House prices and economic growth in Belgium

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Introduction

The economic and financial crisis of 2008 and the following years has shown the importance of the housing market for both financial stability and economic growth. The subprime mortgage crisis in the United States since 2006 is in fact considered to be one of the triggers of the Great Recession, while the bursting of the housing bubbles in Spain and Ireland set off and propagated an important slowdown in economic activity in the euro area. These two recent episodes demonstrate how closely housing markets and economic activity can be linked.

The literature describes several channels through which house prices can have an impact on economic activity. First, residential property prices can influence private consumption through their effect on the real estate wealth of households, the cost of future housing and mortgage lending. Changes in house prices can also affect investment in new dwellings, which is the main component of residential investment. According to the Tobin's Q ratio theory, higher house prices imply that new dwellings could be sold at a higher price, such that, assuming building costs remain unchanged, investment in new dwellings would become more profitable. Lastly, a significant deviation in property prices relative to their equilibrium level, especially when combined with rapid credit growth, can increase the risk of a banking crisis and in addition lead to much deeper and more protracted recessions.

Empirical studies suggest that the link between house prices and economic activity – through both consumption and residential investment – is typically less strong in the euro area than in the United States and the United Kingdom, albeit that there are also major differences across the euro area. How large are these differences between the countries, what explains them and where does Belgium rank ? Next, was the virtually uninterrupted rise in property prices over the past decades unique to Belgium and what does this mean for the financial stability ? These are the main questions this article sets out to answer. The first section describes household wealth and house prices over the past decades, for both Belgium and a number of other advanced countries. These prices are also compared with their key macroeconomic determinants, as well as their main constituent components, including land prices. The second and third sections analyse the effect of house prices on private consumption and residential investment respectively, for Belgium and several other advanced countries. The fourth section reviews the housing market's potential risks to Belgium's financial stability, drawing on a summary of the key messages from the Bank's macroprudential analysis among other sources. The article ends with a recap of key conclusions.

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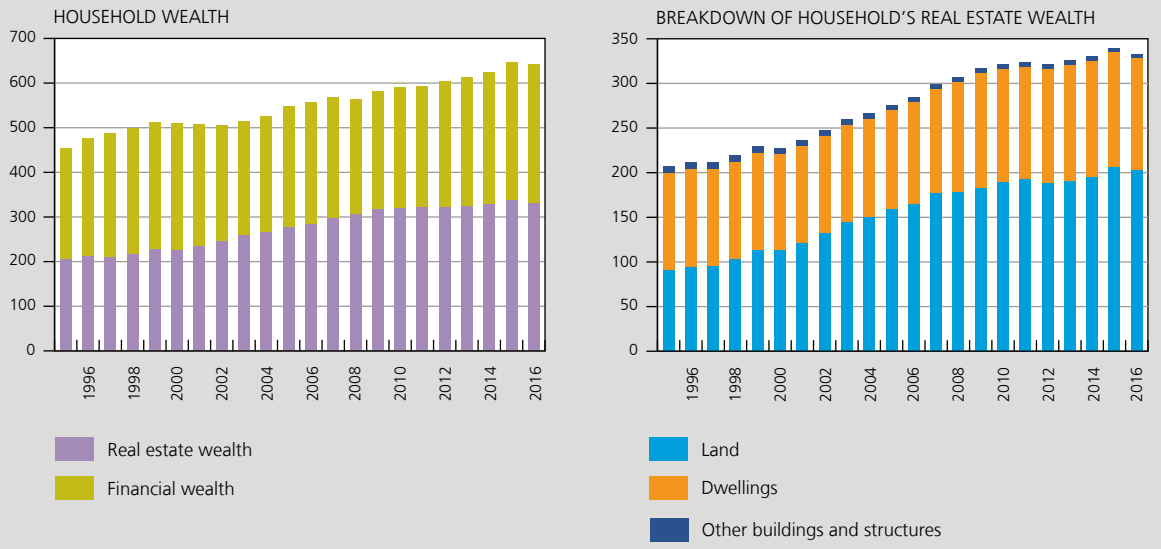
1. Housing market and household wealth

1.1 Household wealth

Household wealth, which consists of both financial and real estate assets, has been growing virtually uninterruptedly in Belgium in the past two decades, up to around € 2,700 billion in 2016, i.e. 645 % of GDP.

These assets are currently mainly held in form of real estate, amounting to € 1,412 billion in 2016 (or 334 % of GDP). Moreover, as a result of their uninterrupted growth since 1995 (the first year for which data is available), real estate assets are the main driving force behind Belgium's household wealth. Real estate wealth has exceeded financial wealth in Belgium since 2003.

CHART 1 HOUSEHOLD WEALTH IN BELGIUM
(as a % of GDP)



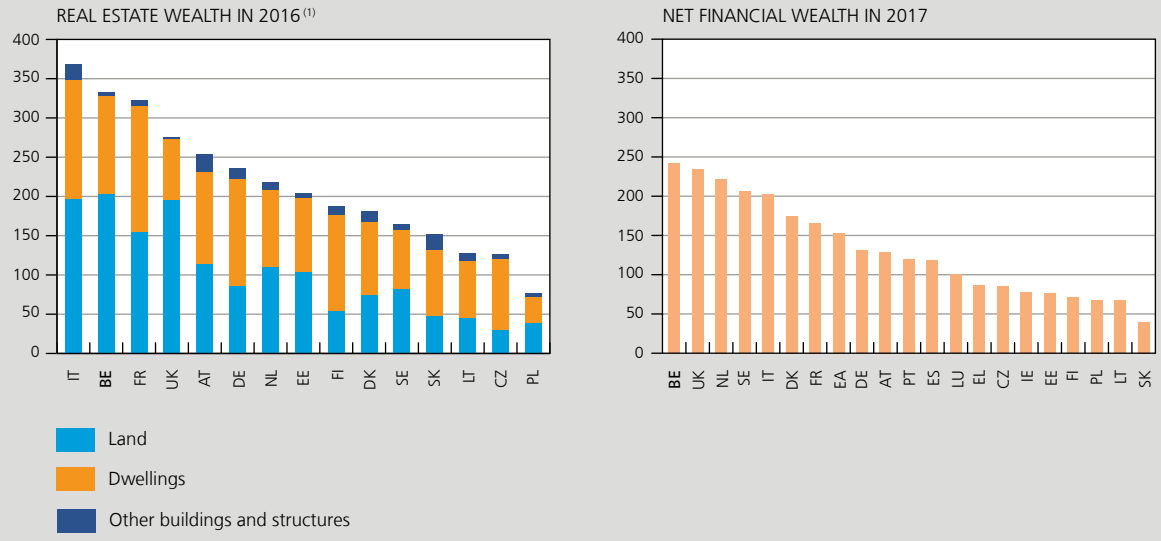
Source : NAI.

Households' real estate wealth breaks down into three types of asset : land, dwellings and other buildings and structures. According to statistics issued by the National Accounts Institute (NAI), land accounts for the largest proportion of property assets (61 %), to the tune of a total € 863 billion in 2016 (or 204 % of GDP). At an average increase of 7 % per annum, land is also the asset category that has contributed most to households' real estate wealth growth since 1995. They mainly include areas on which dwellings (74.2 %) or other types of buildings (6.3 %) are sited, alongside building plots (5 %) and agricultural land (4.5 %). Property assets in the shape of buildings came to € 549 billion (or 129 % of GDP) in 2016 and mainly consist of dwellings. The rise of this latter component since the 1990s is largely attributable to valuation effects, as property prices were on a virtually constant uptrend in the period.

Financial household wealth, by contrast, experienced two major reductions : when the dot.com bubble burst at the start of the 2000s and during the financial crisis in 2008 and subsequent years. However, the value of the financial portion of household assets has since resumed its upward trend against the backdrop of steady increases in financial asset prices, enabling households to make up for the value losses and start locking in new gains from 2013, primarily thanks to their equity portfolios and investment fund units (Baugnet *et al.*, 2017). By 2016, the household financial wealth amounted to € 1,314 billion (or 310 % of GDP).

In terms of both real estate and financial wealth, Belgian households are at the top of the European ranking. That said, only a few European countries release statistics that enable a distinction between the value of buildings and that of land. Among those that provide such data to Eurostat, Belgium ranks second (334 % of GDP in 2016), after Italy (370 % of GDP) and at a level similar to France (327 % of GDP), but ahead of Germany (236 % of GDP) and the Netherlands (218 % of GDP), in particular. Belgium's position in the ranking mainly derives from the value of land held by households, which happens to be the highest for all European countries that publish these statistics. [1] To an extent, the differences between the countries are attributable to specific features, such as the percentage of property owners and population density, this latter factor causes upward pressure on the value of real estate assets, particularly land. Finally, net financial household wealth in Belgium, expressed as a percentage of GDP, is the highest, their outstanding debt remaining limited compared to the significant volume of their financial assets.

CHART 2 HOUSEHOLD WEALTH IN BELGIUM AND A NUMBER OF OTHER EUROPEAN COUNTRIES
(as a % of GDP)



Source: EC.
(1) 2015 data for Austria, Estonia, Lithuania and Poland.

1.2 House prices

Household wealth, then, has staged significant growth in the past decades, primarily on the back of robustly growing asset prices. Regarding real estate wealth, Baugnet *et al.* (2017) estimate the share of valuation effects at nearly two-thirds in its growth since 2008.

