled deflation and a consequent drop in prices; share prices go down and we speak of low economic growth or negative economic growth. House prices decline and interest rates bottom out. Recovery has a number of characteristics, including new and growing optimism, low inflation, slow economic growth and a gradual increase in interest rates.

In the Netherlands, according to the economic indicator of the Dutch Central Bank, the last economic wave started in March 2006. In that month, the indicator rose above the long-run trend. In April 2008 Prosperity ended and the Recession began; economic growth declined, house prices peaked and consumer confidence remained buoyant. But the Recession was brief, because only 14 months later the Netherlands landed in a Depression. The economy is expected to show positive growth figures in 2010 and the Netherlands is again expected to reach Prosperity.

The turning points of Schumpeter's four economic phases can be pinpointed to the month. However, the most relevant Dutch macro databases and databases containing house-buyers' requirements are available on an annual basis from 1995; in order to make connections with the economic phase, we use Liebregts' (2008) redefinition of the four economic phases as phases of low, medium and high economic growth. We have summarised the values of the four key indicators per economic phase in table 1.

Table 1
Economic patrons 1995-2008

Economic	GDP	Inflation	Purchasing Power	Interest rata	Nominal House Price
Low	1.2	1.9	-0.1	4.5	1.4
Middle	2.8	2.3	2.0	5.6	5.0
Hi	4.2	2.2	2.2	5.5	13.9

Source: Statistics Netherlands, Cadastre Netherlands, Dutch Central Bank, CPB /calculations OTB Research Institute (TUDelft)

In the low phase, GDP only grows by an average of 0.6 percent, while the high-growth period shows an average growth of 3.9 percent. We see that incomes decline in a low-growth phase by an average of 0.1 percent per year. In years of high growth, incomes rise by 3.9 percent annually. As Englund and Ioannides (1997) already point out for 15 OECD countries including the Netherlands, there seems to be a clear connection between the increase in house prices and the clusters of economic phases. In a low-growth phase, house prices increase by 3.5 percent, and by as much as 12.6 percent per year in a high-growth phase. We see striking values as regards inflation, incomes and mortgage interest in the medium-growth phase. These indicators reach the highest averages in the medium phase, between periods of high and low economic growth. The medium phase that occurred in 1995 and 1996 developed into a boom, while 2001 was the transition from a high-growth to a low-growth economy. Apparently this transition phase can take on many different faces.

2.2 Market forces and the Dutch housing market

In contrast to the US, home ownership in the Netherlands only matured at the end of the 20th century (De Vries 2009). In 1930, 15% of the population owned their own home, rising to 30% in 1970. Since 1977, more houses have been built to buy than to rent, and only from 1997 does the share of bought homes break the 50% barrier. In 2010, 58% of all homes in the Netherlands are owner-occupied. Viewed historically, this represents spectacular growth, with the market having to adapt continuously and seeking a new equilibrium.

The growth in home ownership is closely connected with the social value of having one's own home and the associated introduction of market forces since the 1990s. In 1930 it was normal to rent rather than to buy a house (Bijvoet 2001). And after the Second World War, the Dutch housing policy was concentrating on addressing the quantitative shortage of homes. House building was strongly driven by the government and there was no question of market forces. Only from 1990 a careful start was made on the liberalisation of the Dutch housing policy. Increasingly, the government cites housing quality, choice, market forces and consumer sovereignty as central concepts, and in 2001 the government emphasised for the first time that home ownership should be encouraged (Boelhouwer 2002, 2005). Great emphasis is put on the facilitative power of the market, in which the price mechanism ensures that supply and demand balance out at macro level.

Many studies place the conditions in which an efficiently operating market is created and the characteristics of the housing market side by side (see, among others, Cho 1996; Barr 1998; Priemus 2000; Kiel & Zabel 2008). Three conditions for a perfect or efficiently operating market are most commonly cited. The first is the possibility for the actors to make allowance in their considerations for all the relevant information; they must therefore have perfect information available now and in the future. The second requirement is that the actors must have equal power in the market. This is possible when there are many customers and many suppliers active in the market. Third is homogeneity. When the product is heterogeneous, such as in the housing market, then the concept of 'market' is not sharply defined. Clearly, neither the housing market nor many other markets are efficient or perfect.

