

Analysis of the developments in residential property prices: Is the Belgian market overvalued?

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Introduction

Close monitoring of the property market is a crucial element of both macroeconomic analysis and macro-prudential policy. The emergence of tensions on the mortgage market can in fact undermine financial stability, as was the case in the United States during the subprime crisis, which was generally regarded as one of the factors leading to the global economic and financial crisis of 2008 and subsequent years. Moreover, the experience of some European countries – notably Spain and Ireland – shows that imbalances on the property market can trigger and propagate a slowdown in economic activity. The great recession that began in 2008 therefore highlighted the importance of property market developments, which have since been the focus of particular attention. For example, house price developments have formed an integral part of the scoreboard for the European Commission's macroeconomic imbalance procedure (MIP) ever since the procedure was set up in 2011.

Apart from the analysis of price developments, the constant monitoring of the property market also involves assessing the risks inherent in that market, particularly in the event of a slump in property prices. In that context, the detection of any property bubbles has become a key element in our analysis. In order to determine the extent to which property prices deviate from their equilibrium level, i.e. the degree to which the market is undervalued or overvalued, the empirical literature describes a number of methods of assessing property market valuations. Those methods can be divided into two main

categories: statistical and econometric. Econometric methods, which we consider as preferable, consist more specifically in comparing property price developments with a number of their underlying determinants, such as household incomes, mortgage interest rates, or demographic developments.

The property market may constitute a risk factor for financial stability and the domestic economy, in the sense that the Belgian financial sector has significant exposure to those risks since mortgage loans and loans to Belgian non-financial firms operating in the construction industry and in real estate activities represent a substantial proportion of banks' assets, respectively at 18% (or € 187 billion)⁽¹⁾ and 3% (or € 34.5 billion) at the end of December 2016.

This article, which focuses solely on the housing market⁽²⁾, presents a detailed analysis of property market developments, and particularly the price rises which have persisted over several decades. The first section, which is mainly descriptive, examines the trend in house prices in Belgium as well as in Europe, on the basis of the available statistics, while the second section reviews the various methods of assessing the valuation of property markets and the fundamental price determinants. Finally, the article ends with a summary of the main conclusions.

(1) That figure corresponds to the proportion of Belgian mortgage loans in the balance sheet of the nine banks using the IRB approach for that type of portfolio. Those banks account for over 90% of the mortgage loan market in Belgium.

(2) Owing to the shortage of good quality data on the commercial property market, it is currently very difficult, if not impossible, to produce an analysis similar to that for the housing market.

1. House price developments in Belgium and in Europe

1.1 Developments in property prices in Europe

Before the 2008 economic and financial crisis, house prices had displayed a marked upward trend over several decades in almost all European countries. However, they also fluctuated repeatedly around that trend, so that a number of cycles emerged.

According to Baugnet *et al.* (2011), the upward phase recorded in the OECD countries between the second half of the 1990s and 2007 was noteworthy because it differed from the preceding average cycle in several respects⁽¹⁾:

- it covered a period of ten years (from the end of 1996 to the beginning of 2007), whereas previously

(1) Baugnet *et al.* (2011) base their analysis on the OECD's statistics on real prices, i.e. nominal prices deflated by the private consumption deflator from the national accounts, in order to neutralise the influence of the movement in the general price level.

- a complete cycle lasted only 6.5 years, with 3.5 years constituting the upward phase;
- despite some variations between countries, the rise was substantial since prices increased by 44 % on average, compared to the previous 15 %;
- the rise in property prices was more widespread and synchronised than in earlier cycles;
- it also seemed to be unconnected with the economic situation, in that prices continued to rise steadily despite the slowdown in economic activity in the early 2000s.

If we start the analysis in 2000, we find that real house prices in Belgium have risen by much more than the average in the euro area, especially from 2005 onwards. However, the euro area average conceals wide variations between countries because the property cycles were considerably less synchronised during the downward phase which began in 2007. It is thus possible to identify three main groups of countries (see chart 1):

- the first group, which includes Belgium and France, featured a strong rise in house prices over several decades, without that leading to a genuine downward correction at the time of the 2008 economic and financial crisis.

CHART 1 REAL HOUSE PRICES IN A SELECTION OF EUROPEAN COUNTRIES
(indices 2000 = 100)



Sources: OECD, NBB.

The dip in real property prices in Belgium was indeed very limited compared to that seen in many other European countries, in terms of both scale (–1.2 %) and duration (only two consecutive quarters);

- the second group consists mainly of countries on the periphery of the euro area, where the steep increases in property prices prior to the great recession were followed by sharp and persistent falls;
- finally, in a few countries, the profile of the trend in house prices in the preceding decades clearly differed from that of the other two groups. Prices actually began rising later in Austria and Germany – from 2004 and 2009 respectively – while they took a downward turn from the second half of 2001 in Portugal.

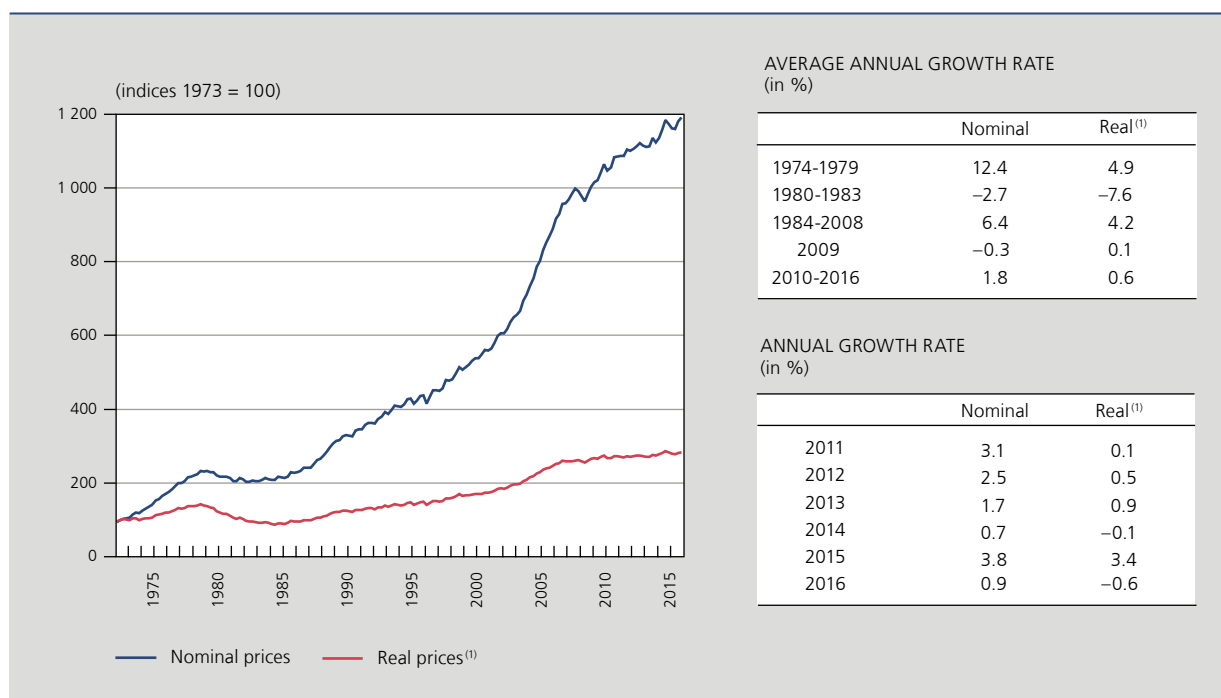
House prices seem to have begun rising again in almost all European countries for several years now. While that was already the case from 2013 in the United Kingdom and in the periphery of the euro area (Spain, Ireland and Portugal), and from 2014 in the Netherlands, property prices in France and Finland have recorded positive growth over the past two years. Moreover, prices have continued rising in Belgium, and to a greater extent in Germany, and especially in Austria where strong increases were seen from 2015 onwards. In regard to Austria,

Albacete *et al.* (2016) attribute the rise to the upper segment of the property market and to the increasing share of purchases concerning second homes or investment, due partly to strengthening foreign demand. In Germany, the rise in house prices appears to be located in major urban centres and to apply mainly to apartments (Kajuth *et al.*, 2013). Conversely, prices are still falling in Greece and Italy, though the pace has slackened.