1.2.1 House prices in Belgium and the euro area

In Belgium, as in numerous other European countries, house prices have surged in the past decades, particularly since the early 2000s, with prices having more than doubled in nominal terms and risen 1.7 times in real terms. In fact, there have only been two genuine periods of falling prices since reliable statistics became available: one in the first half of the 1980s, when nominal prices contracted by 2.7 % on average per annum and real prices by 7.6 %, and a second,

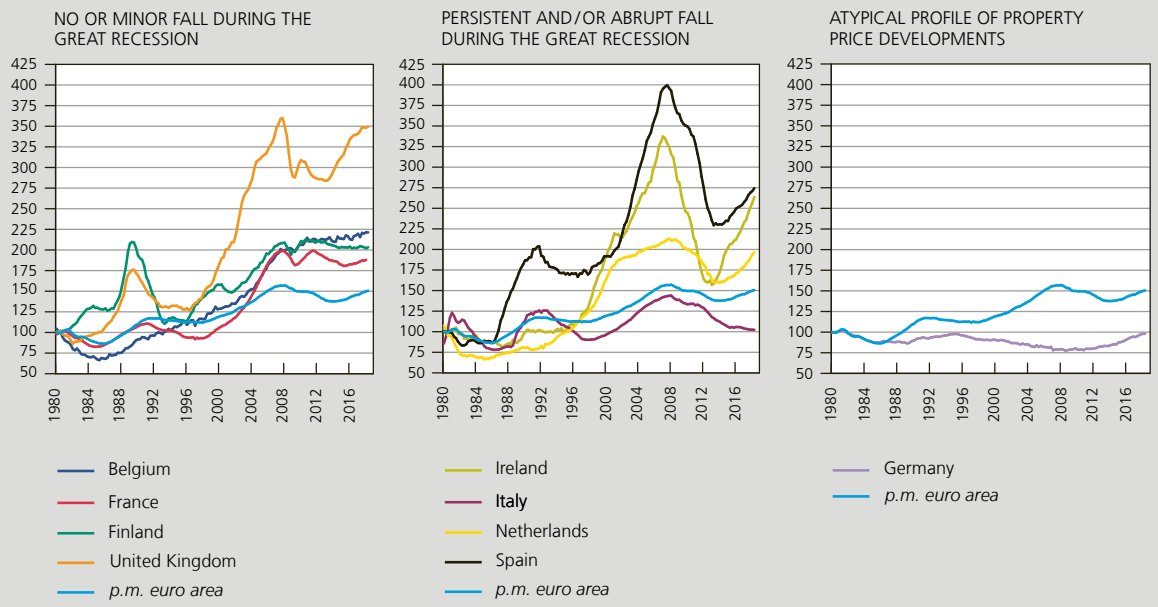
(1) Due caution should be observed when interpreting outcomes, as methods for calculating the value of land in households' real estate wealth may differ from one country to the next. In Belgium, for instance, all types of land are included, which is not necessarily true elsewhere. That said, the effect on Belgium's place in the rankings is not significant, as data reflects most of the land in the possession of households.

period, which was shorter, at the time of the economic and financial crisis, when nominal prices moved down by barely 3 % and real prices by 2 % over a total three quarters.

Property prices in many European countries fluctuated around this upward long-term trend, so that multiple cycles emerged. Undoubtedly, the most notable of the latter was the cycle that began with the upward phase between the second half of the 1990s and 2007, a period that also saw a high level of synchronisation between the European countries, and which ended with the downward correction during the economic and financial crisis in 2008 and subsequent years, a time marked by greater heterogeneity between countries.

CHART 3 REAL PROPERTY PRICES IN BELGIUM AND IN A SELECTION OF EUROPEAN COUNTRIES

(indices 1980 = 100)



Sources : OECD, NBB.

Although house prices in Belgium have clearly been on an upward trend in recent years and have risen more strongly than in the euro area as a whole, they have increased (significantly) faster in a number of European countries, including Spain, Ireland, the United Kingdom and the Netherlands. Granted, these countries also saw more pronounced and persistent downward corrections against the backdrop of the Great Recession a decade ago, but their property prices have been back on the up for a number of years now, and more rapidly so than in Belgium.

With regard to the most recent developments, house price growth has recovered in the euro area since 2014 (see Table 1). The pace of growth broadly matched that in Belgium, except in 2016, when it was clearly higher (3.4 % compared with 1.6 %). The euro area average would appear have been affected by longer price falls in two of its large economies – Italy and France. As noted, Belgium saw house prices rise generally less rapidly than did other key euro area member states, regardless of whether or not they are countries that recorded a correction at the time of the Great Recession. Germany and Austria, for instance, also recorded much higher growth in house prices.

Analyses of property prices, and particularly international comparisons, tend to draw mainly on price indices. Although they provide information about house price trends over time, such indicators do not, however, provide any indication on price levels. Scant available data on average prices per square metre suggests that Belgium typically comes in at around the European average, both in terms of prices charged in major European cities and of average prices by country.

TABLE 1 NOMINAL GROWTH IN EURO AREA PROPERTY PRICES
(in %)

	EA	BE	DE	NL	ES	IE	AT	FR	IT
2013	–2.1	1.3	3.1	–6.0	–9.1	1.2	5.2	–2.1	–6.5
2014	0.3	0.2	3.1	0.8	0.3	16.5	3.5	–1.8	–4.7
2015	1.7	2.0	4.7	3.6	3.6	11.5	4.9	–1.9	–3.8
2016	3.4	1.6	6.0	5.0	4.6	7.5	8.5	1.0	0.3
2017	3.7	3.8	4.6	7.5	6.2	10.9	5.3	3.0	–1.1
2018 (1)	4.2	3.2	5.1	9.3	6.5	12.4	4.5	2.9	–0.4

Sources: OECD, NBB.
(1) First two quarters of 2018 compared with the corresponding period of the previous year.

1.2.2 Determinants of property prices in Belgium

Trends in property prices may be explained by a variety of determinants. This article looks at two complementary approaches, the first of which is based on the idea that a residential property is the sum or combination of different components, specifically its structure and the land it is built on, while the second approach relates price developments to a series of macroeconomic variables.

1.2.2.1 Property prices broken down into building land and structures

The first approach, then, sees a property as a combination of two key elements: its structure, i.e. the building as such, and the land on which it is built. By extension, the price paid for a dwelling can be broken down into the replacement costs of the structure and the price of the building land.

This approach has been adopted by Knoll *et al.* (2017). To this end, they model the real estate sector's production function as a Cobb-Douglas-type with two production factors, i.e. the building land (Z) and the residential structures (X):

$$F(Z_t, X_t) = (Z_t)^{\alpha}(X_t)^{1-\alpha} \qquad (1)$$

in which α is a constant technology parameter with a value between zero and one. (1)

The above allows us to derive the relative importance of the price of the two production factors in long-run property prices growth. The following formula is used to compute the share of land price (p^Z) and that of residential structures (p^X) in house price increases (p^H) between t and t+1.

$$\alpha \frac{ln\left(\frac{p^{X\ or\ Z}_{t+1}}{p^{X\ or\ Z}_{t}}\right)}{ln\left(\frac{p^{H}_{t+1}}{p^{H}_{t}}\right)} \qquad (2)$$

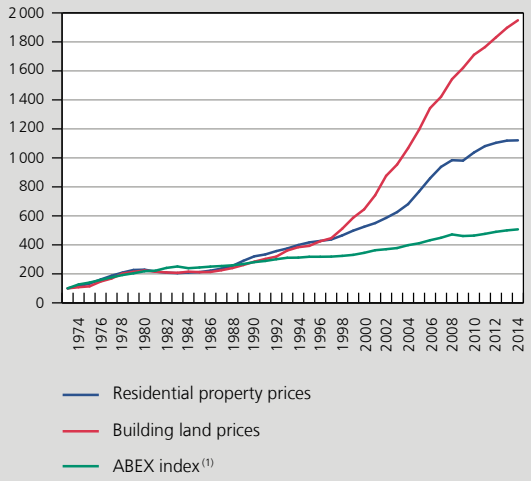
Prices of these production factors cannot be directly observed. The price developments regarding the land on which buildings are sited may be approximated through price trends for building land. To a degree, changes in replacement costs for the building's structure are comparable to changes in construction costs.

(1) Knoll *et al.* (2017) set the value of the parameter at 0.5. However, the outcomes remain robust if the value of the parameter is kept within reasonable limits.

In Belgium, land prices have been rising more robustly than those for dwellings, especially since the 2000s. Between 1973 and 2014[1], nominal house prices multiplied by a factor of 11, compared with a factor of 19 for land prices. By contrast, construction costs as measured by the ABEX index[2] recorded only a fivefold uptick in the same period.

CHART 4 NOMINAL HOUSE AND LAND PRICES, AND BUILDING COSTS

(indices 1973 = 100)



Sources: ABEX, NBB.
(1) Indicator of construction costs.

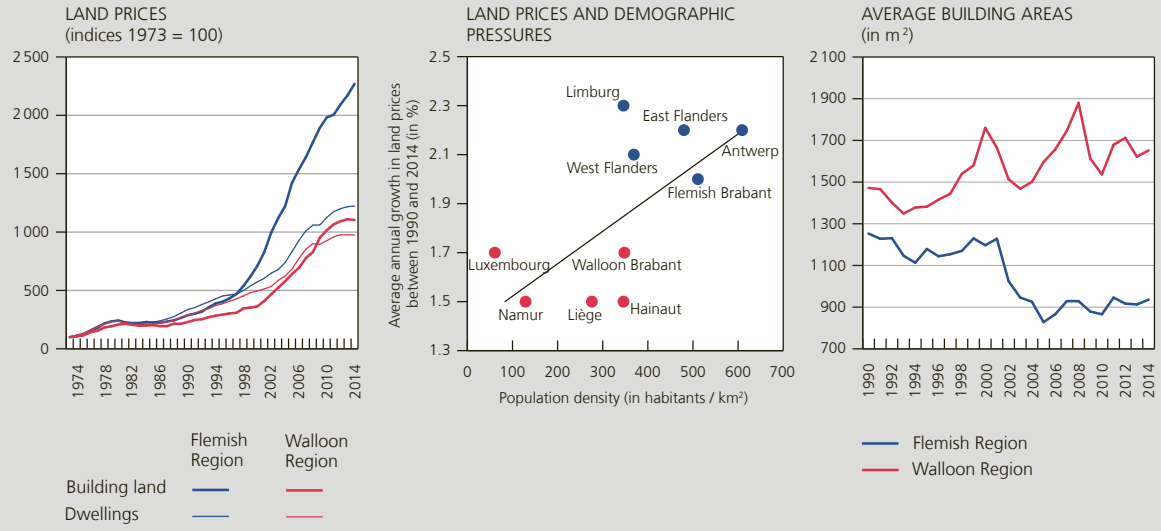
Equation (2) reveals that 73 % of real house prices growth in Belgium between 1973 and 2014 is attributable to the increase in land prices in the period. Therefore, higher building costs accounted for only 27 % of the upturn in house prices, an outcome similar to those arrived at by Knoll *et al.* (2017). They found that, for a total of 14 advanced economies including Belgium, land price dynamics have been the main driver of property prices since the second half of the 20th century. They estimate the share of land price growth in residential property price growth at 81 % between 1950 and 2012. Note that land prices' contribution to higher property prices varies per country, from 74 % for the United Kingdom and 96 % for Finland. Belgium's precisely matches the average, i.e. 81 %.

