Shedding new light on the mortgage debt of households in Belgium

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Introduction

Belgian household debt has risen almost continuously since the early 2000s. Although that trend is not specific to Belgium, it contrasts with developments in most euro area countries, where individuals in general have reduced their debt level since the 2008 financial and economic crisis. The increased debt in Belgium is due mainly to the growth of mortgage loans, while house prices have also been rising.

Past experience – be it in Europe, the United States, or other countries – has shown the risks that rising property prices combined with credit expansion could present for financial stability. In particular, those risks may materialise if the economy suffers a negative shock to employment and incomes, or following a sudden interest rate hike which reduces some households' ability to service their debts, ultimately leading to default. In such circumstances, the losses that credit institutions incur could be further exacerbated by the decline in the value of the property used as collateral.

These potential risks are the reason why household debt is an important point for the attention of the prudential authorities, which are responsible for ensuring that the banks have sufficiently substantial capital buffers to absorb any losses. In 2013, in view of the strong growth of mortgage lending, the National Bank of Belgium ("the Bank") therefore decided to impose on credit institutions a five percentage point increase in the risk weightings calculated on the basis of internal models used for the purpose of determining their capital requirements. In 2018 that measure was supplemented by a new component which takes account of the risk profile of the whole mortgage loan portfolio of each bank. Those provisions are a response to the continuing rise in house prices and lending in recent years, in a context which also features fierce competition within the banking sector.

Against that backdrop, this article aims to shed new light on the origins of these macroeconomic developments. In particular, it seeks to clarify the links between Belgian households' borrowings, their income, and property prices while also taking account of the influence of demographic factors. For that purpose it is based largely on data per municipality. At present, they are the most detailed data that can be used for a quantitative analysis of those links, in the absence of exhaustive individual data. Nonetheless, they permit account to be taken of a degree of heterogeneity within the Belgian population, particularly in terms of income, which is not apparent in the main macroeconomic aggregates. Furthermore, the data have a geographical dimension which is highly relevant for the analysis of the links between lending and

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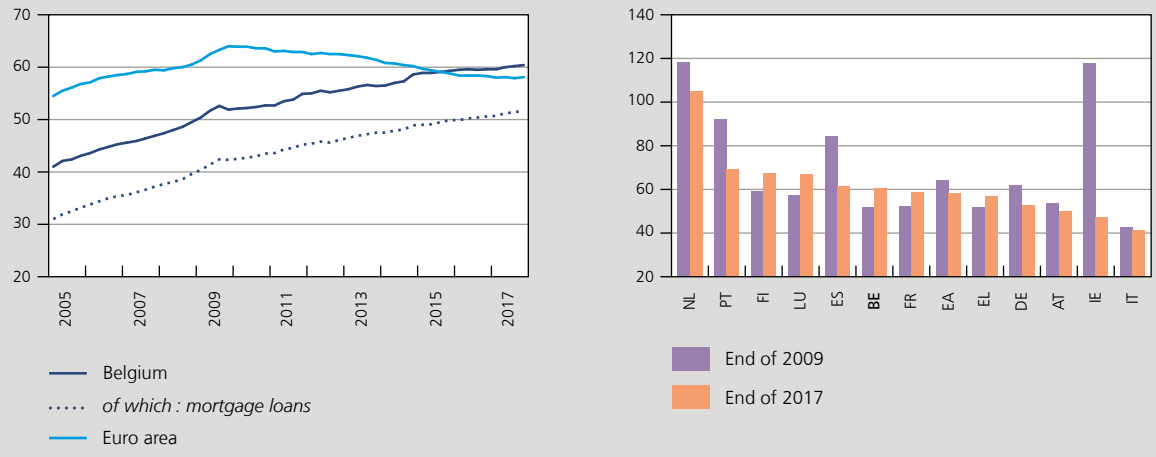
property market developments. They thus constitute a useful addition to the existing macroeconomic statistics and the non-exhaustive individual survey data.

The first section of this article presents the recent developments in household debt in Belgium and in the euro area. The second section analyses the macroeconomic determinants which may have influenced the growth of mortgage debt. The third section constitutes the main part of the article, with an econometric analysis which tries to identify, at municipality level, the fundamental factors behind the increased debt. It examines the influence of the age, income and wealth of individuals and the effect of property price movements. It also addresses some regional aspects. The fourth section brings together the main findings in order to examine them in the light of a selection of other euro area countries and identify points specific to Belgium. Finally, the conclusion highlights the main results of this study.