1.2 Developments in property prices in Belgium

According to the indicator compiled by the National Bank (see box), nominal house prices have displayed a clear upward trend in Belgium since 1973. The annual average data indicate only two periods when prices declined: the first during the first half of the 1980s, when prices fell by an average of 2.7 % per annum, and the second – briefer – period at the time of the economic and financial crisis, when they dropped by 0.3 % in 2009. However, the scale of the fall in prices during those two periods remained far from the size of the increases seen since the 1970s. The rise in property prices was particularly marked during the 1970s, in the late 1980s and between

CHART 2 RESIDENTIAL PROPERTY PRICES IN BELGIUM



Source: NBB.

(1) Deflated by the private consumption deflator from the national accounts and by the national consumer price index for the period preceding 1980.

2005 and 2007, when growth rates reached 10% or more⁽¹⁾. Overall, nominal prices were multiplied by 12 between 1973 and 2016.

Real house prices have also been rising since the early 1970s. Nonetheless, taking account of inflation, the long-term dynamics of property prices are clearly more moderate. However, the price fall recorded in the early 1980s appears steeper in real terms owing to the high inflation rates during that period. Conversely, the reduction in property prices at the time of the 2008-2009 crisis, which was already modest in nominal terms, is significantly smaller owing to the decline in the private consumption deflator; over the year 2009, that deflator was down by 0.7% so that the growth of real house prices remained positive in that year.

In regard to recent trends, the Bank's indicator shows that property price growth is slowing down. After a marked rebound in 2010 (+5.4%), following a very slight drop in 2009, house price growth has steadily diminished.

(1) It should be noted that the statistics on property prices feature a break in the trend in 2005 (see box), so that the growth rate in that particular year may be distorted (upwards). However, the size of the impact cannot be measured owing to the lack of data.

(2) The Flemish Region also recorded a fall in prices between the last quarter of 2008 and mid-2009. However, that decline was smaller so that prices virtually stabilised (+0.2%) over 2009 as a whole.

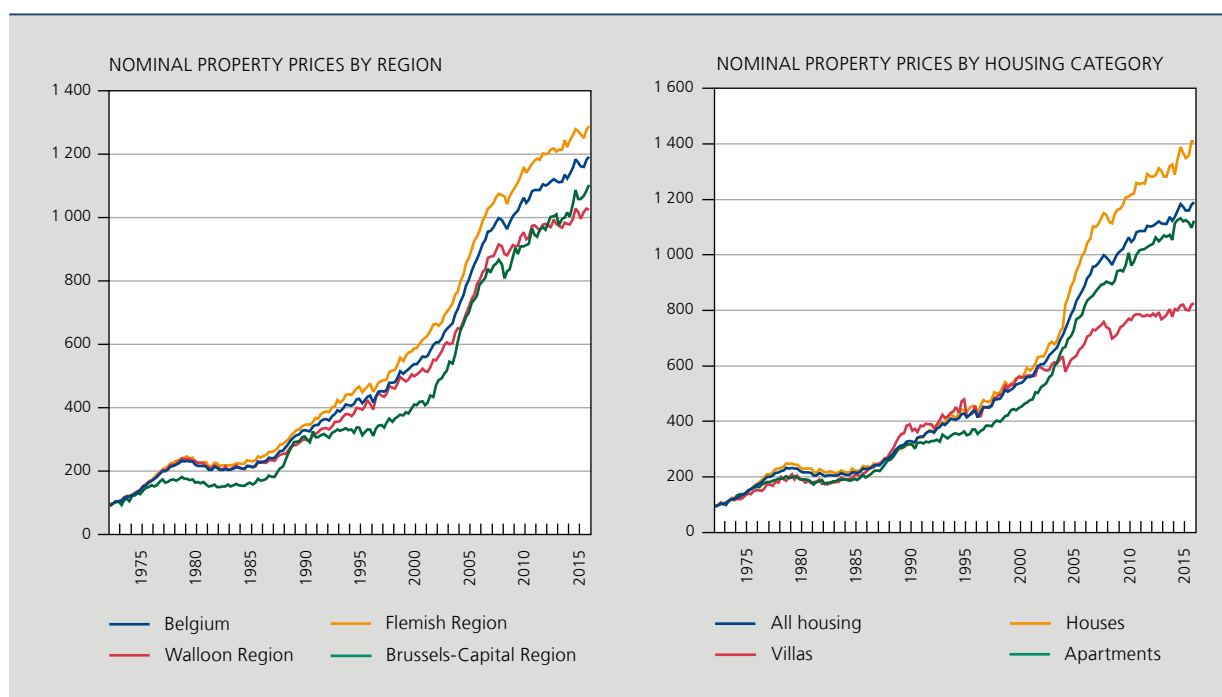
However, there was a marked upturn in 2015 amounting to 3.8% over the year as a whole, despite the reduction in the housing bonus – mainly in the Flemish Region – which in principle was likely to depress price rises. In 2016, the increase in property prices slowed down again with growth of barely 0.9%.

In real terms, the profile of house price growth is slightly different since price increases strengthened overall between 2011 and 2015, following the decline in inflation. Conversely, the faster rise in the general price level led to a fall in real prices in 2016, amounting to a drop of 0.6%.

House prices exhibited a clear upward trend in all regions of the country. Moreover, apart from a few divergences as in 2009 at the time of the economic and financial crisis when prices virtually stabilised in the Flemish Region whereas they fell slightly in the other two Regions⁽²⁾, price developments were broadly the same from one Region to another. However, the increase in prices over recent decades was more volatile in the Brussels-Capital Region. That peculiarity of the capital may be due in part to its almost exclusively urban character and its small size compared to the other two Regions, hence its greater sensitivity to certain changes, particularly demographic variations. In 2016,

CHART 3 NOMINAL RESIDENTIAL PROPERTY PRICES BY REGION AND BY HOUSING CATEGORY

(indices, 1973 = 100)



Source : NBB.

house price growth weakened in all three Regions, but the slowdown was more marked in the Flemish Region.

The breakdown of property prices by housing category reveals greater heterogeneity in price movements.

Ordinary houses and apartments are the two housing categories that have contributed the most to property price increases over almost two decades. Conversely, villa prices have risen at a more moderate pace over that period.