Belgium nevertheless shows marked differences between its various regions[3], with land prices rising most rapidly in the Flemish Region, i.e. by a factor of 23 between 1973 and 2014, compared with a factor of 11 for the Walloon Region. With the exception of the early 1980s and the period between 2006 and 2011, land prices staged a more pronounced rise in the Flemish Region, most particularly between 1992 and 2003. It was during this time that the growth gap relative to the Walloon Region widened to a record 13 percentage points in 1999 and 2000.

Moreover, the more rapid increase in land prices in the Flemish Region was also reflected in a more pronounced divergence vis-à-vis house price increases from the late 1990s, whereas these two variables developed rather more in parallel in the Walloon Region, although differences were seen here too. Under the same approach than above, the increase in land prices between 1973 and 2014 accounted for an estimated 74 % of the real increase in house prices for the Flemish Region. This percentage worked out at 54 % for the Walloon Region in the same period.

(1) The analysis is restricted to the 1973-2014 period because of data availability. Official statistics on building land prices are no longer available after this date. That said, post-2015 alternative data confirms the outcomes of the analysis below.
(2) The ABEX index measures costs for residential property constructions and is calculated by pulling together the observations of the members of a nation-wide committee. The period covered by the index is very wide-ranging, as its first observation dates back to 1914.
(3) This analysis ignores the Brussels Capital Region, as building land is relatively scarce here and transactions are few, making the available data less than representative and price indicators more volatile.

CHART 5 PRICES AND LAND SCARCITY IN THE FLEMISH AND WALLOON REGIONS



Sources: Statistics Belgium, NBB.

The much higher increase in land prices in the Flemish Region can partly be explained by a higher relative scarcity of land than in the Walloon Region. As a whole, the Flemish Region is indeed more densely populated than the Walloon Region, reducing the available space for building. With the exception of Hainaut and Walloon Brabant, whose population densities are comparable to those in Limburg, all the Walloon provinces are less or much less densely populated than their Flemish counterparts. However, the growth in land prices since 1973 is positively correlated with this variable.

Meanwhile, the regions also saw diverging developments in average acreages for building land. Whereas acreages were relatively similar in 1990, with 1,250 square metres for the Flemish Region compared with 1,470 square metres in the Walloon Region, they have shrunk significantly in the Flemish Region, by 25 % to 940 square metres in 2014, while it increased by 12 % to 1,650 square metres in the south of the country in 2014. The gap between the two regions opened up in 2002, when the average area of building land suddenly dropped in the Flemish Region. A study by ING (Manceaux, 2011) argues that the decrease in land areas in the Flemish Region was caused by the promulgation of a new land use plan (Ruimtelijk structuurplan Vlaanderen) in 1999.

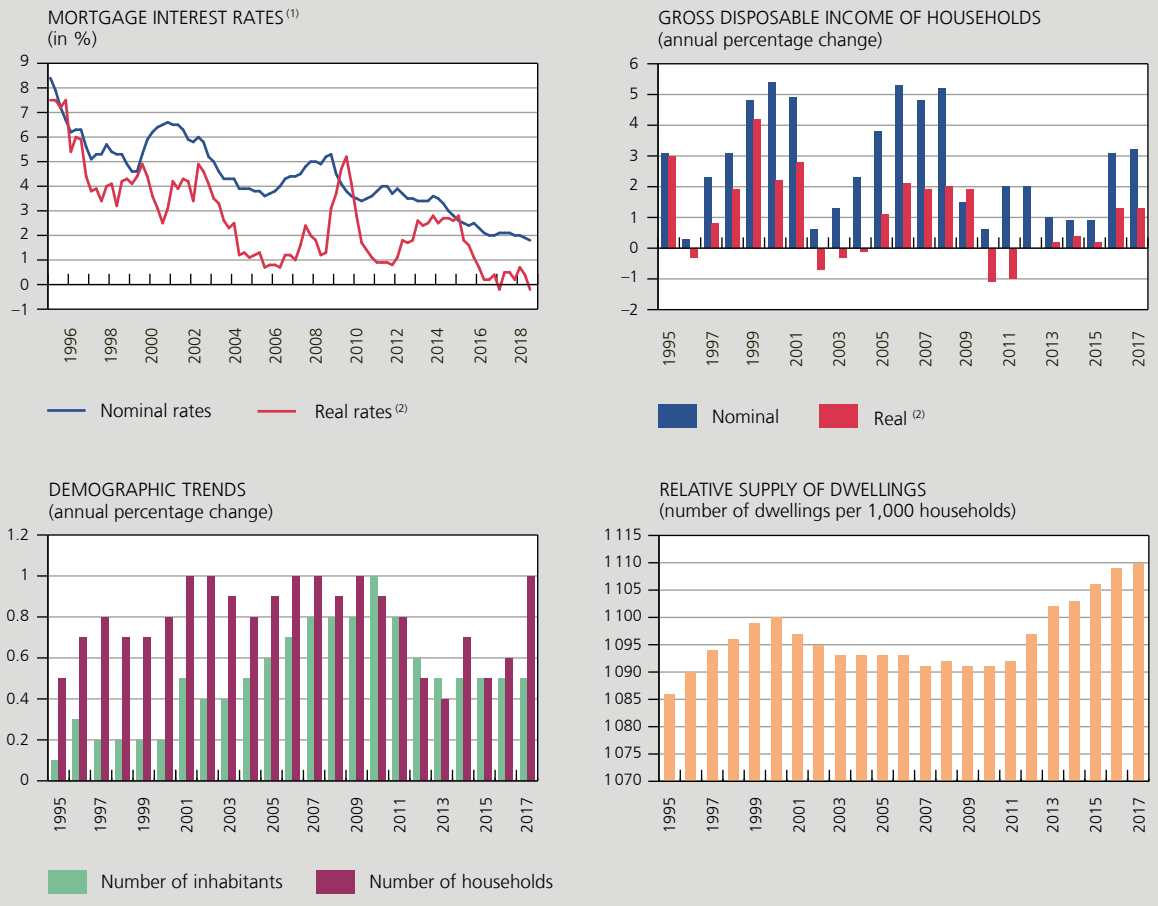
1.2.2.2 Fundamental determinants of house prices

The strong expansion of property prices in Belgium since the 1970s can largely be attributed to changes in a series of fundamental determinants of the housing market, mainly on the demand side (Warisse, 2017). In particular, the sharp downturn in mortgage rates in the past decades, combined with higher household incomes, made homes more affordable (all things being equal). Population growth has undoubtedly also played a role, as demographic pressures accelerated in the wake of the steadily decline in average household size. In addition, tax treatment of real estate changed in such a way that was likely to encourage access to mortgage loans and the demand for housing. With the exception of the devolution to the regions and the resizing of the tax deductibility of mortgage loans ('housing bonus') from 2015 (particularly in the Flemish Region, where such relief cut significantly), changes included the implementation of the housing bonus at the federal level in 2005, tax amnesties dating from 2004 that encourage Belgian households to repatriate funds from abroad – a proportion of which must have been reinvested in residential property –, the reduction of registration fees and, in the Flemish Region, the introduction of their portability.

The impact of demand factors on house prices depends on the extent to which supply adapts to them. If construction activity does not produce an adequate response to a rise in housing demand, pressures on house prices will increase in principle. Housing stock statistics reveal that supply has been typically adapted to demographic trends, with the number of dwellings rising faster between 1991 and 2017 (by 27 %) than the number of households in the same period (22 %). 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, the trend reversed and stabilised up to 2010, implying a reduction in the number of vacant dwellings, which was most likely one of the factors underlying the rise in property prices during that period, particularly between 2001 and 2007. Finally, the latest observations indicate that, since 2011, the housing stock has grown by more than demographics, which might suggest a smaller impact of demand factors on the growth of residential property prices.

Nonetheless, these results concern Belgium as a whole. Although, overall, supply seems to have adapted 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 households became clearly negative there between 2007 and 2011. Although the latest observations since 2012 reveal more favourable results, they do not offset past developments. This also suggests that the construction of new homes is not necessarily taking place in the areas where the demographic pressure is greatest, which may be due partly to a more limited supply of building land and generally more stringent planning regulations

CHART 6 DETERMINANTS OF HOUSE PRICES IN BELGIUM



Sources: NAI, Statistics Belgium, NBB.
(1) Average interest rates on new contracts.
(2) Deflated by the private consumption deflator.

in those areas. As indicated in the third section of this article, the price elasticity of housing supply shows a negative correlation with population density as well as with the rigidity of laws and regulations governing housebuilding. In the other two regions, the situation seems less of an issue, at least from an aggregate point of view, with the housing stock expanding more slowly than the number of households only for a short period, i.e. between 2001 and 2006 in the Walloon Region and between 2001 and 2007 in the Flemish Region.

Lastly, other factors have probably stimulated demand for property and so contributed to recent increases in house prices, in both Belgium and elsewhere in Europe. These include the persistent low interest rate environment, which may indirectly influence the housing market by making real estate investments attractive compared to other financial investments, which have seen significant falls in returns.

2. House prices and private consumption

This section outlines the effect of house prices on private consumption. After a brief discussion of the transmission channels, this effect is estimated for eleven advanced countries using an error correction model (ECM) for private consumption.

2.1 Transmission channels of house prices to private consumption

House prices can influence private consumption through their effect on housing wealth, the cost of future housing and mortgage lending.

First of all, higher house prices increase the housing wealth of households, which can result in a positive wealth effect on consumption. The life cycle theory of consumption posits that households spread their consumption across their lifetimes, factoring in their total real estate and financial wealth as well as their expectations on future income flows (Ando and Modigliani, 1963). An expansion of their wealth should therefore have a positive effect on household consumption, as should an increase in the discounted value of future income flows.

However, the positive wealth effect of higher house prices is partly offset by the negative impact on consumption of a higher future cost of housing. Unlike financial assets, houses are not only an element of household wealth, but they also provide housing to the households. The cost of housing consists of rent for tenants and of implicit rent for owner-occupiers, i.e. the rent they would pay if they were renting their own dwelling. As an increase in house prices often also implies an increase in future rents, it can also have a negative impact on consumption via that channel[(1)]. Tenants, who would face higher rent expenses in the future, would cut their current consumption in the face of rising house prices. Also future buyers would reduce their consumption as they would need to save more to buy a particular property. For property owners, by contrast, and in particular for those owning more than a single property, the positive wealth effect resulting from their increased housing wealth would be larger than the negative effect of the increase in the implicit rent on their dwelling. Therefore, an increase in house prices primarily has a redistributive effect on consumption, in the sense that tenants and future buyers would be worse off and would consume less, and that property owners would be better off and would consume more (Cooper, 2016). As the group of future buyers and tenants is largely made up of the younger and future generations and of households with low income and limited wealth, an increase in house prices also implies an inter-generational wealth transfer and increases inequality (Muellbauer and Murphy, 2008).