It has been investigated in many countries whether the housing market works efficiently (Cho 1996). It appears that the housing market is imperfect, as the hypothesis of an efficiently operating market was rejected time after time. This imperfection or inefficiency is owing to the fact that the economic forces have not played out. This causes changes from within, again causing an imbalance in the housing market.

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2.3 House price development

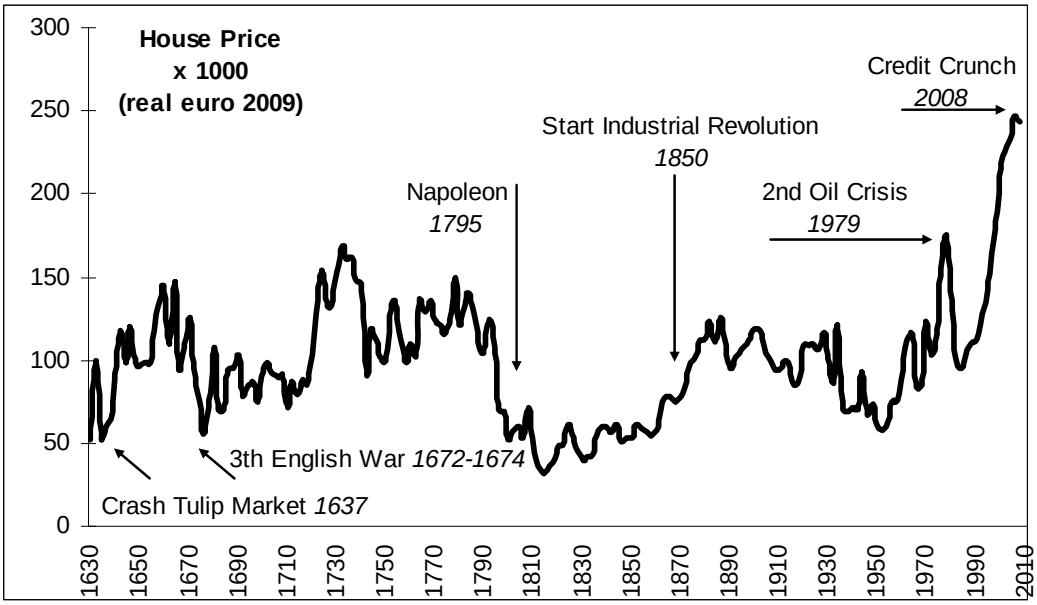

Fig 2 House Price Development, nominal, 1975-2009

Source: Eicholtz (1997), Statistics Netherlands, NVM Estate Agents, Dutch Land Registry Office/ Calculations OTB Research Institute (TUDelft)

We have four long-run data sources for an analysis of the house price development in the whole of the Netherlands. The first we refer to is the Herengracht in Amsterdam over the period 1628-1973 (Eichholtz 1997). The second data source is the CBS (Statistics Netherlands) (1965-1974) which overlaps the Herengracht index. But the CBS gives a more representative view of the Dutch price development. Both the CBS and the Herengracht index stop in 1974. The third source is the NVM (Dutch Association of Real Estate Brokers), which publishes information on the housing market from 1975. The participating real estate agents have a fluctuating market share of around 70%. The database of the Dutch Land Registry Office is the forth source which publishes the average house price per month from 1993, based on all house sales. These four data sources are combined in fig. 2.

The development of the real house price over the last four centuries (fig. 2) provides an impression of the socio-economic changes that took place in the Netherlands and Amsterdam; the horizontal line shows the average real house price over the entire period (EUR 99,000). We present the development of the real house price in accordance with Shiller's hypothesis that the (US) house price correlates with inflation in the long term (Shiller 2005). This gives us an idea of when the house price is 'high' or 'low'. Clearly visible in the middle of the figure is the deep recession that the Netherlands experienced at the start of the nineteenth century. Only when industrialisation got underway in the Netherlands house prices did reach their old level again: an early proof that house prices in the Netherlands have a direct relationship with the economic growth. In other western economies, too, the relationship between the economic growth and house price has been demonstrated. Adams and Fuss (2009) examine the impact of the macro economy on house prices using a panel of 15 countries over a period of more than 30 years to allow the robust estimation of long-term macroeconomic impact. They conclude that a 1% increase in economic activity raises the demand for houses and thus house prices over the long term by 0.6%.