Box – House price indicators

There are several indicators which can be used to assess house price developments in Belgium. Those, which are published by various sources (central bank, international institutions, government, notaries, estate agencies, etc.), and regularly discussed in the press, sometimes present a (slightly) different picture or in some cases even opposing trends. That is due essentially to the databases and the methodologies used. We generally identify three main sources according to the characteristics (geographical coverage and period considered) and the statistical quality of the indicators.

1. Federal Public Service Economy

The first information source is a database updated on a quarterly basis by the Directorate General Statistics (DGS) of the FPS Economy. It is based on the land registry records and comprises a set of statistics relating to real estate transactions for which registration fees were payable. The data therefore relate only to the secondary market, i.e. existing properties.

The published statistics include the number of transactions, the total area of the plots and various measures of the prices of the homes sold, such as the average price and the median price, which can be used to estimate their distribution. In addition, the data are broken down into three broad categories of properties, namely “ordinary houses”, “villas, bungalows and country houses” and “apartments, flats and studios⁽¹⁾”. The data cover a very large geographical area and a long period since they are available at municipal level from the first quarter of 1973.

It should be noted that there was a break in the trend between 2004 and 2005 following a significant change in the data processing.

2. National Bank of Belgium

However, using the average price of the transactions has the disadvantage that the indicator is sensitive to changes in the composition of the transactions. The Bank therefore opted to calculate a chained weighted index on the basis of the data published by the FPS Economy. The change in that indicator can then be interpreted as a “pure” price effect.

The Bank’s residential property price indicator therefore takes the form of a Laspeyres chained index, such as:

$$PI_t = PI_{t-1} \cdot \frac{\sum_{geo,type} N_{geo,type,t-1} \cdot AP_{geo,type,t}}{\sum_{geo,type} N_{geo,type,t-1} \cdot AP_{geo,type,t-1}}$$

in which *PI* corresponds to the price index, *N* is the number of transactions on the secondary market, *AP* is the average price of the transactions, *geo* indicates the districts and *type* indicates the housing categories.

(1) For convenience, in the rest of this article, the names of these three categories are shortened respectively to “houses”, “villas” and “apartments”.

The level of geographical breakdown of the property transactions used to compute the indices corresponds to the 43 administrative districts in Belgium, because that allows an adequately detailed breakdown without compromising the representativeness of the data.

Finally, the Bank's indicator is adjusted for any changes in the structure of the transactions. In practice, that permits the construction of several indices broken down by two dimensions, namely by geographical area and by the various housing categories⁽¹⁾.

3. European Commission

Eurostat also publishes an index of house prices in Belgium via the FPS Economy. That index differs in two main respects from the one produced by the Bank. First, it covers both the secondary and the primary market, i.e. new buildings. Also, in the case of existing properties, it tries to adjust for the change in housing quality over time.

The reason for the qualitative adjustment for the secondary market is that property market transactions are highly heterogeneous. The hedonic regression technique was therefore used to smooth out those differences. For that purpose, the DGS receives from the land registry a database comprising a set of characteristics of the property sold for each transaction. Those characteristics include notably the type of construction, number of rooms, surface area, and location of the building.

In the case of new housing, there are no price statistics as such. Up to 2013, the producer price index for construction was used as a proxy. Since then, movements in primary market prices have been estimated from sales of housing built in the past five years.

Finally, the Eurostat index takes the form of a Laspeyres chained index in which the weights are adjusted annually. However, that indicator covers a smaller geographical area and a shorter period of time since it is available only for Belgium as a whole, and only since 2005. Owing to the methodology used, entailing the collection of extensive data on property transactions, it is also based on a smaller sample.

(1) It should be noted that the Bank uses the same database to produce indices of price developments for building land. However, those prices are not included in the average for all dwellings.

2. Property market valuation measures

In Belgium, the developments in property prices over recent decades have given cause for concern, as prices have risen almost continuously and the drop recorded during the economic and financial crisis that began in 2008 was extremely small in comparison with that in many other European countries.

The empirical literature describes a number of methods of assessing whether prices deviate from their equilibrium level, i.e. whether the property market is overvalued or undervalued. Traditionally, market valuation indicators are divided into two main categories according to the approach used to determine the equilibrium value of property prices. The first method, the statistical approach, uses the long-term average of ratios of macroeconomic

variables, such as price-to-income or price-to-rent, while the second is based on econometric techniques.

2.1 Statistical approach

The statistical approach generally consists in comparing house price developments with changes in other macroeconomic variables. Those indicators include price-to-rent and price-to-income ratios, which compare property price developments with changes in rents and household disposable income respectively. The price-to-income ratio is therefore considered to measure the housing affordability, while the underlying idea behind the price-to-rent ratio is that anyone looking for somewhere to live has to weigh up the cost of buying as opposed to renting a home.

The main advantage of this approach lies mainly in its simplicity of use and calculation. Nonetheless, it does have its limitations too. In particular, the use of a long-term average to approximate the equilibrium level of property prices is based on the implicit assumption that that value remains stable over time; that is a weighty assumption since the equilibrium value is necessarily influenced by changes in the fundamental determinants of property prices, such as demographic developments, preferences of economic agents, mortgage contract characteristics (loan-to-value ratio, duration, etc.) and the associated tax treatment, as well as the characteristics of the properties. Moreover, in this approach, the degree of the property market valuation is greatly affected by the choice of the period considered in order to define the long-term average.

Price-to-rent and price-to-income ratios generally point to high levels of overvaluation of the residential property market in Belgium. More specifically, on the basis of the indicators published by the OECD, the overvaluation would amount in the fourth quarter of 2016 to 47 % and 42 % respectively. However, as already mentioned, that result depends on the period chosen to compute the

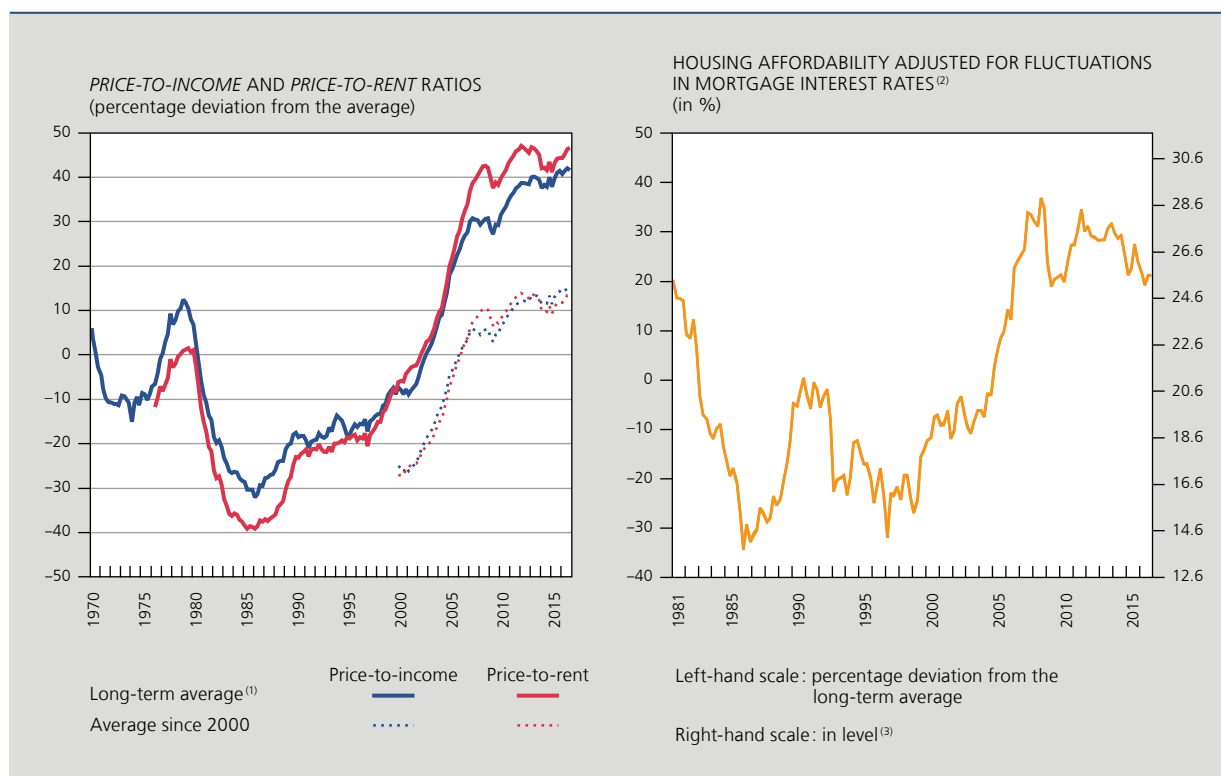
long-term average. For example, if we consider only the data available between 2000 and 2016, the overvaluation drops to about 15 % for both ratios (see chart 4).