The aggregate wealth effect of an increase in house prices on consumption is typically considered to be minor as the potential increase in consumption of owners would in part be cancelled out by tenants and future buyers consuming less (Muellbauer, 2007). This aggregate effect depends in part on the characteristics of a country's housing and mortgage market. It is likely to be less positive in countries with a low percentage of homeownership, such as Germany, where the housing wealth is less equally distributed across the population and where a proportion of the real estate is held indirectly by households through pension funds (Catte *et al.*, 2004; Muellbauer, 2007). Also in countries with a low average loan-to-value ratio, in which a large down payment as a percentage of the value of the property is required

(1) However, Berger *et al.* (2017) and Iacoviello (2011) argue that a higher cost of housing would result in a substitution effect in which households opt to live in cheaper homes to be able to maintain their consumption spending levels.

to obtain a mortgage loan, the aggregate effect of higher house prices would be smaller. The reason is that the required down payment in these countries would increase by an amount that corresponds to a larger fraction of the house price increase, such that future buyers would have to save more. Lastly, the aggregate wealth effect would be higher in countries with greater rent controls, as higher house prices would have less of an effect on rents such that tenants would reduce their consumer spending to a lesser extent in these countries (ECB, 2009). While many countries, including Belgium, only restrict rents in existing contracts and do not impose any controls on rents in new rental agreements, other countries, such as Germany, France, the Netherlands and particularly Sweden, also restrict the rents of new contracts (Kholodilin, 2018).

Finally, there exist a financial accelerator mechanism of higher house prices, more specifically through mortgage lending to property owners that want to borrow more for additional consumption spending. As higher house prices increase the home equity, which is the difference between the market value of the property and the remaining mortgage debt, banks could be more willing to extend additional credit with the property as collateral to these property owners. After all, more home equity reduces the credit risk for a bank, as, in the event of a default, it would likely be able to sell the property at a higher price than the outstanding debt. How big a part this financial accelerator mechanism plays in a country greatly depends on the existence and use of home equity withdrawal products, which enable households to obtain additional credit for consumption with the property as collateral, such as the so-called "opeethypotheek" in the Netherlands and the "home equity loan" and "home equity line of credit" in the United States (Calza *et al.*, 2013; Cardarelli *et al.*, 2008; Muellbauer and Murphy, 2008; Cooper, 2016)[1]. In Belgium, however, such home equity withdrawal products are hardly used[2].

2.2 Error correction model (ECM) for private consumption

To arrive at empirical estimates of the effect of house prices on private consumption, we have estimated separate error correction models (ECM) for consumption (C_t) for a number of advanced countries, in which the explanatory variables are the house prices (HP_t), the net financial wealth (FW_t), the household gross disposable income (DI_t) and the short-term interest rate (IR_t)[3]. Our model is comparable to the empirical models in Cardarelli *et al.* (2008), Case *et al.* (2005), Catte *et al.* (2004), Eugène *et al.* (2003), Ludwig and Sløk (2004) and Sousa (2009). The ECM model assumes that there is a stable long-run equilibrium relationship between consumption and its determinants, and that divergences from this equilibrium relationship will lead to gradual adjustments of consumption to this equilibrium.

2.2.1 The long-run equilibrium of consumption in the ECM model

The long-run equilibrium relationship of the ECM model is given by

$$\log(C_t) = \beta_0 + \beta_1 \log(DI_t) + \beta_2 \log(HP_t) + \beta_3 \log(FW_t) + \beta_4 IR_t + \varepsilon_t \qquad (3)$$

where the coefficients β_1, β_2 and β_3 are long-term elasticities representing the percentage effect on consumption of a 1 % increase in respectively disposable income, house prices and net financial wealth. The coefficient β_4 is a semi-elasticity and measures the percentage impact on consumption of a rise in the short-term interest rate by one percentage point. Finally, ε_t is the error term. The long-run equilibrium relationship is estimated using the ordinary least squares estimator.

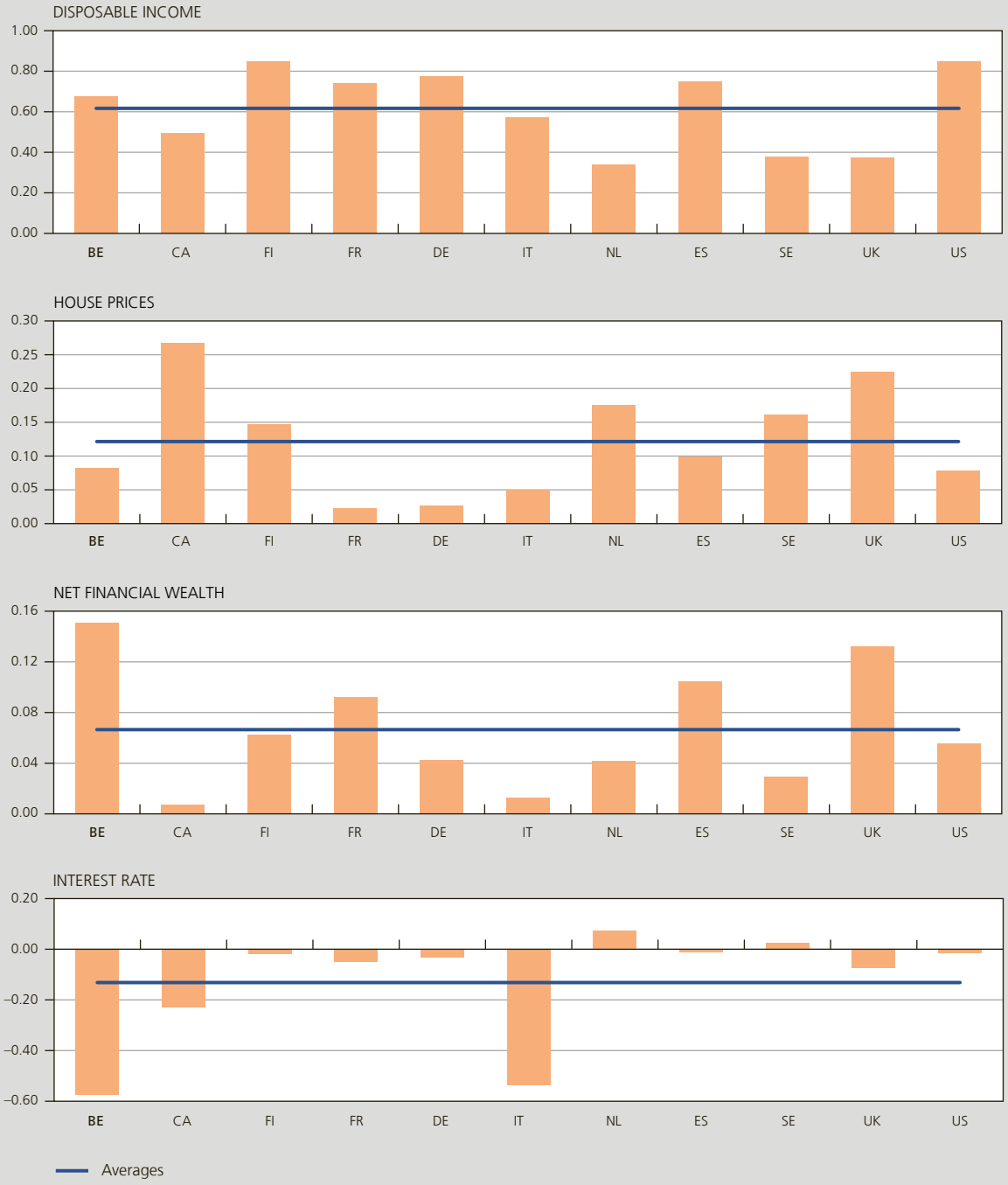
The estimates show that disposable income is an important determinant of consumption in all countries, with estimated elasticity varying from 0.34 (Netherlands) to 0.85 (United States), and with Belgium coming it at 0.68, just above the average. The estimated elasticity of the effect of house prices on consumption is between only 0.02 (France) and 0.27 (Canada) and is relatively low for Belgium (0.08). Net financial wealth has an estimated effect on consumption of only 0.01 for Canada and 0.15 for Belgium, meaning that the effect in Belgium is high relative to the other countries. In part, this may be explained by the high ratio of net financial wealth relative to GDP in Belgium (see Chart 2 in Section 1), as a 1 % increase in net financial wealth leads to a higher absolute increase. Finally, the effect of the

(1) Refinancing their current mortgage loan with a higher principal would be another way for owners to obtain additional credit for consumption.

(2) While in Belgium there exist mortgage loans with a movable purpose, which have the owner's property as collateral and can be used for the financing of a car among other purposes, these loans are hardly used: they accounted for a mere 0.4 % of new loans in 2018 (up to and including October).

(3) ECM models are estimated for the period between 1999 and 2017 (quarterly data) for eleven advanced countries, in particular Belgium, Canada, Finland, France, Germany, Italy, the Netherlands, Spain, Sweden, the United Kingdom and the United States. All variables are deflated by the private consumption deflator, seasonally adjusted – with the exception of the short-term interest rate and the net financial wealth – and expressed as a logarithm (except the short-term interest rate). Lastly, the short-term interest rate is expressed as an annual percentage rate.

CHART 7 ESTIMATED COEFFICIENTS OF THE LONG-RUN EQUILIBRIUM OF PRIVATE CONSUMPTION IN THE ECM MODEL



Sources: Eurostat, OECD, own calculations.

short-term interest rate on consumption for most countries is negative. This could be explained by the substitution effect in which a higher interest rate makes saving relatively more attractive, while the potential income effect of a higher interest rate is not incorporated as the capital incomes are already included in the net financial assets variable of the model (Eugène *et al.*, 2003; Burggraeve and Jeanfils, 2008). The estimated semi-elasticity varies between –0.58 for Belgium and 0.07 for the Netherlands, and so is relatively large for the former in absolute terms.