Since 1984, the real house price in the Netherlands has been above the four-century average. It is the period in which the basis is laid for market forces on the Dutch housing market. The period to 1990 is characterised by a fast economic recovery. Despite increasing economic growth, the inflation percentage remains on the decline. Between 1987 and 1989, inflation is even exceptionally low. We

also see a recovery in incomes and a strong decrease in interest rates. The financial capacity of households on the housing market thus improves markedly. House prices show a more or less stable trend. From 1992, market forces are carefully introduced, house prices develop annually with nominal exceptions of over 10% in 1993 (10.5%), 1996 (10.1%), 1999 (18.1%) and 2000 (15.1%). The only exception to this positive price development is the first half of 1990, in which prices increased by only 2.1%. In this period, the Gulf War was fought and there was evidence of economic instability. After 2001, economic conditions in the Netherlands change and there is lower economic growth in 2001 and even a decline in 2002 – a situation that last occurred at the beginning of the 1980s. House prices respond with decreasing growth percentages, reaching a trough in 2003 (1.7 percent). In that year, inflation (at 2.1 percent) was higher than the rise in house prices, meaning that house prices fell in real terms. Note that in the US the nominal house price rose annually between 2000 and 2005 by 8.9% or 6.5% per year in real terms (Goodman & Thibodeau 2008). This increase in national house prices followed a decade in which house prices remained roughly constant in real terms while prices in the Netherlands, by contrast, rose strongly. But from 2004 the Netherlands has seen an economic recovery, slowly rising interest rates and house price increases. This phase abruptly changes in the fourth quarter of 2008 into a recession as a reaction to the bankruptcy of Lehman Brothers on 15 September 2008. The Dutch open economy appeared to be very vulnerable to the worldwide credit crunch (Priemus 2009). A year later, house prices had dropped by 5%.

2.4 Demand factors, economic growth and price trend

Recently, De Vries and Boelhouwer 2009, Van der Heijden et al 2004, and Haffner and De Vries 2010 again demonstrated that the Dutch housing market is an imperfect market in which supply has insufficient power in the market. The inefficiency arises because demand is strongly stimulated by government policy and by the simultaneous increase in borrowing capacity through the introduction of the two-earners and interests-only mortgages and other products by the financial institutions. These demand impulses cause spectacular price increases. De Vries (2009) concluded that this changed the housing market structurally, resulting in higher price levels. The price trend is thus mainly driven by developments in housing demand.

The most important factors that influence demand on the housing market in the long term are, besides economic growth, demographic causes, government fiscal policy and the policy of the financial institutions. (For an overview of relevant literature see: Goodman & Thibodeau 2008). The force exerted by these factors on demand depends on the economic phase. Demographic developments appear to have a structural influence (Boelhouwer et al 2002; Green & Hendershott 1996; Goodman & Thibodeau 2008). An increase in population and/or households affects the demand for housing. However, researchers find that the demographic influence varies. Mankiw and Weil (1989) explain the house price trend in the United States entirely in terms of demographic developments. Using hedonic regression techniques, they link the value of the house to the age of each household member. Based on their study, the authors predict in 1989 that real house prices in 2007 would have declined by 47 percent because the demand for more expensive houses would flatten out. However, Poterba (1991) finds no impact of the Mankiw-Weil demographic variable on metropolitan level real house appreciation during the 1980s. Green and Hendershott (1996) conclude that changes in demographic factors may have contributed significantly to real house prices appreciation if attributable to education and household income.