1. Recent trends in household debt in Belgium and in the euro area

In the past ten years, household debt in Belgium has risen almost continuously as a ratio of GDP, whereas in the euro area as a whole it has declined since the 2008 financial crisis. Since 2015 the debt of Belgian households has exceeded the figure for the euro area, mainly on account of mortgage loans. At the end of 2017 it stood at 60.4 % of GDP, compared to 58.1 % in the euro area.

CHART 1 OUTSTANDING AMOUNT OF HOUSEHOLD DEBT IN BELGIUM AND IN THE EURO AREA
(in % of GDP)



Sources : EC, NBB.

The situation seems somewhat mixed in the euro area, and Belgium is not the only country where household debt has risen. That was also the case in France, Finland and Luxembourg. However, most Member States began a process of debt reduction : at the end of 2017, the debt of individuals was lower than in 2009.

That adjustment was very substantial in Spain, Ireland and Portugal. In the first two countries it was accompanied by the bursting of property bubbles. In the years preceding the crisis, property price rises and household debt levels reinforced one another in those countries : first, because higher property prices generally drive households to borrow larger sums to finance the purchase of a home, and then because a rise in the market value of mortgaged property may also make the banks prepared to lend a higher amount. Finally, demand for new homes provided considerable support for activity in the construction industry and in associated sectors. That resulted in strong employment and income growth which in turn favoured the property bubble via escalating demand for housing and credit. However, in other countries where

the property market did not collapse, household debt ratios have also fallen since 2009. That applies to Germany and Austria, for instance.

Despite the reduction in debt levels there are still sometimes substantial differences between Member States, for a variety of reasons. For example, differences may be due to credit legislation which is more flexible in some countries than in others, or to supply factors such as competition within each country's banking sector. Differences may also be attributable to the availability of more flexible lending arrangements giving easier access to finance in some countries.

The situation in the Netherlands is worth mentioning in that regard. A large proportion of household credit there consists of bullet loans, a formula whereby the principal is repaid at maturity, in contrast to repayment loans in which part of the borrowed capital is paid back in each monthly instalment. In the case of bullet loans, the whole amount borrowed appears on the household's balance sheet throughout the term of the loan, which explains the high level of outstanding mortgage loans for Dutch households.

The tax applicable to real estate and mortgage loans may also account for variations in debt levels. For instance, some countries (including Belgium) have introduced a tax on imputed rents, while many countries allow a tax deduction for the interest paid on a mortgage loan (Wolswijk, 2005). There are other institutional or even cultural factors, too. In Italy, for example, the rate of home ownership is relatively high but that is not reflected in the outstanding debt of households, perhaps because greater use is made of alternative funding sources, such as loans between individuals, transfers between family members, or inheritance (Gomez-Salvador *et al.*, 2011). Finally, demographics, and particularly the structure of the age pyramid, may also explain part of the variations in debt levels between countries. All other things being equal, a larger percentage of young people in the population should be reflected in a higher debt burden, as young people are more likely to contract a bank loan in order to finance the purchase of a home.

2. The macroeconomic context

From a macroeconomic standpoint, mortgage lending is influenced by a range of determinants, including the credit institutions' lending policy which is itself dictated to some degree by the policy of the regulators, the Eurosystem's monetary policy and the tax measures of the federal and regional governments in Belgium. All these factors discussed in detail below play a part in determining the supply of credit.

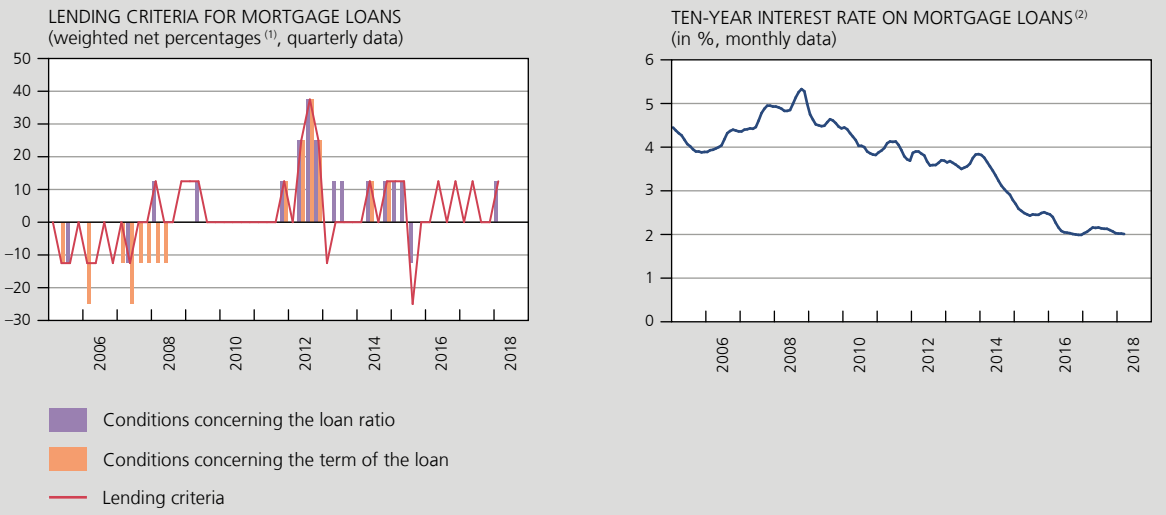
Bank lending criteria and prudential policy