These estimates should be interpreted with due caution. First, the estimated coefficients have a statistical error margin, as they are estimated using 76 observations for each country. In addition, it is assumed that the determinants of consumption in the ECM model are exogenous and their estimated effect on consumption could be biased by a feedback relationship between consumption and its determinants. Finally, the estimated effects could also be biased by variables that are not included in the model, but that do affect both consumption and its determinants. For instance, a more rapid projected growth in future incomes on the back of a faster expected technological progress could boost current and future consumption, house prices as well as the prices of financial assets such as share prices (Carroll *et al.*, 2011; Croux and Reusens, 2013; Iacoviello, 2011).

The next step was to compare the estimated long-term elasticities of the ECM model with the estimates of other empirical studies. For Belgium, the estimated impact of house prices and financial wealth on private consumption is clearly larger than earlier estimates or hypotheses for Belgium, such as in Eugène *et al.* (2003) and Burggraeve and Jeanfils (2008), both of which identified only a minor effect of net financial wealth and no, or even a slightly negative effect of house prices. That said, the estimates for Belgium were well within the range of estimates reported in studies for other advanced countries and are particularly close to the estimates of Sousa (2009) for the euro area. Finally, the range of estimated elasticities of the ECM model for the different advanced countries was comparable with those of other studies for advanced countries. However, it should be noted that the range of estimated elasticities is relatively wide and that the estimated elasticities for the same country or group of countries partly differ between the studies, which shows that these estimates have a margin of error.

TABLE 2 OVERVIEW OF ESTIMATED LONG-TERM ELASTICITIES OF CONSUMPTION FOR VARIOUS EMPIRICAL STUDIES[1]

	Studies for Belgium			Studies for other advanced countries				
	ECM estimate	Eugène *et al.* (2003)	Burggraeve and Jeanfils (2008)	ECM estimate	Case *et al.* (2005)	Coskun *et al.* (2018)	Ludwig and Sløk (2004)	Sousa (2009)
	Belgium			OECD countries				Euro area
House prices	0.08	–0.01	0.00	[0.02;0.27]	[0.11;0.17]	[0.09;0.19]	0.04	0.05
Net financial wealth	0.15	0.04	0.05	[0.01;0.15]	[–0.01;0.02]	[–0.08;0.06]	0.08	0.13
Disposable income	0.68	0.96	0.95	[0.34;0.85]	[0.29;0.66]	[0.50;0.85]	0.70	0.65
Interest rate[2]	–0.58	[–0.27;–0.14]	–0.30	[–0.58;0.07]	n.	[–0.33;0.39]	n.	n.

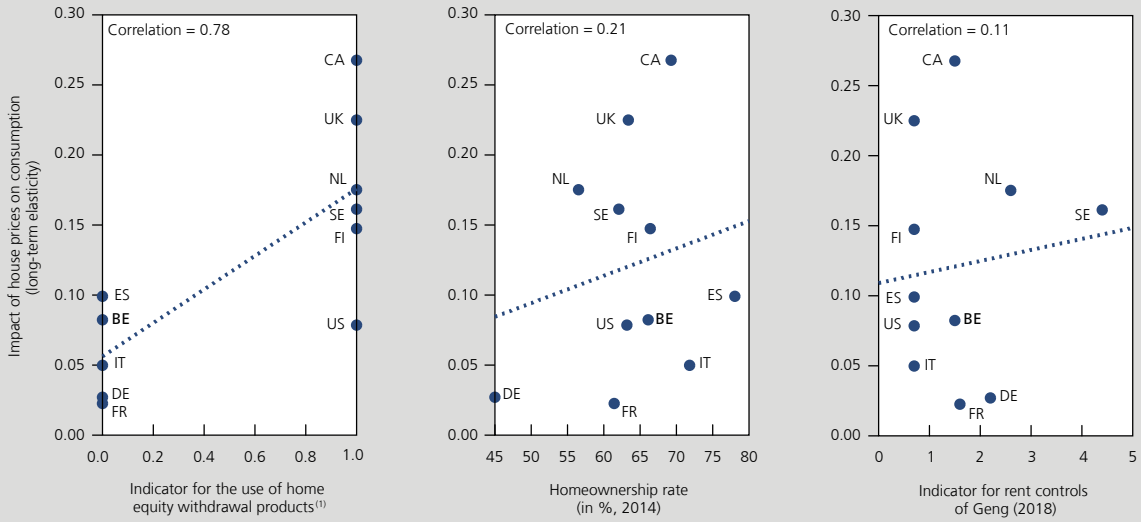
Sources: Burggraeve and Jeanfils (2008), Case *et al.* (2005), Coskun *et al.* (2018), Eugène *et al.* (2003), Eurostat, Ludwig and Sløk (2004), OECD, Sousa (2009), own calculations.

(1) The definitions of the variables in the empirical model differ in part between the various studies. Net financial wealth becomes share prices in Case *et al.* (2005), Coskun *et al.* (2018) and Ludwig and Sløk (2004). Disposable income is replaced by human capital in Burggraeve and Jeanfils (2008). Property prices feature as real estate wealth in Eugène *et al.* (2003) and Sousa (2009). And lastly, the variables – with the exception of the interest rate – are expressed in per capita terms in Case *et al.* (2005), Coskun *et al.* (2018), Ludwig and Sløk (2004) and Sousa (2009).

(2) The estimated semi-elasticity of the effect of the short-term interest rate on consumption.

Finally, we analyse to what extent the estimated impact of house prices on consumption is driven by structural features of the housing and mortgage market, drawing on simple correlations. First, there is a strongly positive connection between the long-term effect of house prices on consumption and the use of home equity withdrawal products. The correlation stands at 0.78 and is statistically significant. What is more, the elasticity of the effect of house prices on consumption is 0.12 higher on average for countries in which such home equity withdrawal products are frequently used (i.e. Canada, Finland, the Netherlands, the United Kingdom, the United States and Sweden) compared with countries in which these products are not or not frequently used (i.e. Belgium, Germany, France, Italy and Spain). Hence, like Cooper (2016), Cardarelli *et al.* (2008) and Kharroubi and Kohlscheen (2017), we find that the elasticity of house prices is highly dependent on the usage of home equity withdrawal products. Next, we find a positive correlation between the the size of the effect of house prices on consumption and the homeownership rate (also identified by De Nederlandsche Bank, 2018, and by Kharroubi and Kohlscheen, 2017), but the correlation of 0.21 is rather small and statistically not significant. Lastly, rent controls play a positive, but very minor and statistically not significant part. The impact of higher house prices on consumption would appear to be a little higher in countries that have strict rent controls, such as Sweden.

CHART 8 CHARACTERISTICS OF THE HOUSING AND MORTGAGE MARKET AND THE LONG-TERM EFFECT OF HOUSE PRICES ON CONSUMPTION



Sources: Calza *et al.* (2013), Eurostat, Geng (2018), OECD, own calculations.

(1) The indicator for the use of home equity withdrawal products is based on Calza *et al.* (2013), with categories "Not used/Limited use" and "Used" changed to a numeric index with respectively 0 and 1 as values.

2.2.2 The short-term consumption dynamics in the ECM model

The equation for the short-term consumption dynamics in the ECM model is given by

$$\Delta\log(C_t) = \alpha_0 + \gamma r_{t-1} + \alpha_1 \Delta\log(DI_t) + \alpha_2 \Delta\log(HP_t) + \alpha_3 \Delta\log(FW_t) + \alpha_4 \Delta IR_t + \delta_t \quad (4)$$

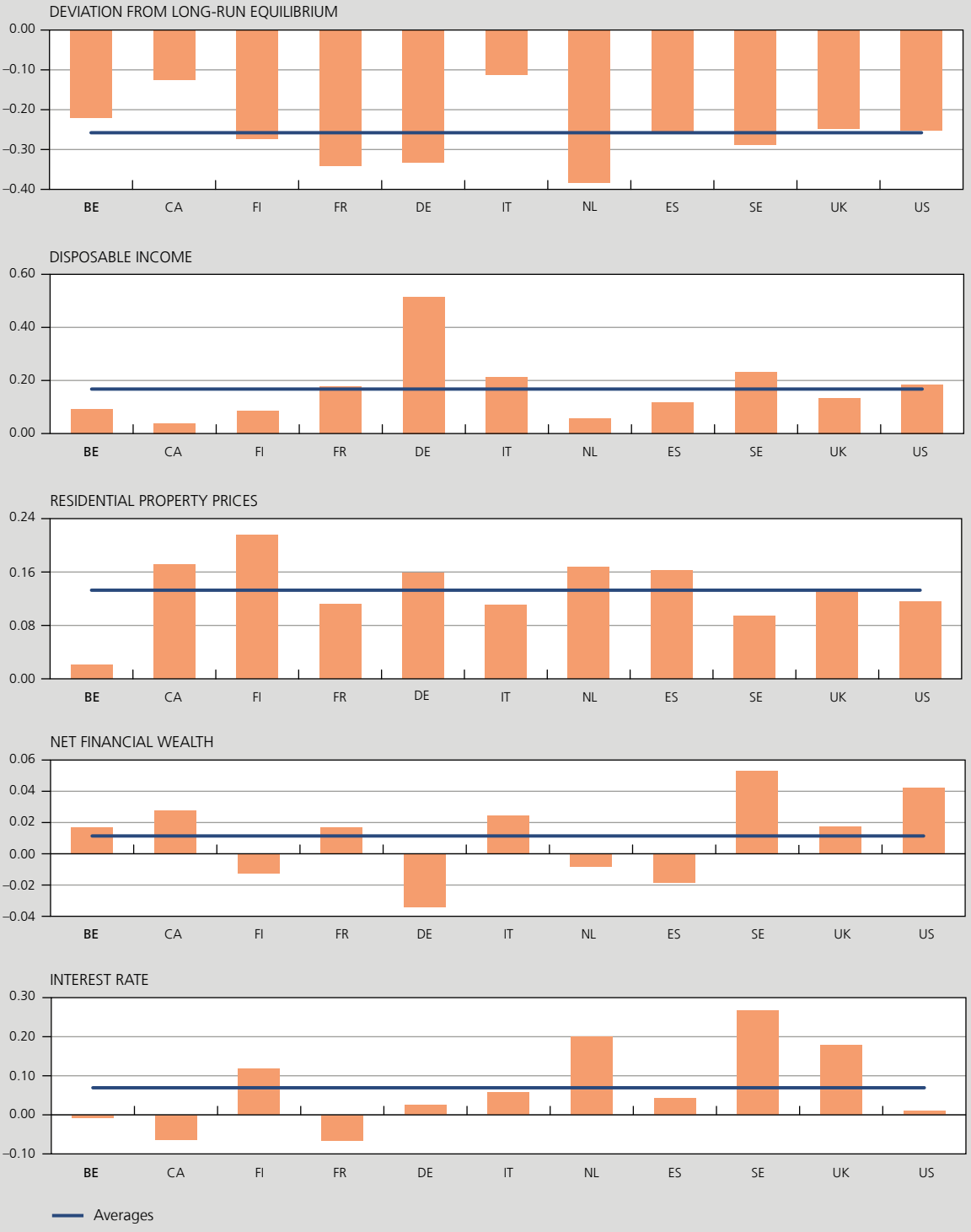
The residual r_{t-1} is the deviation from the estimated long-run equilibrium from equation (3). The coefficient γ is the proportion of this deviation that is corrected every quarter and it hence is a measure of the pace at which consumption adjusts to its long-run equilibrium. Coefficients α_1, α_2 and α_3 are short-term elasticities and represent the percentage impact on consumption of a 1 % increase of respectively disposable income, house prices and net financial wealth. Lastly, coefficient α_4 captures the semi-elasticity of the short-term interest rate and δ_t is the error term.