In the Netherlands we see little connection between economic growth and age composition after the 1970s. This is partly because the demographic developments have a delayed effect on the general economy and the housing market. However, from 2000 the group of 45 years and older increased sharply. This is the group that is most active on the housing market. The study by Markiw and Weil shows this group to be the one that can most afford to own homes. In addition, the increase in the proportion of single-person households from 1960 and the sharp increase after 2000 have particular influence on the demand for homes and their quality. Over the long term, house-buying demand is driven by the composition of households.

Affordability in the housing market is constituted by a combination of the fiscal policy of the government and the lending conditions of the financial institutions. In the Netherlands, affordability is

monitored every six months by calculating the maximum borrowing capacity of a number of household types. The borrowing capacity takes account of the interest rate, income and the standards of the financial institutions. In the period from 1982 to 1986, financing capacity increased, after having been under pressure in the previous period. The house price trend, which also emerged from a deep trough, did not immediately respond to this increased capacity. Perhaps most people were still too aware of the deep recession. Up until the 1990s, house prices and financing capacity were reasonably in tune. In the 1990s, prices increased sharply, but so did borrowing capacity. The causes of the strong increase in borrowing capacity in this period are the strong decline in mortgage interest rates during this decade, the increase in household incomes and the introduction of new mortgage products. This also caused the demand for homes to increase from the mid-eighties (Boelhouwer 2006).

The financial institutions in particular set their policy according to the economic conditions. A striking example of this is the recent market situation following the credit crunch of the third quarter of 2008. The economic circumstances before the credit crunch were good; incomes grew and income prospects were rosy, and mortgage interest rates dropped. Financial institutions had relaxed their lending conditions. This situation changed abruptly in November 2008 with a sharp drop in prices, which appears to have been a direct consequence of the downfall of Lehman Brothers on 15 September, when the credit crunch reached the Netherlands. Optimism concerning further increase in income evaporated. Government and banking policy exacerbated this situation by tightening up lending conditions (Haffner en De Vries 2009). At the end of 2009, the balance showed that prices had dropped by 5% and the number of sales by 35% (De Vries and Van der Wal 2009).

3. Micro relationships between economic growth and housing market

For the period between 1995 and 2008 there are micro data available with which we can demonstrate connections between housing requirements, asking prices and the economic growth. We use the surveys of *House Buyers in Profile* (HBP), which were conducted in October – December of the years 1995, 1996, 1997, 1998, 1999 and January – March in 2002, 2004, 2006 and 2008. HBP was specifically set up to survey the dynamics in house-buying demand among households with above-average incomes (66% of Dutch households). It is based on a random sample of around 1300 potential house buyers. As the survey was conducted during periods of low, medium and high economic growth, we can see connections between the pattern of housing requirements and the economic growth.

3.1 Influence of economic growth on demand determinants

Table 2 provides an overview of the most relevant differences between the characteristics per economic phase. Other characteristics are included in the analysis, such as having children and the desire for bigger living space, but these appear to have no significant correlation with phases of the economy. Table 2 shows that the spread of the demand determinants in the low-growth economic phase differs from that in the medium-growth and high-growth phases. The differences between the medium-growth and high-growth phases are considerably smaller. When we look at the socio-demographic characteristics, it is clear that the proportion of households with an income more than twice the average in the medium-growth (35.3) and high-growth (34.3) phases is greater than during a low-growth phase (30.7). What strikes one most is that only the proportion of the age group 30-40 differs per economic phase (low 39.6; middle 33.5; high 31.7). The other age groups are comparable as if as the economic growth has no effect upon their behaviour.

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Table 2
Preferred quality of house buyers per economic phase, 1995-2008, %