Apart from the more general considerations set out above, each ratio has its own specific defects. In the case of the price-to-rent ratio, Baugnet *et al.* (2011) show that there is a significant conceptual difference in that the house price (in the ratio's numerator) is calculated on the basis of new transactions on the secondary market and therefore reflects current market conditions, whereas rents (in the denominator) correspond in Belgium to the "rent" component of the consumer price index and usually reflect the movement in rents under existing leases rather than that under new leases. Moreover, the relatively small size of the rental market⁽¹⁾ limits the relevance of the price-to-rent ratio for Belgium.

As already stated, the price-to-income ratio is meant to assess the housing affordability. Since a property

(1) According to the OECD, the proportion of tenants was 32 % in Belgium in 2014.

CHART 4 STATISTICAL RATIOS AND HOUSING AFFORDABILITY



Sources: OECD, NBB.

(1) Average between 1970 and 2016 for the price-to-income ratio; average between 1976 and 2016 for the price-to-rent ratio.

(2) This measure is based on the technical assumption that a mortgage loan has an average maturity of 20 years and a loan-to-value ratio equivalent to 80 % of the property value.

(3) In level, this indicator corresponds to the average share of household disposable income devoted to the debt service of a mortgage loan.

purchase is generally financed by borrowing, such an analysis should take account of access to mortgage loans and, more particularly, the debt service burden incurred by the home owner. For that purpose, the price-to-income ratio can be adjusted to take account of fluctuations in mortgage interest rates (interest-adjusted-affordability), as the latter have a significant bearing on households' ability to borrow. The indicator developed for that purpose consists in comparing the debt service burden – capital repayments and interest – on a mortgage loan contracted to finance the purchase of a property valued at the average market price with the average household disposable income. This measure, based on a number of technical assumptions relating to such factors as the average loan maturity and the loan-to-value ratio, exhibited a marked upward trend during the 2000s, especially between 2003 and 2009, mainly on account of the sharp rise in property prices during that period. Housing affordability was subsequently affected by the outbreak of the economic and financial crisis, since the indicator declined until the spring of 2010 owing to the slight fall in house prices and the substantial decline in interest rates, before climbing back up until the end of 2011 as a result of the renewed rise in property prices and the sluggishness of household income. Since then, housing affordability has improved overall, with the slackening pace of house price rises and the continuous decline in mortgage interest rates. In 2016, the debt service burden related to a mortgage loan averaged around 25 % of household disposable income (see chart 4).

If the housing affordability indicator is expressed as a percentage deviation from its long-term average, in the same way as for the price-to-income and price-to-rent ratios, that suggests – with all the due caveats mentioned above – that the housing market is overvalued by around 21 %, i.e. lower than what is generally indicated by the price-to-income and price-to-rent ratios.

The housing affordability indicator is also subject to certain limits since it disregards not only changes in mortgage loan conditions (loan-to-value ratio, maturity, etc.) but also the related tax treatment. Moreover, movements in interest rates alone are not enough to measure the affordability of mortgage loans, even though they are a very significant factor. Financial institutions may indeed decide to tighten or, conversely, ease their mortgage lending conditions. According to the Bank Lending Survey, credit standards for house purchase were eased substantially between 2003 and 2007, in parallel with the improvement in housing affordability. Since then, banks have almost continuously tightened the criteria applied when granting mortgage loans.

In general, by taking account of only a limited number of property price determinants, the statistical indicators of market valuation cannot provide a structural assessment of house price developments in view of the range of factors likely to have a significant bearing on them.

2.2 Econometric approach

The second group of indicators that can be used to assess the valuation of the property market is based on econometric techniques. The aim is to estimate, on the basis of fundamental determinants, an equilibrium price which can be used as a benchmark for measuring any deviations in market prices. In practice, the residuals of an econometric regression are used to measure the market's undervaluation or overvaluation, since they correspond to the part of the dependent variable – in this case house prices – that cannot be imputed to the explanatory variables.

The main advantage of this method is that, unlike the statistical approach, it can take account of numerous house price determinants, both supply and demand factors. However, due to data availability and quality issues, empirical research has been largely limited to demand factors, the main ones being household income, mortgage interest rates and demographic developments.

Nevertheless, this method has its drawbacks too. As pointed out by Gallin (2003), Gurkaynak (2005), Girouard *et al.* (2006) and Klyuev (2008), the relationship econometrically estimated may be unstable and, instead of being a measure of the market valuation, the gap between recorded prices and the equilibrium price may result from the omission of one or more fundamental determinants. Moreover, even if that gap is zero, a latent risk may exist if the price determinants are not at their long-term equilibrium value, as in the case of historically low mortgage interest rates.

2.2.1 Existing approaches

Numerous indicators of the valuation of property markets have been developed according to an econometric approach. They generally differ in the explanatory variables incorporated in the model. That applies, for instance, to the models used by international institutions such as the European Central Bank (ECB), the European Commission (EC), and the International Monetary Fund (IMF).

Apart from the statistical ratios, namely price-to-rent and price-to-income, the ECB also uses two model-based indicators in its assessment of the European property markets. The first consists in regressing the price-to-rent ratio on a

measure of long-term interest rates (asset pricing), within the framework of a model where the return on a housing investment (approximated by the rent-to-price ratio) should be equal to the returns on alternative investment opportunities bearing the same risk (estimated by long-term interest rates). The second indicator corresponds to the residuals of the regression of property prices on the average disposable income of households, the average mortgage interest rate and the housing stock. However, the exact specification of the equation may vary according to the characteristics of the country considered and data availability⁽¹⁾. For Belgium, for example, the equation does not include the housing stock; in a way, it is therefore an indicator of housing affordability since it only takes account of household incomes and mortgage interest rates. In the third quarter of 2016, that indicator pointed to a more or less neutral market valuation, namely -1 % deviation from the equilibrium price. It should be noted that the price-to-income and price-to-rent ratios indicate a greater degree of overvaluation, although that is still less than the overvaluation identified previously on the basis of the OECD data, the reason being that the ECB uses a shorter reference period to compute the long-term averages. Ultimately, the ECB considers the average of these four indicators to determine the property market valuation level; in the case of Belgium, that suggests an overvaluation of almost 12 % in the third quarter of 2016 (see chart 5).