The estimated coefficient for adjustment towards the long-run equilibrium, $\hat{\gamma}$, is strongly negative and statistically significant for all countries, indicating that the ECM model with a long-run equilibrium for consumption is plausible[1]. In particular, this estimated coefficient varies between –0.11 (Italy) and –0.36 (Netherlands) and it stands at –0.22 for Belgium.

In addition to this important correction mechanism towards the long-run equilibrium, consumption growth in the ECM model is also determined by the short-term dynamics in disposable income, house prices, net financial wealth and interest rate. However, in absolute terms, the estimated short-term elasticities are typically smaller than those in the long term. The estimated short-term elasticity of the effect of house prices on consumption varies between 0.02 for Belgium and 0.22 for Finland, meaning that it is small in Belgium. Compared with the long-term impact, these differences in the estimated short-term effect of house prices on consumption between countries are only to a lesser extent explained by the above discussed features of the housing and mortgage market. The short-term elasticity only has a positive correlation with the indicator for the use of home equity withdrawal products, even if this correlation of 0.37 is relatively small and statistically not significant.

(1) The null hypotheses of a unit root in residuals r_{t-1} is rejected for half the countries reviewed, which is another indication that the ECM model for consumption is a plausible model.

CHART 9 ESTIMATED COEFFICIENTS OF THE SHORT-TERM PRIVATE CONSUMPTION DYNAMICS IN THE ECM MODEL



Sources: Eurostat, OECD, own calculations.

3. House prices and residential investment

This section first discusses the importance of residential investment for the economic cycle. It then moves on to analyse to what extent residential investment is affected by developments in property prices, drawing on the estimated price elasticity of housing supply of Caldera and Johansson (2013). It ends on a discussion of the extent to which the price elasticity of housing supply influences the transmission of housing demand shocks to house prices, housing supply and economic activity.

3.1 The importance of residential investment for the economic cycle

For the most part (on average 56 % in the 2010-16 period), residential investment is composed of investment in new housing construction, but it also includes spending on refurbishments, as well as taxes and legal expenses related to the purchase of a dwelling. In addition, investment in new construction is also the main determinant of the volume growth of the residential investment. For the 1995-2017 period, residential investment's average share of GDP amounted to only 5.6 % on average for the advanced countries under review and 6.2 % for Belgium, compared with respectively

CHART 10 AVERAGE SHARE OF GDP AND VOLATILITY OF RESIDENTIAL INVESTMENT AND PRIVATE CONSUMPTION

Sources: Eurostat, OECD, own calculations.

(1) Volatility relative to GDP is measured as the standard deviation of the annual growth of residential investment and consumption relative to the standard deviation of GDP growth, calculated for the 1995-2017 period.

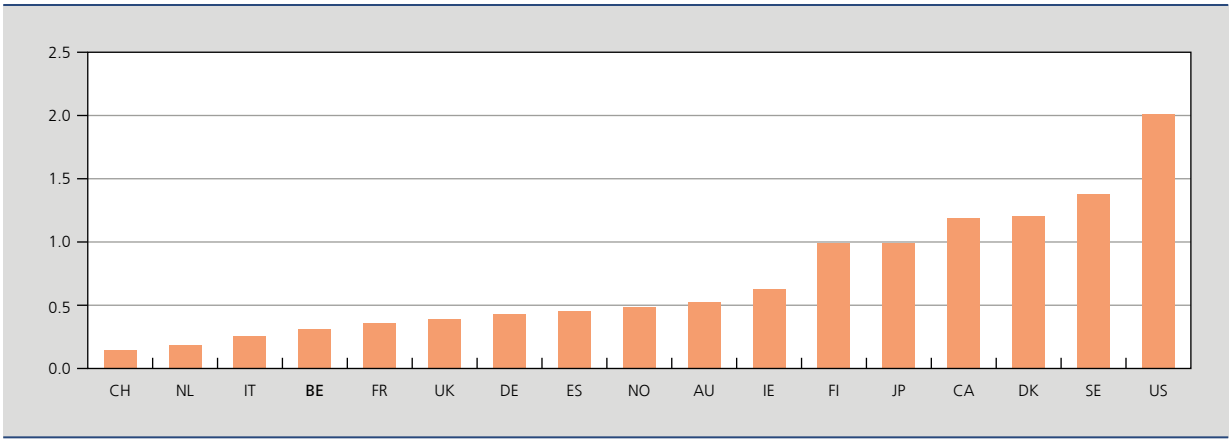
54 % and 53 % for the average private consumption share of GDP. That said, volatility of residential investment growth, measured as the standard deviation of the annual growth rate, is on average 4.1 times higher than the volatility of GDP growth for the group of advanced countries and 3.5 times for Belgium, whereas volatility of consumption growth for most countries (including Belgium) is below that of GDP growth. This means that, despite its low average share of GDP, residential investment can still have a substantial effect on the economic cycle.

3.2 Long-term price elasticity of housing supply

House prices can influence investment in new housing construction. According to Tobin's Q theory, higher house prices imply that new builds can be sold more expensively, making investment in new housing construction – at unchanged building costs – more profitable. However, this effect of higher house prices on the expected profitability of new housing construction could be partly cancelled out by concomitant increases in land prices, which account for a sizeable proportion of the total building costs of a new home and which typically go up when house prices do (see Section 1 and Muellbauer and Murphy, 2008).

The price elasticity of housing supply is the effect of a change in house prices on residential investment. Caldera and Johansson (2013) estimated the long-term price elasticity for various advanced countries using an error correction model (ECM) for residential investment in which not only house prices but also building costs and demographic variables are used as determinants of the long-run equilibrium of residential investment. This estimated price elasticity of housing supply varies markedly between countries: it is low in the West European countries, including Belgium, and very high in the United States and the Scandinavian countries. A 1 % increase in house prices would boost long-term residential investment by 2.0 % in the United States, compared with only 0.3 % in Belgium.

CHART 11 LONG-TERM PRICE ELASTICITY OF HOUSING SUPPLY

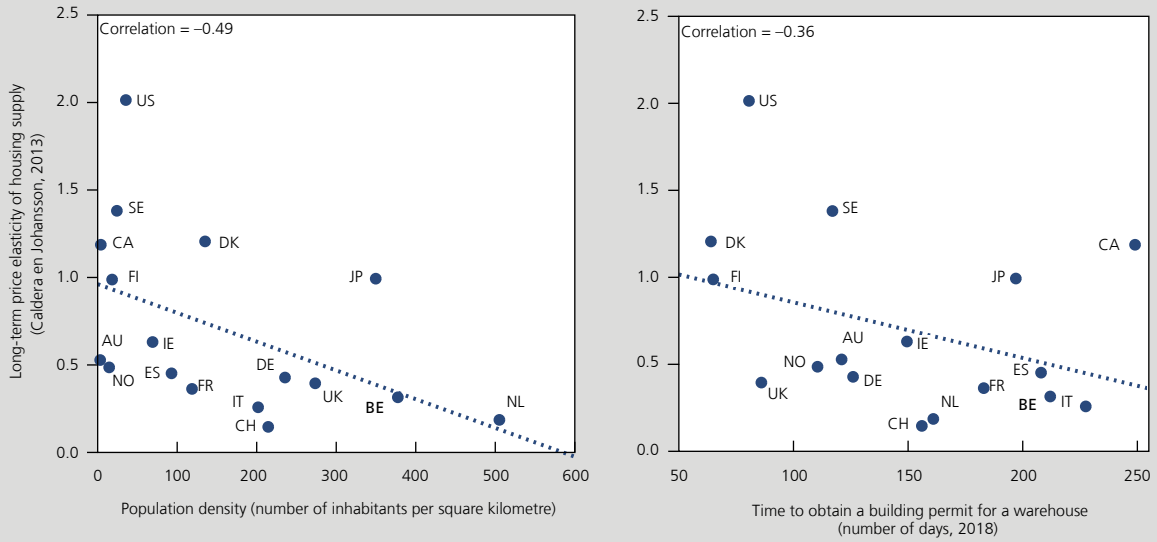


Source: Caldera and Johansson (2013)

The differences in the price elasticity of housing supply between countries can in part be explained by geographical and demographic factors, as well as government policies (Caldera and Johansson, 2013). First, the price elasticity depends on the physical constraints on available building land. Hence, it is smaller for countries with a high population density, where there is less land available for building. In addition, the price elasticity also depends to a large extent on government policies, and particularly spatial planning rules as well as procedures for acquiring a building permit. For example, the price elasticity tends to be lower in countries in which it takes longer to obtain a building permit.[(1)] Hence, the high population density and relatively strict regulation can partly explain the low price elasticity of Belgium's housing supply.

(1) We are using the internationally comparable data from the World Bank Doing Business 2018 on the number of days needed to obtain a building permit for a warehouse as an indicator and we expect this indicator to be highly correlated to the amount of time needed to obtain a building permit for residential property.