		Low	Middle	Hi
Household income	until 1,5x average income	40.1	34.0	34.1
	Between 1,5 and 2x average income	29.2	30.0	31.6
	from 2x average income	30.7	36.0	34.3
Age	18-30	13.8	14.9	14.6
	30-40	39.6	33.5	31.7
	40-55	31.2	37.4	37.4
	55 and older	15.3	14.2	16.3
Preferred architecture	Experimental	13.5	14.5	12.3
	Modern	15.9	15.9	15.7
	Traditional	70.6	69.6	71.9
Preferred kitchen	open kithcen	33.4	23.9	20.4
	Separate from living room	36.5	43.3	45.0
	No preference	30.0	32.9	34.7
Preferred number of rooms	1, 2 or 3	15.2	12.4	11.3
	4 or 5	64.8	65.6	68.2
	6 or more	20.0	22.0	20.5
Preferred dwelling type	Row or corner	21.6	12.2	18.9
	Semi-detached	27.9	31.1	29.7
	Detached, no floors	18.2	21.6	20.6
	Detached, 1 or 2 floors	18.2	20.8	20.4
	appartment	14.0	14.3	10.4
Rent or Owner occupied	Certainly owner occupied	73.5	79.5	80.9
	No preference	26.5	20.5	19.1
Preferred location	City centre	14.0	9.7	9.4
	City suburb	37.4	36.5	35.9
	In a small town	25.5	34.8	37.9
	Nearby a small town	17.1	15.3	14.3
	No preference	6.0	3.7	2.5
Want to move to	Less luxery dwelling	8.2	8.4	6.4
	More luxery dwelling	58.0	67.8	68.0
	Same quality	33.8	23.8	25.6
Look at advertisements	ja	73.5	83.1	81.9
Say to friends I want to move	ja	44.0	59.0	58.6
Watch windows real estate agents	ja	48.4	62.9	61.3
Ask for information newly built dwellings	ja	18.7	34.5	29.9
Inspected dwellings outside, consider to move	ja	18.7	34.5	29.9
Inspected dwellings inside, consider to move	ja	24.7	36.1	30.2
Tolk with a real estate agent?	ja	15.9	23.3	17.7

Source: OTB Research Institute (TU Delft), HBP 1995 – 2008

It is to be expected that in a high-growth economy, people have more money to spend and so desire more rooms per home. This is borne out by the fact that demand for smaller homes are more visibly greater in the low-growth phase than in the medium- and high-growth phases. It is also clear that the demand for apartments declines as soon as the economy starts to recover and the demand for types of homes that offer more in terms of amenities, such as detached houses, starts to increase. It is striking that in the low economic phase, 73 percent of the people are determinedly seeking to buy a home, while in the medium and high phases the percentage is more or less equal (81 percent).

The three economic phases differ unmistakably as regards the desired residential environment. The likelihood of people seeking a home on the outskirts of town and in smaller municipality's increases visibly as the economy recovers. It also appears that in a high-growth phase, households are much more active in the housing market than in a low-growth phase.

The categories in table 2 are only two-dimensional. For this reason, a multinomial logistic regression model has been estimated, in which we determine the chances of a household having a particular pattern of residential preferences, given a specific phase of the economy. Multinomial logistic regression makes insightful connections between categorical variables such as economic phase and a collection of variables that can be measured on any scale, such as demand determinants (Tabachnick en Fidell, 2001). The model results are presented as odds ratios. An odds ratio of 1 means that there are no differences. An odds ratio greater than 1 means that the chances of the characteristic occurring compared against the low-growth phase are greater; an odds ratio less than 1 means less likelihood of occurrence. We show the significance level by means of asterisks. An example: the odds ratio of 0.49 for someone older than 55 years indicates that the likelihood of someone over 55 being the oldest person in the household as against someone of up to 30 years is 0.49 times more likely in the medium-growth phase than in the low-growth phase. In high-growth phase, the odds ratio is 0.59. The strength of cohesion in the model is generally shown as the proportion of explained variance. In categorical models it is not possible to calculate this such as the R2 in linear regression, because you cannot speak of variance in respect of multinomial variables. However, there are various pseudo-R^2 sizes, which are comparable with the R^2 from the linear regression analysis. An accepted pseudo size is ρ^2 by Nagelkerke. Pseudo R^2 sizes, therefore also Nagelkerke's ρ^2, generally take on low values.

Using this technique, we estimate the parameters of the medium- and high-growth economic phases against the low-growth phase, which serves here as a reference pattern. And we continually compare the categorical variables against a reference value, in which a distinction is made between four socio-demographic characteristics (age, income, children, number of wage earners), eight residential characteristics (architecture, type of kitchen, number of rooms, size of living room and bedroom, type of home, ownership ration, existing or new construction) and two environmental factors (type of location and amenities of the neighbourhood).