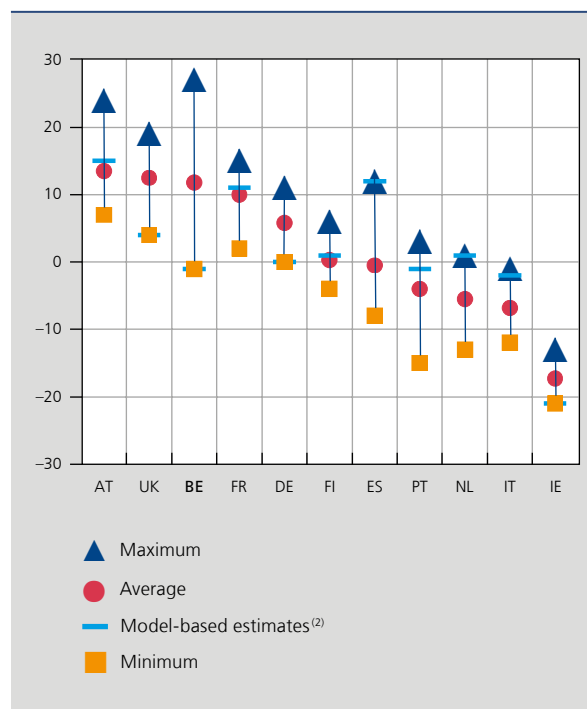
The European Commission's valuation of the property markets is likewise based on the average of various indicators, namely the price-to-rent and price-to-income ratios and the results from an econometric model. The latter are obtained more specifically from the residuals of the regression of property prices on per capita household disposable income, mortgage interest rates, the number of inhabitants and housing investment. The model specification does not vary between countries, and panel estimation techniques are also used for countries which do not have sufficiently long time series for the aforementioned variables. In the case of Belgium, the price-to-income and price-to-rent ratios expressed as a percentage deviation from their respective average since 1995 indicate that the property market was overvalued by 22 % in 2015, while the model-based indicator puts the overvaluation at barely 2 %. Overall, the average of these three indicators suggests a 15 % overvaluation.

The IMF also uses econometric techniques to underpin its assessment of the Belgian property market (IMF, 2015). For that purpose, house prices are regressed

(1) This is therefore not a panel estimate which, owing to its fixed structure, might fail to take account of the heterogeneity inherent in European property markets.

CHART 5 RESIDENTIAL PROPERTY MARKET VALUATION ACCORDING TO THE ECB APPROACH⁽¹⁾

(third quarter of 2016, in percentage deviation from the equilibrium price)



Source: ECB.

(1) These estimates are based on four different approaches, namely the price-to-rent ratio and the price-to-income ratio and two model-based indicators. The minima and maxima correspond respectively to the lowest and highest estimates using these four methods. For more information, see box 3 in the ECB Financial Stability Review of June 2011 and November 2015.

(2) This indicator corresponds to the residuals of the regression of property prices on the average household disposable income, the average mortgage interest rate and the housing stock. However, the number of variables included in the model may differ between countries

on demand factors, namely per capita GDP (as a proxy for household income), long-term interest rates and the working-age population. Domestic credit to the private sector is also included to approximate financial developments. While the results show a substantial overvaluation of the Belgian property market in the 1970s, the indicator suggests that current prices are very close to the regression-implied equilibrium.

In Belgium, Smet and Van Gompel (2014) also developed a property market valuation indicator using econometric techniques. More specifically, house prices are regressed on the household disposable income, mortgage interest rates and the number of households. The authors indicate that supply variables such as housing investment or the number of building permits granted were also included in the model's specification but ultimately they proved not to be significant, so that house prices are determined entirely by demand factors. On the basis of that indicator, the

property market was overvalued by around 10 % between 2006 and 2009, essentially following the strengthening of the tax deductibility of mortgage loans in 2005.

2.2.2 The National Bank of Belgium’s approach

The Bank also adopts an econometric approach as the basis of its assessment of the housing market in Belgium. Its indicator corresponds more specifically to the residuals of the regression of house prices on a series of fundamental determinants, namely the average disposable income of households, mortgage interest rates, the number of households, and some dummies intended to capture structural changes on the property and mortgage markets, particularly changes in the tax treatment of mortgage loans in 2005 and 2015. The nominal values of property prices, mortgage interest rates and household disposable income are deflated by the private consumption deflator from the national accounts in order to neutralise the influence of the movement in the general price level. In addition, all the variables except for mortgage interest rates and the dummies are taken in logarithmic form.

$$\log(hp_t) = \alpha_0 + \beta_1 \cdot \log(inc_t) + \beta_2 \cdot mir_t + \beta_3 \cdot \log(hh_t) + \beta_4 \cdot d_t^{2005} + \varepsilon_t$$

The aforementioned explanatory variables are generally identified by the empirical literature as the main fundamental determinants of property prices. By analogy with Smet and Van Gompel (2014), the model only incorporates demand factors as the supply variables tested, such as gross fixed capital formation in housing, proved to be of little significance. Furthermore, as pointed out by Philipponnet (2016), the addition of a variable reflecting mortgage credit fluctuations does not seem appropriate for assessing the long-term trends in house prices owing to the two-way relationship between these variables, one being both the cause

and the consequence of the other (Goodhart and Hofmann, 2008).

The regression results summarised in table 1 also appear to make these variables the fundamental determinants of house prices in Belgium, since the estimated coefficients are all significant and display the expected sign. Moreover, the Engle–Granger test (1987) indicates the existence of a cointegration relationship.

First, the relatively rapid increase in the real disposable income of households between 2005 and 2009 definitely bolstered demand for housing and hence the rise in property prices. Conversely, in the ensuing four years, the disposable income of households declined, mainly because of the marked fall in property incomes in a context of low interest rates, but also to a lesser extent because of the wage moderation policy. Since 2014, however, the growth of the real disposable income of households has been positive again and has also gained momentum, primarily in 2016 notably as a result of such factors as the strong labour market recovery. Overall, this enabled individuals to revise their income expectations upwards while downgrading their expectations regarding economic uncertainty. Our estimate of the elasticity of house prices to household disposable income stands at 1.1 (see table 1), indicating that a 1 % increase in the average disposable income of households leads to a 1.1 % rise in house prices. That tallies perfectly with the results found for the OECD countries, which generally range between 1 % and 2 % (see Girouard *et al.* (2006) for a review of the literature).