Household demand is certainly a factor in the volume of mortgage loans in an economy, but the credit institutions' own policy on lending also plays a role. During the years covered by this study, credit institutions have made adjustments, notably in response to the Bank's prudential measures. In general, mortgage loans are an important market for Belgian banks, both because they enable the banks to secure their customers for long periods, and because this is a fairly low-risk market in view of the guarantee provided by the mortgage. That also accounts for the fierce competition in this segment.

In the years preceding the 2008 financial crisis, the banks repeatedly relaxed their home loan credit criteria, as is evident from the responses to the bank lending survey (BLS). Conditions relating to the term of the loan and those concerning the loan-to-value ratio were both weakened. That credit policy was revised during the quarters that followed the outbreak of the crisis, as the banks were obliged to clean up their balance sheet. The tightening occurred in 2009, but also in 2012 during the sovereign debt crisis, leading to a decline in the volume of lending in those two years in particular (see below).

In connection with its macroprudential mandate, the Bank has also taken steps to limit any future risks. Thus, at the end of 2013 the risk weightings applicable to mortgage loans were raised by 5 percentage points for banks adopting an internal ratings-based approach (IRB). In addition, in 2015, in response to the steep rise in the household debt level, the Bank called on credit institutions to exercise due caution in setting their mortgage loan conditions. Finally, in 2018 the 2013 measure was extended and supplemented with a new component the size of which depends on the risk of each bank's entire mortgage loan portfolio. Those announcements may have played a role in the successive moves to tighten lending criteria from 2013 onwards.

CHART 2 FINANCING CONDITIONS FOR MORTGAGE LOANS IN BELGIUM



Source: NBB.
(1) A positive (negative) percentage indicates a tightening (easing) of lending conditions.
(2) Interest rate on new contracts in which the rate is fixed for longer than 10 years.

Eurosystem monetary policy

Another dimension of the credit supply is reflected in the interest rate on loans. That rate is influenced by the monetary policy applied in the euro area, which has been accommodative in recent years. Thus, retail interest rates, including the rates charged on mortgage loans, have declined since 2008 in line with the reference rates set by the ECB: in Belgium, the (average) interest rate on mortgage loans with a term of ten years or longer had climbed to 5.3 % in 2008, but was down to just 2.0 % at the end of 2017.

This sharp fall in interest rates on mortgage loans led to many loans being renegotiated, especially in 2014 and 2015 when interest rates were slashed.

Tax measures

The introduction or abolition of tax measures by the various governments at federal or regional level may affect the production of mortgage loans in any particular year, as households can bring forward or postpone their borrowing in order to take advantage of a particular tax measure.

During the period considered, various measures were introduced and/or abolished. First, in 2010, two measures introduced at federal level may have played a more specific role in boosting the volume of mortgage lending. Those measures were the reduction in the VAT rate to 6 % for new builds, home renovation and the purchase of social housing (in force from 1 January 2009 to 31 December 2010) and the abolition on 1 January 2011 of registration fees applied to the value of the land included in the price of a new property, those fees being replaced by VAT. Among other things, the latter measure drove up the tax expense involved in the purchase of a new home, so that some contracts were concluded more speedily in the second half of 2010.

Furthermore, in 2011 the abolition of the tax advantage for "green loans" – another federal measure – for financing energy-saving projects (in force from 1 January 2009 to 31 December 2011) generated a rise in the amounts granted in the form of mortgage loans to fund renovation. There was a corresponding decline in new mortgage business in 2012 because that tax incentive had disappeared.