In table 3 we present the results. This shows the likelihood of a household having a particular pattern of requirements, given the economic growth. A model with only environmental characteristics has an explained variance of 1.7 percent, based on Nagelkerke's ρ^2. If only socio-demographic characteristics reflect the demand for homes, significant differences show up per economic phase as regards income. We find that households with above-average income are more active on the housing market in a medium- and high-growth phase than in a low-growth phase, because the odds ratios are above 1. Adding residential characteristics improves the model to 10.0 percent. We see that newly built homes in a medium- and high-growth economy are more likely to sell than in a period of low economic activity. In this, the chances of preferring a newly built home are 1.85 greater in the medium-growth phase than in the low-growth phase. The likelihood changes somewhat less in the high-growth phase (1.62). It also appears from the analysis that the number of households seeking an expensive house during the high-growth phase increases sharply. By adding the desired location and amenities of the neighbourhood, the model improves to a Nagelkerke ρ^2 of 11.3 percent, which can be called a reasonable value. The fact that the influence of income has declined compared with the previous models leads us to conclude that the added value of the house and environmental characteristics are stronger than that of income. This is logical, for during the high-growth phase households with higher incomes want the desirable (more expensive) locations on the outskirts of the town or in smaller municipalities. The complete model also shows the following: the stronger the economy becomes, the more the chances increase of housing demand being based on better home and

Table 3
Multinomial logistic regression model

		A			B			C		
Nagelkerke ρ^2		0,0169			0,0999			0,1133		
		Middle Odds		High Odds	Middle Odds		High Odds	Middle Odds		High Odds
intercept		0.00	***	0.00 ***	0.00		0.00	0.00		0.00 **
Household income	Between 1,5 and 2x average income	1.28	**	1.23 **				1.01		1.05
	from 2x average income	1.48	***	1.36 ***				1.16		1.20 *
	until 1,5x average income (ref)	.		.				.		.
Age	30-40	0.72	***	0.69 ***				0.68	**	0.71 **
	40-55	1.00		1.04				0.86		1.01
	55 and older	0.58	***	0.56 ***				0.49	***	0.59 **
	18-30 (ref)	.		.				.		.
Childern	No children	0.87	**	0.88 *				1.04		1.04
	Yes children (ref)	.		.				.		.
One or more incomes	One	1.18	**	1.05				1.10		1.02
	Two (ref)	.		.				.		.
Preferred architecture	Experimental				1.18	*	0.99	1.31	**	1.13
	Modern				0.95		0.98	0.91		0.93
	Traditional (ref)				.		.	.		.
Preferred kitchen	open kitchen				0.51	***	0.43 ***	0.50	***	0.43 ***
	Separate from living room				1.07		0.95	1.02		0.89
	No preference (ref)				.		.	.		.
Preferred number of rooms	4 or 5				1.30	**	1.37 **	1.36	**	1.53 **
	6 or more				1.27	*	1.15	1.26		1.24
	1, 2 or 3 (ref)				.		.	.		.
Preferred square methre living room	Until 40 m2				1.15	*	1.13 *	1.26	**	1.19 **

	40-55 m2	1.44	**	1.02		1.64	**	1.04	
	55 and more (ref)	.		.		.		.	
Preferred square methre sleeping room	12 until 16 m2	0.73		0.77		0.89		0.86	
	16-20 m2	0.79		0.78		0.92		0.80	
	20 m2 and more	0.83		0.86		0.88		0.84	
	Until 12 m2 (ref)	.		.		.		.	
Preferred dwelling type	Row or corner	0.42	***	1.10		0.42	***	1.20	
	Semi-detached	0.84		1.17		0.82		1.23	
	Detached, no floors	0.94		1.42	**	0.98		1.45	**
	Detached, 1 or 2 floors	0.79	*	1.23		0.79		1.30	
	Appartement (ref)	.		.		.		.	
Rent or Owner occupied	Certainly owner occupied	1.36	***	1.49	***	1.32	**	1.52	***
	No preference (ref)	.		.		.		.	
Newly built or stock	Stock	1.09		1.06		1.18	*	1.15	
	Newly built	1.80	***	1.56	***	1.81	***	1.55	***
	No preference (ref)	.		.		.		.	