Second, the decline in mortgage interest rates over recent decades has certainly been a factor supporting the property market since, all other things being equal, a fall in interest rates leads to a reduction in the borrower’s repayment burden, and hence an improvement in the housing affordability. Both nominal and real mortgage interest rates have in fact been declining since the early 1990s. In particular, nominal rates have fallen almost constantly since the economic and financial crisis that erupted in 2008, against the backdrop of an accommodative monetary policy. They are currently around 2 %, which is an all-time low. If inflation is taken into account, the movement in real interest rates has been somewhat different since they displayed an upward trend between the end of 2011 and the beginning of 2015. Conversely, the acceleration in inflation in the past two years has led to a sharper fall in real interest rates, which were close to 0 % at the end of 2016. The results of our model suggest that a 1 % fall in mortgage interest rates triggers a rise in house prices of around 2 % (see table 1). Once again, that is within the range generally found by the empirical

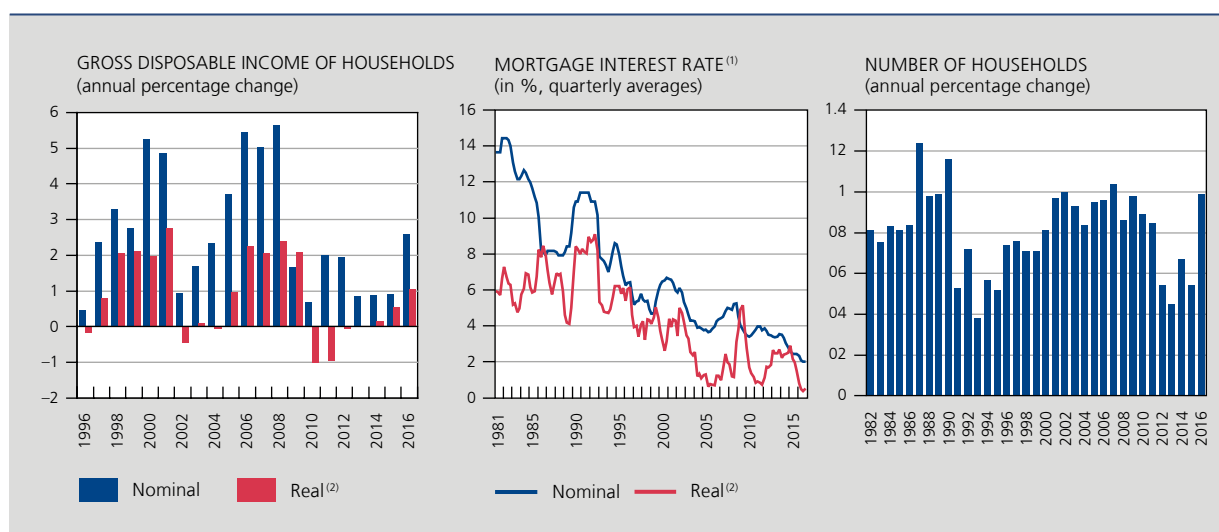
TABLE 1 VALUATION OF THE PROPERTY MARKET: THE NBB’S MODEL-BASED APPROACH

Explanatory variables	Coefficients	t-stat
Constant α_0	-28.62***	-4.80
Average household disposable income inc	1.13***	4.69
Mortgage interest rates mir	-0.02***	-2.67
Number of households hh	2.16***	5.53
Dummy from 2005 d^{2005}	0.21***	5.06

Source: NBB.

Note: *** corresponds to a significance level of 1 %.

CHART 6 DISPOSABLE INCOME, MORTGAGE INTEREST RATES AND DEMOGRAPHIC DEVELOPMENTS



Sources: DGS, NAI, NBB and own calculations.
 (1) Average interest rate on new contracts.
 (2) Deflated by the private consumption deflator.

literature, although the results may vary widely depending on the interest rate definition used or the geographical areas considered. The semi-elasticity of house prices to interest rates generally ranges between 0.4 (Ott, 2014) and 7 % (Gattini and Hiebert, 2010). It should be noted that Smet and Van Gompel (2014), whose model is calibrated for Belgium, find a semi-elasticity of 2.8 %.

The constant expansion of the Belgian population over many decades has significantly increased demand for housing and is therefore a factor influencing property prices in the long term. However, changes in the number of inhabitants do not necessarily affect demand for housing to the same degree: in the case of births, families may indeed continue living in the same home if the space is sufficient, while a home remains unavailable in the event of a death if the surviving partner decides to continue living there (Noppe and Van Gompel, 2012). For these reasons, the change in the number of households is more relevant for assessing the impact of demographics on demand for housing. In that connection, average household size has declined considerably in recent decades, so that the rise in the number of households has outpaced the growth of the population. Between 1980 and 2016, the increase in the number of households is estimated at more than 1.2 million units in Belgium.

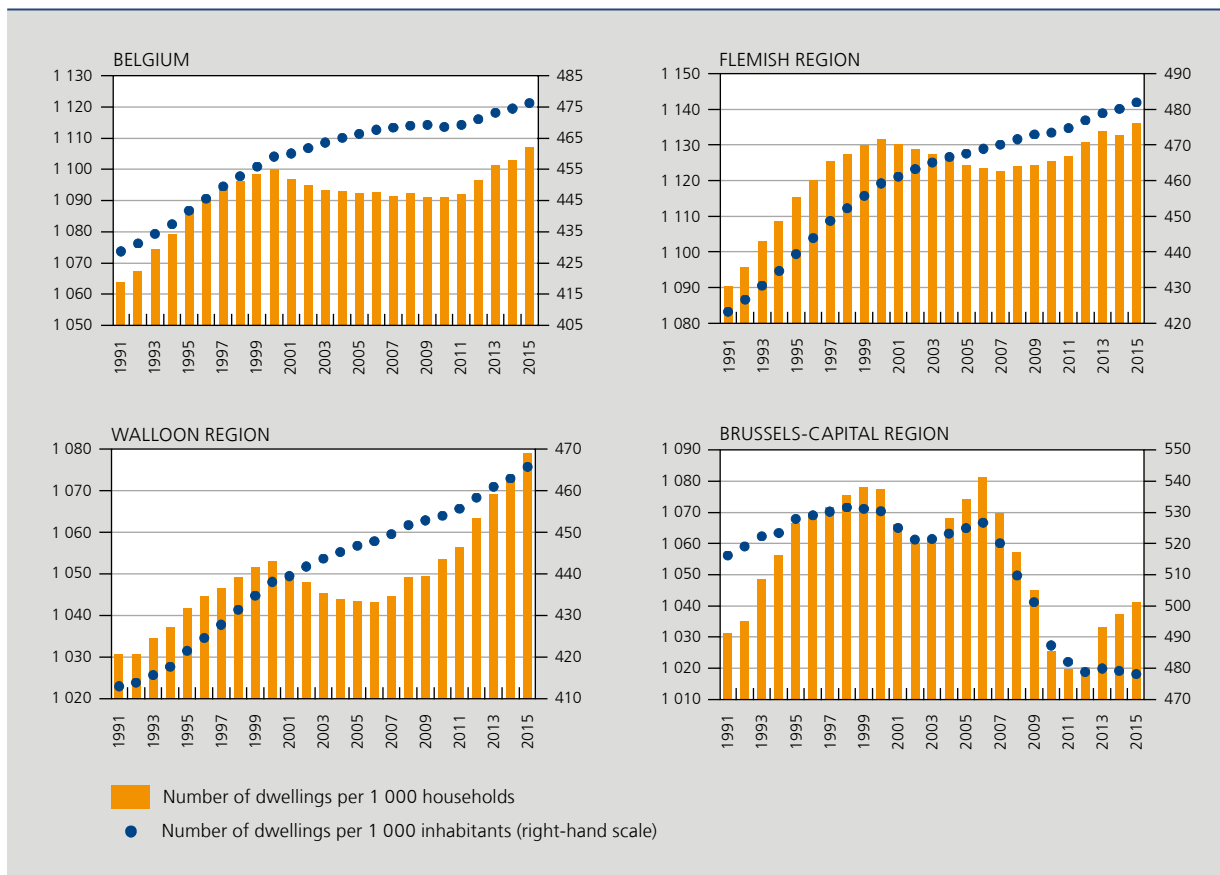
As pointed out by Manceaux (2011), the impact of demographics on house prices nevertheless depends on the speed with which the supply can be adjusted to

these changes. If construction activity does not produce an adequate response (for example, if it takes too long to build new homes), that will increase the pressure on house prices.