In 2013, the reticence on the property market, and consequently the reluctance in the conclusion of new home loans, was due partly to the uncertainty over continuation of the tax deductibility of interest on mortgage loans for a person's sole own home (also known as the "housing bonus") following the transfer of the powers in that respect to the Regions from mid-2014. Conversely, the announcement of changes to the rules under the reform of the tax treatment of mortgage loans from 2015 prompted some households in Flanders to bring their transactions forward to 2014, so as to retain the benefit of a more favourable tax advantage.

3. Beyond the macroeconomic determinants: the influence of income and property prices

The trend in mortgage loans granted to Belgian households can be explained by distinguishing between three factors. The first concerns the macrofinancial framework described in the previous section, which may influence both the supply of mortgage loans and the demand from borrowers. The second factor concerns individuals' income, which largely determine their borrowing capacity, in other words the amount that the banks are willing to lend them when they apply for a loan. Finally, the third factor concerns the effect of property price levels, which influence the funding needs of households wishing to purchase a home. If property prices rise, that implies a bigger loan if there is no change in income, assuming that the maximum sum authorised by the bank has not been reached.

3.1 Identification of the fundamentals via an econometric analysis

In order to identify how the macroeconomic framework, household incomes and property prices respectively influence borrowing, we used econometric estimates. Ideally, these models should be estimated using a data bank with individual data for all Belgian households, so that the amount of each mortgage loan granted can be linked to the borrower's income and wealth, and to the value of the property being purchased. However, such a data bank does not currently exist.

Nevertheless, in the absence of such a data bank, an analysis can be conducted on the basis of the statistics available at the NBB's Central Credit Register. Those statistics permit a dual breakdown, by municipality and by age group[(1)], of new mortgage loan contracts concluded in Belgium each year, and a breakdown by the amounts concerned, from 2006 onwards[(2)]. These data can be compared to the ones on net taxable income, which are likewise broken down by municipality and age group, and made available by Statbel. The period covered by the income data ends in 2015. With these two data sources combined, it is possible not only to assess the influence of households' income on the mortgage loans granted to them, but also to analyse the geographical distribution across Belgium's 589 municipalities. This geographical dimension enables us to examine the link between the amounts of the mortgage loans granted and the prices charged on the property market, since these data are also available at municipal level from the same institution.

To use the information contained in these statistics we apply an econometric method designed for analysing longitudinal data. The advantage of that approach is that we can distinguish between the influence of income and property prices on mortgage lending, and the impact of the factors discussed in the preceding paragraph concerning the macrofinancial framework. This method also enables us to take account of the effects specific to each municipality which cannot be observed via the variables included in the model. For instance, those effects may be due to differences in the age structure of the population[(3)].

The first estimated model can be represented by the following equation:

$$Credits_{i,t} = \alpha + \beta_r Income_{i,t} + \beta_p Price_{i,t} + \gamma_i + \delta_t + \varepsilon_{i,t}$$

(1) In the case of loans concluded by two or more persons, the breakdown by age and municipality is based on the data relating to the first person named in the contract.

(2) These data also include changes to existing contracts. Those changes do not appear in the transaction statistics obtained from the financial accounts. Those statistics relate to net credit flows, i.e. the amounts of new loans minus the amounts of expired loans. Consequently, the credit data used in this section of the article are not entirely comparable with the statistics published elsewhere.

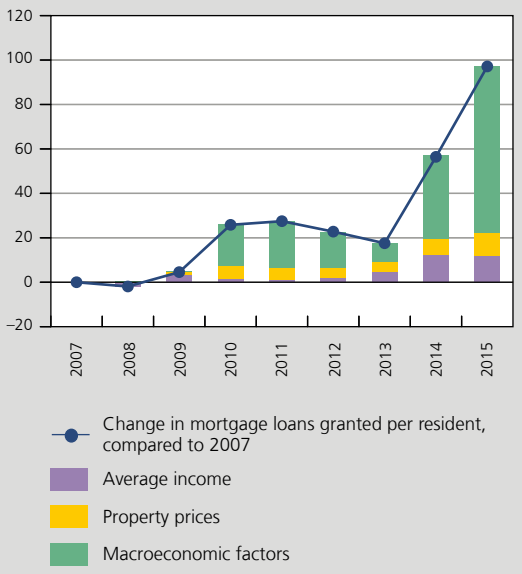
(3) Such effects may be due, for example, to the presence of a care home in a municipality which otherwise has few residents.