Source: OTB Research Institute (TU Delft), HBP 1995 - 2008
Notes: Significance at the 1%, 5%, and 10% levels is denotes as ***, **, and *, respectively
Nagelkerke $\rho^2 = 0{,}113$
Reference category = low economic phase

environmental quality. This is shown by the significant odds ratios that lie above 1 as regards the number of houses with four and five rooms (compared with houses with fewer than four rooms), the free-standing bungalow (as against the apartment), determination to buy rather than rent (as against no preference) a newly built house (as against no preference) and all the categories of the desired location, in which we see that the more expensive locations in particular show high odds ratios. We conclude that the house buyer adapts his preference to the economic phase. In a stagnant economy, demand emphasis is on affordability rather than increased quality. Thus, the economic phase influences our housing requirements.

3.2 Relationship of desired quality and desired price

It is shown in the previous section that the demanded quality is contingent on the economic phase. This section discusses the question of whether the demanded quality in a given economic phase is valued differently – in other words, does the connection between the demanded quality and the asking price change when the economic conditions change? Again, we refer to the surveys of *House Buyers in Profile* from 1995. We use the hedonic regression method.

First of all we estimate, per economic phase, a hedonic model in which house price and income are annually standardised. By standardising, a data set is created in which for each year the average house price and average income is zero with a standard deviation of 1. Standardised coefficients are often interpreted as a reflection of the influence a predictor has within the model. However, the standardised regression coefficients are estimated without taking account of the mutual correlations. Pratt's measure of relative importance is an alternative statistic that does take account of these. The higher Pratt's Importance, the more the variable contributes to the explained variance (R^2).

The standardised coefficients as well as Pratt's Importance for the low-, medium- and high-growth phases can be seen in table 4. There appears to be no clear pattern in the values of the regression coefficients. But there does appear to be a system when we look at the Pratt's Importance. The level of income in a low-growth economy is clearly less important (34%) to the formation of the asking price than in the medium-growth (70%) and high-growth phases (55%). It would seem that, in the low-growth phase, quality is the most important characteristic in deciding the price. These accords with expectations. In a low-growth economy, people are more critical, while in a high-growth economy they are motivated more by their spending power.

We subsequently tested whether the standardised regression coefficients of the three models vary. We first determined the deviation between two regression coefficients; then we determined, with the aid of the standard error[1] (SE) the 95-percent reliability interval of the deviation (table 5). In table 5 it is indicated whether coefficients deviate from each other or not. From this we conclude that the income in the medium-growth phase determines the level of the house price more than in the low-growth phase. It also appears that appreciation of quality in particular varies between the low-growth phase and the medium-growth phase. The price-quality relationship between the medium- and high-growth economies barely differs.

[1] The standard error (SE) of the deviation between two independent regression coefficients is a function of the estimator's standard errors $SEbx\text{-}by = \sqrt{(SEbx^2 + SEby^2)}$

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Table 4
Coefficients hedonic regression and Pratt-importance