The housing stock expanded by almost 25 % between 1991 and 2015, suggesting that, in general, the supply was amply adjusted to demographic developments, since the number of inhabitants and the number of households increased by 12.4 % and 20.1 % respectively over that same period (see chart 7). However, three sub-periods can be identified. First, between 1990 and 2000, the housing stock expanded strongly in relation to the number of households. Next, up to 2010, the trend reversed and stabilised, implying a reduction in the number of vacant homes, which was most likely one of the factors underlying the rise in property prices during that period, particularly between 2001 and 2007. Finally, however, the latest observations indicate that, since 2012, the housing stock has grown by more than demographics.

Nonetheless, these results concern Belgium as a whole. Although the supply seems suited overall to the increase in the number of households, the situation may vary considerably from one region to another. In that context, the Brussels-Capital Region is an interesting case, as the growth differential between the housing stock and the number of inhabitants or households became clearly negative there between 2007 and 2011. Although the latest observations since 2013 reveal

CHART 7 MATCHING OF DEMOGRAPHIC DEVELOPMENTS AND HOUSING SUPPLY



Sources: DGS and own calculations.

more favourable results, they do not offset past developments. This suggests that the construction of new homes is not necessarily taking place in the areas where the demographic pressure is greatest, notably in Brussels, which may be due partly to a lack of building land and more stringent planning regulations in those areas. In that connection, Albrecht and Van Hoofstat (2011) demonstrate the importance of scarcity premiums, i.e. the additional price to pay for a home available in a region or price bracket where the housing supply is outstripped by demand. The mismatch between supply and demand for housing therefore seems to play a role in property price developments.

In the other two Regions, the situation seems to be less of an issue. In the Flemish Region, the construction of new dwellings has outpaced the rise in the number of households. Between 2001 and 2007, the situation was reversed, but the growth differential remained limited. Finally, in the Walloon Region, it was only between 2001 and 2006 that the housing stock expanded more slowly than the number of households.

Our model suggests that demographic developments have a positive impact on property prices, since the elasticity of house prices to the number of households is estimated at 2.2, indicating that a 1% rise in the number of households leads to a 2.2% increase in property prices. That also coincides with the result obtained by Smet and Van Gompel (2014) for Belgium.

Apart from the points identified above, certain factors specific to the tax treatment of owner-occupied housing have also supported the rise in property prices in Belgium during the past few decades. Thus, until very recently, tax changes have tended to facilitate access to mortgage loans and to stimulate activity on the secondary market. That was particularly the case in 2005 in the context of the reform of the tax deductibility of mortgage loans for “own and sole home” (more commonly known in Belgium as the “housing bonus”), which increased the tax advantage already existing for home-owner households. According to Hoebeek and Inghelbrecht (forthcoming), the strengthening of the housing bonus in 2005 significantly enhanced demand for mortgages and, hence, property prices and the

average loan maturity (since the tax advantage depends on it). Previously⁽¹⁾, registration fees had already been reduced and the Flemish Region had also made those fees portable, which tended to encourage (young) households to invest relatively early in their first property, even if they would later switch to buying a more expensive property as their income increases sufficiently to make it affordable.

However, under the Sixth State Reform, responsibility for mortgage loan deductibility was devolved to the Regions, and since 2015 the regional authorities have embarked on reforms in that respect. The details and the timing of the housing bonus reform vary from one Region to another, but, in order to ensure the sustainability of public finances, the overall aim was to reduce the tax advantage for home-owner households, particularly in the Flemish Region, so that in principle the contribution of this factor to property price growth should diminish, whichever Region is considered. However, it should be noted that the housing bonus reform in the Flemish Region greatly inflated the number of secondary market transactions recorded at the end of 2014, as many households brought forward the purchase of a property – if they could – in order to continue benefiting from the more favourable federal tax concession. This was the only Region where real estate activity markedly increased in 2014 (see chart 8).

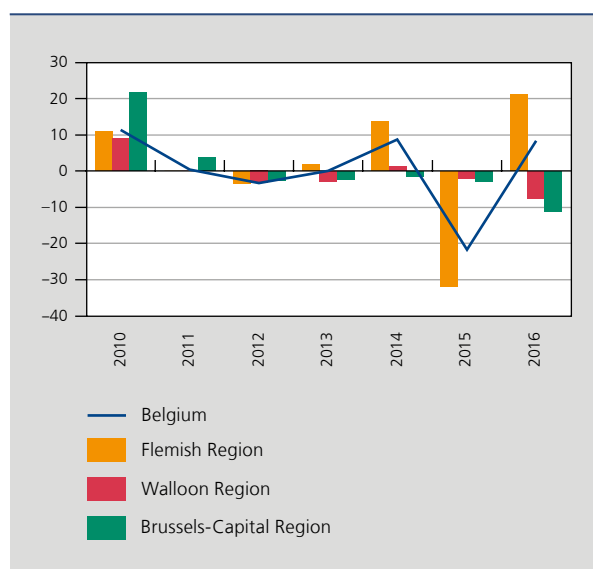
(1) As this is a regional competence, the dates on which this tax change took place vary between the Regions. While this measure took effect in the Flemish Region and in the Brussels-Capital Region in 2002 and 2003 respectively, the Walloon Region did not adopt similar measures until 2009.

In the framework of an econometric model, it is technically difficult to take account of all the factors relating to the tax and regulatory environment of the mortgage market which could ultimately influence house price developments. That is why the Bank's indicator only considers the changes in the housing bonus, that factor being the one to which the literature attributes the most significant impact on house prices (Hoebeeck and Smolders, 2014; Hoebeeck and Inghelbrecht, forthcoming). For that purpose, dummies are added from 2005 and 2015, the years in which the tax deductions for mortgage loans were respectively increased and reduced. However, it should be noted that those variables also capture other structural changes in the property and mortgage markets, such as the trend break in the property price statistics in 2005 (see box).

Ultimately, the difference between recorded property prices and the equilibrium prices estimated by the model, i.e. the residuals from the regression, provides an indication of the valuation of the property market. According to the Bank's indicator, the property market has not had any long periods of overvaluation, contrary to what the price-to-income and price-to-rent ratios might suggest, especially if they are based on averages computed over a longer period. However, the market appears to have been particularly overvalued at certain times. That was notably the case in the first half of the 1980s and in the early 2000s, i.e. two periods when property prices were rising strongly or had recently done so without that being entirely explained by the fundamental determinants.