CHART 12 DETERMINANTS OF LONG-TERM PRICE ELASTICITY OF HOUSING SUPPLY



Source: Caldera and Johansson (2013), United Nations, World Bank Doing Business 2018

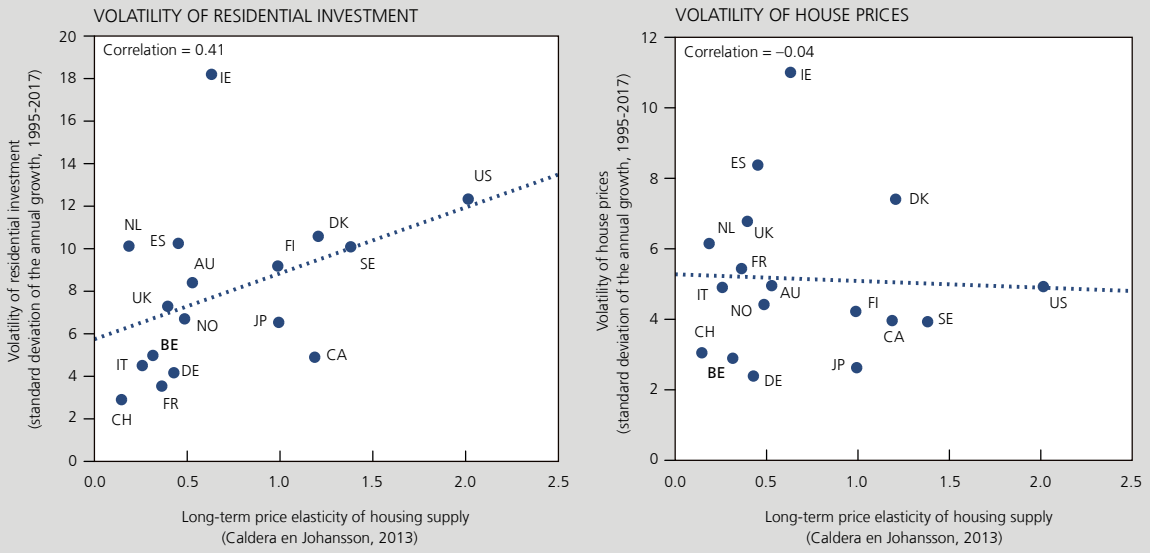
3.3 The price elasticity of housing supply and the transmission of housing demand shocks

The price elasticity of housing supply has an important impact on the transmission of housing demand shocks to house prices, housing supply and economic activity (European Commission, 2011).

In countries with a very elastic housing supply, positive housing demand shocks – e.g. a rise in the number of households or an increase in the disposable income – would predominantly trigger higher housing supply, which would increase residential investment, as well as the employment and value added in the construction industry. Conversely, negative demand shocks would mostly cause downward adjustments to the housing supply in those countries. So, if such shocks were to hit the various countries to the same extent, residential investment should be more volatile in countries with a more elastic housing supply. Our dataset of 17 advanced countries indeed shows a strongly positive correlation of 0.41 between the estimated price elasticity of Caldera and Johansson (2013) and the volatility of the annual growth of residential investment.

Countries with a very inelastic housing supply should see their housing supply respond much less to housing demand shocks, and these shocks would therefore predominantly lead to changes in house prices. Andrews *et al.* (2011) find that in a country with a relatively low price elasticity – i.e. half a standard deviation below the median for the OECD countries – the rise in house prices as a result of a positive demand shock is about 50 % higher than in a country with a price elasticity at the median. Housing demand shocks can therefore also impact economic activity in countries with an inelastic housing supply: while residential investment would change relatively little in response to such housing demand shocks, economic activity would be indirectly affected through their large impact on house prices, which in its turn could affect both consumption (see Section 2) and credit supply (see Section 4). Also the European Commission (2011) states that house prices are more volatile in countries with a very inelastic housing supply. However, a simple correlation measure between the estimated price elasticity and the volatility in house price growth for a dataset of 17 advanced countries shows only a very limited negative correlation, which seems to suggest that house prices are often also influenced by idiosyncratic factors, such as the taxation (see Section 1).

CHART 13 LONG-TERM PRICE ELASTICITY OF HOUSING SUPPLY AND VOLATILITY OF RESIDENTIAL INVESTMENT AND HOUSE PRICES



Sources: Caldera and Johansson (2013), OECD, own calculations.

4. The importance of house prices from a wider macroprudential angle

This final section discusses the importance of house prices from a wider macroprudential angle. The empirical literature on the determinants of banking crises[1] has found an important role for house price bubbles. These are typically defined as the build-up of major divergences in house prices from their equilibrium level and their presence is reflected in a strong overvaluation of real estate. Such house prices bubbles, especially when coupled with rapid credit growth, increase the risk of a banking crisis and they lead to recession that are much deeper and more protracted (Jorda *et al.*, 2015a; Jorda *et al.* 2015b; Ferrari *et al.*, 2015).

The impact of house price bubbles that are coupled with a strong credit growth – both on the risk of a banking crisis and on the depth and length of recessions – is underpinned by a feedback mechanism between house prices, banks' balance sheets, credit growth and economic activity.[2] In the buildup of a house price bubble, the rapid rise in house prices can bolster the profitability and net worth of banks, as higher house prices push up the collateral value of outstanding mortgage loans and hence reduce the losses in the event of default. In addition, higher house prices can also positively impact private consumption and residential investment (see Sections 2 and 3), hence improving economic activity and employment as well as mitigating the risk of default on mortgage loans. In turn, these effects could increase supply and demand for loans, which subsequently could positively affect economic activity and house prices (ESRB, 2016). By contrast, the sharp fall in house prices during the bursting of the bubble reverses this positive feedback loop. Especially when combined with other negative income and employment shocks in the economy, steeply lower house prices would have a negative impact on the collateral value of outstanding mortgage loans, on economic activity, on employment and on default rates on mortgage loans. This would lower the profitability and net worth of banks and might result in higher funding costs for banks, and in extreme cases, in difficulties in obtaining sufficient funding (ESRB, 2016). Subsequently, the reduced credit supply and demand resulting from these effects could lead to further declines in house prices and economic activity (De Backer *et al.*, 2015; Mishkin, 2009; Jorda

(1) Laeven and Valencia (2012) define a banking crisis as the occurrence of major signs of financial distress in the banking system in the shape of substantial losses, important liquidations or major bank runs, coupled with strong banking policy intervention such as extensive liquidity support from the government or central bank and major bank nationalisations by the government.

(2) By contrast, asset bubbles that do not involve a strong credit build-up, such as the share bubbles in 1987 and 2000, are far less of a threat to financial stability, as the repercussions of the bursting of such bubbles are largely confined to a fall in the wealth of households owning such assets and only to a much lesser extent affect the banks' balance sheets (Mishkin, 2009 and Tett, 2013).

et al., 2015b). Furthermore, the feedback loop between house prices, banks' balance sheets, credit growth and economic activity has become more important over the past decades, because the increasing proportion of mortgage loans in the balance sheets of the advanced countries' banks since the second half of the 20th century has made these banks more exposed to the housing market (Jorda *et al.*, 2016).

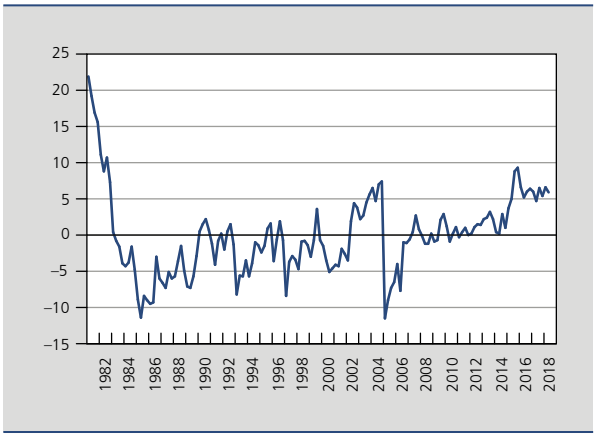
In Belgium, the financial stability risks are closely monitored not only by the National Bank of Belgium (NBB) in its capacity as macroprudential authority, but also by the European Central Bank (ECB) and the European Systemic Risk Board (ESRB). These institutions devote appropriate attention to analysing the housing market, the indebtedness and repayment capacity of households, as well as the extent to which banks are able to cushion unexpected losses on mortgage loans and on loans to construction and real estate companies – aspects of financial stability in Belgium we will briefly discuss below.[1]

4.1 The valuation of house prices in Belgium

As discussed in Section 1, house prices in Belgium have moved up sharply in the past 30 years without any major price correction, even if growth has softened in the past couple of years. However, the estimates of an econometric model that takes into account a range of demand factors – specifically households' disposable income, mortgage rates, demographic trends and the main changes in property taxation – indicate that the strong increase in house prices is largely driven by the dynamics of these demand factors (Warisse, 2017) and that house prices would be about 5.9 % higher than their estimated equilibrium level in the second quarter of 2018. This rather minor overvaluation would seem to suggest an absence of a bubble in Belgium's housing market. This does not mean, however, that there is no risk of falling property prices, more specifically if one of the house price determinants would worsen, for instance if mortgage rates would suddenly shoot up.

CHART 14 REAL ESTATE MARKET VALUATION

(deviation from the equilibrium value, in %)



Source : NBB

4.2 The indebtedness of Belgian households

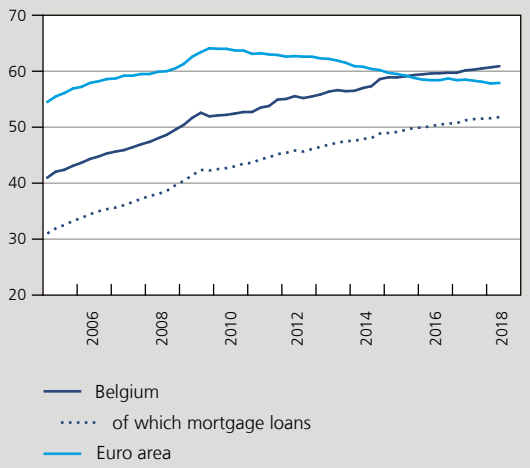
The main reason to remain vigilant to developments in the housing market in the context of macroprudential policy is related to the evolution of Belgian household debt, which mainly consists of mortgage debt. Household debt as a percentage of GDP has increased almost continuously over the past ten years, while it has been decreasing in the euro area since the 2008 financial crisis (Du Caju *et al.*, 2018). Mainly on account of mortgage loans, household debt has exceeded the euro area average since 2015 : it accounted for 60.9 % of GDP by mid-2018, compared with 57.9 % in the euro area. Although Belgian households also have very high financial wealth (see Chart 2), which they could use

(1) For a more extensive analysis of the risks of property prices to financial stability in Belgium, see NBB's Financial Stability Review (FSR, 2018).

to pay off their debts in case of an unexpected drop in income, this wealth is very unequally distributed and a large number of households have only very limited financial assets. The Belgian banks' mortgage portfolios therefore include substantial segments of loans that could result in higher than expected default numbers in the event of a sharp negative economic shock. These vulnerable segments consists of households with hefty monthly loan repayments compared with their monthly incomes and in addition few financial assets. The 2014 Household Finance and Consumption Survey, which provide an update to the 2010 survey findings discussed in Du Caju (2017), showed 14.5 % of mortgage debt to be owed by households that spend over 30 % of their income on repaying their mortgage and whose liquid financial assets cover less than six months of mortgage payments. This percentage is very similar to the 14.6 % for the euro area. Lastly, for a large proportion of these vulnerable mortgages, the value of the house is not much higher than the outstanding debt, implying that banks could incur major losses on the defaulted loans in the event of falling property prices. In particular, 10.9 % of mortgage debt is owed by households that spend over 30 % of their income on repaying their mortgage loans and whose outstanding mortgage debt is over 80 % of the value of the house.