	Low		Middle		High		Low	Middle	High
R2	0,41		0,46		0,50				
	Beta	Sign	Beta	Sign	Beta	Sign		Pratt Importance	
(constant)	-0.37		-0.18	*	-0.17				
Income	0.37	***	0.58	***	0.50	***	34%	70%	55%
traditional architecture	0.05		-0.12	**	0.11	**	0%	0%	0%
Modern architecture	0.30	**	-0.12	**	0.08		2%	0%	0%
experimental architecture	-0.04		-0.19	**	0.01		0%	0%	0%
Big living room	0.25	***	0.14	***	0.28	***	8%	4%	10%
4 or 5 rooms	0.28	***	0.22	***	0.14	**	3%	2%	1%
6 or more rooms	0.63	***	0.43	***	0.32	***	13%	7%	5%
Big sleeping room	0.04		0.06	***	0.04	**	1%	3%	2%
Two incomes	-0.04		-0.24	***	-0.25	***	1%	3%	2%
30 to 40 years	0.48	***	0.06		0.01		0%	0%	0%
40 to 55 years	0.49	***	-0.03		0.01		6%	0%	0%
55 years and older	0.68	***	-0.03		0.15	**	4%	0%	1%
No children	0.05		0.00		0.04		1%	0%	0%
region North Netherlands	-0.43	***	-0.35	***	-0.55	***	3%	2%	5%
Outside built-up area	0.07		0.07	*	0.02		0%	0%	0%
Appartment	-0.48	**	-0.05		-0.27	**	1%	0%	1%
House in a row	-0.74	***	-0.05		-0.40	***	15%	0%	8%
Semi-detached	-0.51	**	-0.09		-0.22	**	1%	1%	2%
Detached, no floors	-0.23		0.29	***	0.27	***	4%	6%	6%
Detached, floors	-0.44	**	0.14	*	0.01		2%	1%	0%
Dreamers	-0.19	**	-0.02		-0.07	**	0%	0%	0%

Source: OTB Research Institute (TU Delft), HBP 1995 - 2008
Notes: Significance at the 1%, 5%, and 10% levels is denotes as ***, **, and *, respectively
Estimation logaritm of the desired house price

Table 5
Significantion of the deviation

	Low and Middle			Middle and High		
	Deviation	SE	Sig	Deviation	SE	Sig
(constant)	0.19	0.26	No	0.02	0.15	No
Income	0.21	0.03	Yes	-0.08	0.02	No
traditional architecture	-0.17	0.10	No	0.23	0.07	Yes
Modern architecture	-0.42	0.11	No	0.20	0.08	Yes
experimental architecture	-0.15	0.12	No	0.20	0.08	Yes
Big living room	-0.11	0.06	No	0.14	0.04	Yes
4 or 5 rooms	-0.06	0.09	No	-0.08	0.07	No
6 or more rooms	-0.20	0.11	No	-0.10	0.08	No
Big sleeping room	0.03	0.03	No	-0.02	0.02	No
Two incomes	-0.20	0.07	No	-0.01	0.04	No
30 to 40 years	-0.42	0.09	No	-0.05	0.06	No
40 to 55 years	-0.52	0.09	No	0.04	0.06	No
55 years and older	-0.71	0.12	No	0.19	0.09	Yes
No children	-0.05	0.07	No	0.04	0.04	No
region North Netherlands	0.08	0.09	No	-0.20	0.06	No
Outside built-up area	0.00	0.07	No	-0.05	0.05	No
Appartment	0.43	0.23	No	-0.23	0.12	No
House in a row	0.69	0.23	Yes	-0.34	0.12	No
Semi-detached	0.43	0.22	No	-0.13	0.11	No
Detached, no floors	0.52	0.23	Yes	-0.02	0.11	No
Detached, floors	0.58	0.23	Yes	-0.13	0.11	No
Dreamers	0.17	0.06	Yes	-0.05	0.04	No

Source: OTB Research Institute (TUDelft), HBP 1995 - 2008

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4. Summary

The structural demand for houses is fed in the first place by demographic factors such as population growth and the number of households. From 1900 up to the Second World War, the population grew more or less gradually. The post-war baby boom disturbs this pattern from the 1960s onwards, as does the sharp increase in the proportion of single-person households. The strong increase in borrowing capacity, caused by rising wages and falling interest rates, influenced the demand for quality and for owner-occupied housing. Since the 1990s, the central concepts in the Dutch housing market have been the implementation of market forces and freedom of choice. According to the neoclassical economic theory, demand will increase as the economy recovers. Our analysis shows that the house buyer in a high-growth economy is in search of a better quality of property and is prepared to pay for it. In a stagnant economy, such as in the early years of the 21st century, the demand for quality takes second place to the demand for affordable homes. A mechanism therefore appears to exist that weighs quality against affordability, and the chances increase that households in a medium- and high-growth phase will demand more quality than in a low-growth phase. It also appears that appreciation of quality varies in particular between the low-growth phase and the medium-growth phase. The price-quality relationship barely varies between the medium-growth and high-growth phases.

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