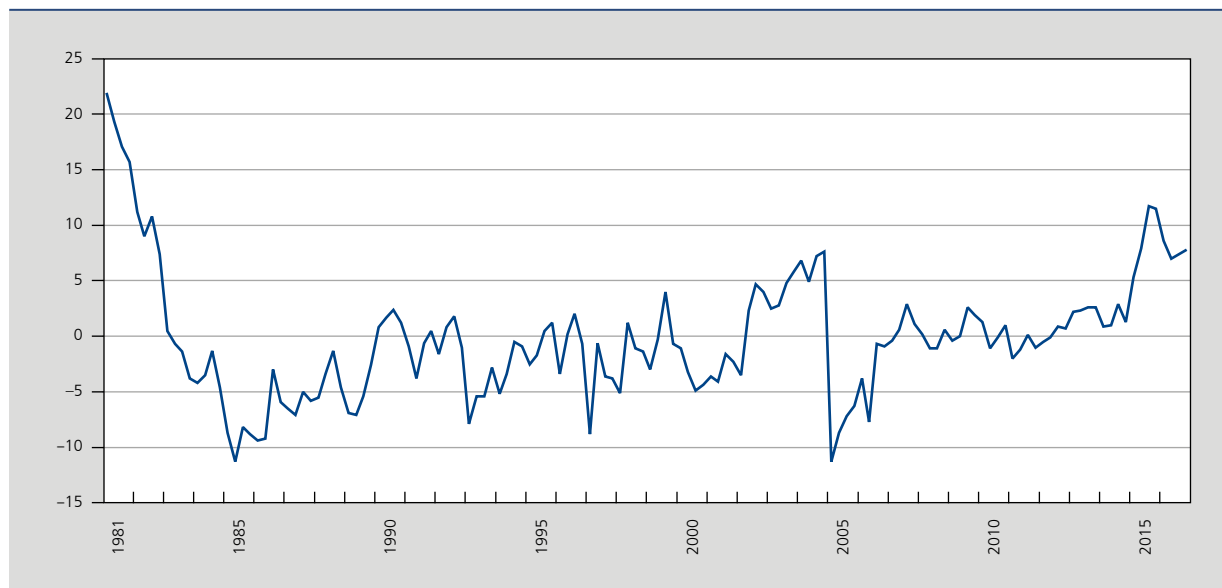
The third period of overvaluation identified by the indicator began in mid-2012 and is still continuing. However, it was in 2015 that the overvaluation of the property market increased significantly. That was due to the substantial reduction in the housing bonus in the Flemish Region in 2015, which, in principle, should have exerted downward pressure on house prices, as the opposite effect had been seen ten years previously when the tax deductibility of mortgage loans was strengthened. Yet property prices rose strongly in 2015, considerably increasing the overvaluation of the market as estimated by the model. That therefore implies that the rise in prices was not attributable entirely to the fundamental determinants incorporated in the model, including mortgage interest rates, which continued to decline. In that context, attention should be drawn to the indirect influence that the persistence of a generally low interest rate environment may have on the property market. The significant reduction in the yields on many financial investments may indeed make investment in real estate relatively more attractive, thereby stimulating demand for housing and driving up prices.

CHART 8 NUMBER OF TRANSACTIONS ON THE SECONDARY MARKET
(annual percentage change)



Source: DGS.

CHART 9 RESIDENTIAL PROPERTY MARKET VALUATION ACCORDING TO THE NBB'S APPROACH⁽¹⁾
(percentage deviation from the equilibrium price)



Source : NBB.

(1) This indicator corresponds to the residuals of the regression of house prices on a series of fundamental determinants, namely the average household disposable income, the number of households, the average mortgage interest rate and various measures aimed at taking account of changes in the tax treatment of mortgage loans. The variables are expressed in real terms.

However, the estimates for 2016 suggest that the overvaluation of the property market has lowered, mainly as a result of the marked slowdown in price growth, and was down to 7.8% in the fourth quarter.

It should be noted that a neutral valuation, i.e. a situation in which prices are totally in line with their fundamental determinants, provides no indication of future price developments and cannot imply that there is no risk for the property market. If one of the fundamental factors were to deteriorate significantly, that could trigger a slump in prices. That would be the case, for instance, if mortgage interest rates suddenly increased or if the general macro-economic conditions worsened.

Conclusion

In Belgium, the housing market has been particularly dynamic in the past few decades. House prices increased strongly from the early 1970s, and there have been only two relatively brief periods of decline, namely in the first half of the 1980s and in 2009, at the time of the economic and financial crisis.

Since then, property prices have continued to rise, albeit more slowly than was generally the case before the great

recession, so that – if inflation is taken into account – they have virtually stabilised. Nevertheless, the stronger price growth in 2015 surprised somewhat on the upside, despite the significant cut in the tax deduction for mortgage loans (housing bonus) in the Flemish Region. But, in 2016, the Bank's indicator pointed to a marked slowdown in nominal prices and a slight fall in real prices.

Owing to the absence of any downward correction such as that seen in many European countries a few years ago, house price developments became a cause of concern in Belgium since the emergence of imbalances on the property market can trigger and propagate a slowdown in economic activity and threaten financial stability. The question of the possible overvaluation of the property market therefore became a key point in both macroeconomic analysis and the conduct of macroprudential policy.

To determine the extent to which recorded market prices deviate from the equilibrium price in either direction, the empirical literature describes a number of indicators which can be divided into two main categories. However, the first category, which includes price-to-rent and price-to-income ratios, which generally point to high levels of overvaluation in Belgium, is subject to numerous limitations and fails to take account simultaneously of all the factors which may influence the property market. Even

if it may also have its drawbacks, the second category comprising the econometric approach overcomes some of those shortcomings since it consists in comparing house price developments with their fundamental determinants on both the supply and the demand side.

By following this approach, the Belgian property market is not significantly overvalued, contrary to what might be suggested by statistical indicators such as the price-to-income and price-to-rent ratios. Price movements are therefore largely attributable to changes in certain fundamental determinants. In particular, the increase in household incomes combined with the decline in interest rates over the preceding decades has made housing more affordable. Property prices were also supported by the marked rise in the number of households and by the tax treatment of owner-occupied housing, which has generally been adjusted in a way likely to facilitate access to mortgage loans. However, that has been less the case since 2015, with the devolution of more powers to the Regions and successive reforms of the housing bonus, especially in the Flemish Region. Yet, the increase in prices did not taper off during the course of that year, leading

to an even higher overvaluation of the property market. Owing to the marked slowdown in price rises in 2016, that overvaluation is nevertheless estimated to have dropped back and stabilised around 7.8%.

Apart from the fundamental determinants mentioned above, other factors – which cannot necessarily be taken into account in the econometric approach of the valuation of the property market – have apparently played a role in the recent trend in prices. That applies to the persistence of a low interest rates environment, which may indirectly influence the property market since it tends to make investment in property attractive compared to other financial investments on which returns have declined significantly, thus stimulating demand for housing and driving up house prices.

It should be pointed out that a neutral valuation, i.e. a situation in which property price movements are perfectly in line with market fundamental, does not in any way mean that there is no risk for the property market. If one of the property price determinants were to deteriorate significantly, the result could be a sharp fall in prices.

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