CHART 15 HOUSEHOLDS' OUTSTANDING DEBT

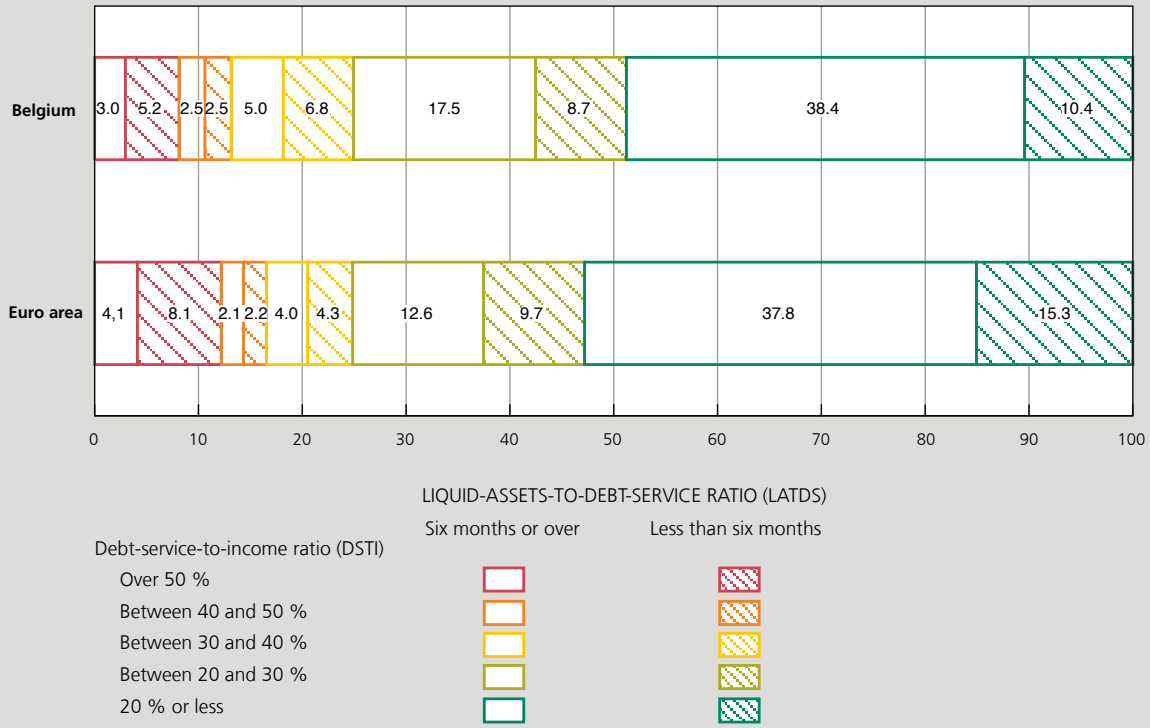
(as a % of GDP)



Sources: EC, NBB

CHART 16 BREAKDOWN OF MORTGAGE DEBT IN 2014, BY DEBT-SERVICE-TO-INCOME [1] AND LIQUID-ASSETS-TO-DEBT-SERVICE [2]

(in % of total outstanding mortgage debt for households)



Source: Eurosystem HFCS (2014).

(1) Monthly mortgage payments divided by a household's gross income.

(2) The value of a household's liquid assets (deposits, bonds, savings certificates, listed shares and mutual funds) divided by the monthly mortgage repayments.

4.3 Minimum capital requirements for mortgage loans

To cover unexpected losses, banks have to meet minimum capital requirements which depend on the amount of their risk-weighted assets. The risk weight for mortgage loans Belgian banks calculate under the internal ratings-based approach [(1)] only amounted to 10 % by the end of 2017, not including the macroprudential measures discussed below. That this is well below the average of 15 % for the European Union can be explained by the fact that credit risk in internal risk models is calibrated on historical credit loss data and that there has been no crisis in the house prices in Belgium in the past decades, as noted in Section 1. With these low risk weights possibly underestimating the systemic credit risk of mortgage loans and given the large proportion of mortgage loans in banks' balance sheets, the National Bank of Belgium has undertaken several macroprudential measures since 2013 to make banks more resilient to unexpected losses in their mortgage loan portfolios. For banks using the internal ratings-based approach, the calculated risk weight for mortgage loans was raised by five percentage points by the end of 2013. In 2018, this measure was renewed and complemented with an additional increase in the risk weight that depends on the risk of the individual bank's mortgage loan portfolio. Together, these measures are expected to result in an increase in the average risk weight of Belgian mortgage loans to 18 % (FSR, 2018).

(1) The risk weights of the assets can be calculated using a standardised approach or using an internal ratings-based approach (IRB); this latter method is used for the vast majority of Belgian mortgage loans.

4.4 Other risks to financial stability posed by Belgian property prices

Aside from the risk pertaining to mortgage loans discussed above, Belgium's property prices also pose other potential risks to financial stability. A large proportion of Belgian bank loans, totalling 11 % of GDP in 2017, has been furnished to construction and real estate companies such as property developers and construction companies, whose creditworthiness is strongly dependent on movements in property prices (FSR, 2018). More particularly, timing differences between the purchase of existing properties or building plots and the sale of the refurbished or newly constructed houses can entail a risk of major losses for project developers in the event of a strong decline in house prices, possibly entailing a risk for financial stability in as far as these activities are financed by debt. Aside from banks, also other financial institutions in Belgium are exposed to property prices. In 2017, 12 % of the assets held by Belgian insurance companies were property-related, while the country's real estate investment trusts saw their portfolios (of mostly commercial property) grow to € 13 billion (FSR, 2018).

Conclusion

This article discusses house prices developments in Belgium and their importance for economic activity, in particular private consumption, residential investment and financial stability. The Belgian results are also compared with those from several other advanced countries.

House prices have been rising steadily in Belgium over the previous decades. Prices only decreased during two periods: a first period during the first half of the 1980s and a second period, which was shorter and where the decline was limited, during the economic and financial crisis of 2008 and subsequent years. The rise in residential property prices also led to a substantial increase in households' real estate wealth, which amounted to more than € 1,400 billion in 2016. A large part of the increase in property prices during the last 45 years can be attributed to the sharp rise in land prices, especially in the Flemish Region, where the relative scarcity of building plots increased, particularly since the beginning of the 2000s. In addition to demographic pressures, which were reinforced by the gradual decline in average household size, the growth in residential property prices was also supported by various macroeconomic factors such as the pronounced fall in mortgage interest rates, which, combined with the increase in household income, all other things being equal, made houses more affordable. Moreover, taxes on real estate generally changed in such a way that they increased access to mortgage credit and housing demand.

House prices can have an impact on private consumption through several channels. First, a rise in house prices leads to an increase in the real estate wealth of property owners, who would consequently consume more. However, this positive wealth effect is partly offset by the fact that higher house prices also lead to a higher purchase price for future buyers, who thus would have to save more to be able to buy a certain dwelling, and to higher expected future rents, which can have a negative effect on the consumption of tenants. In addition, certain credit products that can be used for consumption purposes and that have the residential property as collateral can reinforce the positive effect on consumption of an increase in house prices. The results of an error correction model for consumption, which was estimated for several advanced countries, indicate that the impact of house prices on consumption is mainly large in countries where these credit products are frequently used, such as the Netherlands and the United Kingdom. For Belgium, where these credit products are barely used, the estimated effect of house prices on consumption is smaller, although it is still larger than what was found in previous studies.

House prices can also influence investment in new dwellings, which constitutes the biggest component of the residential investment. Higher house prices imply that new dwellings could be sold at a higher price, such that, assuming building costs remain unchanged, investment in new dwellings would become more profitable. Previous empirical estimates in the literature nevertheless show that, compared with the United States and the Scandinavian countries, the impact of house prices on residential investment is very small in West European countries, including Belgium. This could in part be explained by high population density and the relatively heavy regulation governing procedures to obtain a building permit in these countries. Moreover, housing demand shocks in these countries would mainly lead to adjustments in house prices and only to a lesser extent to fluctuations in economic activity.

Lastly, house prices can also have an influence on financial stability. Earlier empirical studies have in fact shown that house price bubbles, especially when combined with rapid credit growth, increase the risk of a banking crisis and in addition can lead to much deeper and more protracted recessions. According to the current estimates of the NBB's valuation model, house prices in Belgium are only slightly overvalued, which seems to indicate that there is no bubble in the housing market. The main reason for remaining vigilant to developments in the housing market in the context of macroprudential policy is related to the evolution of Belgian household debt, which mainly consists of mortgage debt. This has increased almost continuously over the last ten years, while it has been decreasing in the euro area as a whole. In addition, the mortgage loans contain vulnerable segments – where households have borrowed a relatively large amount in relation to their income and liquid assets – which could result in a higher-than-expected number of defaults in the event of a large negative economic shock. Since the value of the house for a large part of these mortgages is not much higher than the outstanding debt, banks could in that case suffer large losses, especially if there were also a sharp fall in house prices. In this context and in view of the large share of mortgage loans in the balance sheet of Belgian banks, the National Bank of Belgium has taken macroprudential policy measures since 2013 to make banks more resilient to unexpected losses on their mortgage portfolios.

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