In this equation the dependent variable, $Credits_{i,t}$, is the amount of the loans granted in municipality i during year t, in relation to the number of residents. The model's main explanatory variables, namely $Income_{i,t}$ and $Price_{i,t}$, are defined respectively as the real average net taxable income per resident (aged 18 or over) and the real average price of housing purchased on the secondary market[1]. It should be noted that the prices themselves may also be influenced by the loans granted, since more favourable borrowing terms for households may lead to stronger demand for housing and thus exert upward pressure on house prices. From an econometric point of view, the endogenous nature of that variable may result in distortion, which was taken into account in our estimates. Those estimates are based on the two-stage least squares method, which helps to avoid any endogeneity problems[2]. The parameter γ_i represents the effects specific to each municipality, while the parameter δ_t aims to capture the effects specific to each year. It is the latter parameter that enables us to estimate the influence of changes in the macrofinancial environment on lending. However, it should be noted that this approach cannot distinguish the respective influences of each of the factors concerned. Nonetheless, it offers a way of assessing the impact of particular measures or macroeconomic shocks on lending, according to the timing of those events.

The regression results are summarised in chart 3, in the form of estimated contributions to the trend in mortgage lending. The impact of macroeconomic factors on total mortgage lending is clearly apparent from 2010, when the interest rates applied by the banks fell sharply and the abolition of certain tax concessions was announced, prompting individuals to take out more mortgage loans in 2010 and 2011 (see section 3.2). The disappearance of those same tax incentives and the tightening of credit conditions were reflected, as one would expect, in a smaller contribution of the macroeconomic environment to credit trends in the two ensuing years. In 2014, and to an even greater extent

CHART 3 CONTRIBUTIONS OF THE MAIN EXPLANATORY VARIABLES TO THE TREND IN MORTGAGE LENDING

(estimates based on an econometric model[1], percentage changes compared to 2007)



Source: NBB.

(1) Apart from the variables shown in the chart, the model includes fixed effects per municipality.

(1) That price is calculated for each municipality and for each year as the weighted average of the average prices of apartments, houses and villas. The weightings are determined on the basis of the number of transactions. As in the case of taxable income, the nominal property prices are divided by the consumer price index to obtain series expressed in real terms.

(2) This method requires the selection of a number of instrumental variables which may have no correlation with the error term of the equation to be estimated, but must provide an explanation of property prices. The instrumental variables selected for that purpose are presented in table 2 (see below).

in 2015, a dominant factor in that trend was the renegotiation of current loans at a time when the decline in interest rates was at its steepest.

The estimates in chart 3 show not only the significant role of macroeconomic factors but also the influence of household income and house prices on the lending figures during the period examined. As a result of the crisis years, the incomes of Belgian households did not make any substantial contribution to the growth of lending between 2007 and 2013. It was not until 2014 and 2015 that they resumed their upward influence on credit expansion, as a result of the recovery. House prices, which have risen slowly but steadily since 2010, also influenced the volume of loans granted in 2010 to 2015. The links between these two determinants and the pattern of lending are examined in more detail in the next two sections.

3.2 Links with household income and wealth

3.2.1 At household level

The link between the movement in income and mortgage lending can be related to the structural behaviour of households on the property and mortgage market. That behaviour is heavily dependent on household income and age, as explained by the life cycle theory originally formulated in the 1950s by Franco Modigliani[1] and subsequently refined further.

This theory is based on the assumption that households try to maintain a stable level of consumption throughout their life (consumption smoothing). In so doing, they tend not to adjust their expenditure according to their current income but rather according to an estimate of their longer-term income ("permanent income"). They borrow or save to offset fluctuations and trends in their income. Consequently, households' borrowing and saving behaviour is linked to their age and income. Young households with good income prospects can contract loans and acquire property. If their income is sufficient, in middle age and later, households can typically save more and build up wealth either in the form of financial assets or in additional property. After retirement age, that wealth can then be used to offset a decline in income and thus maintain their level of consumption. Information from the Household Finance and Consumption Survey (HFCS)[2] can be used to provide an empirical illustration of the life cycle theory.

Households can take out a mortgage loan to purchase a home of their own, as their primary residence, or to invest in another property (e.g. as a second home, a property to let out, or a property for business purposes). Using the HFCS data it is possible to distinguish between the various forms of property ownership and the associated mortgage loans.

According to data from the HFCS for 2014, 32 % of all Belgian households had an outstanding current mortgage loan for their own home in that year, i.e. 45 % of home-owning households. Altogether, 70 % of Belgian households are owner-occupiers. It is mainly young households (under the age of 35) and middle-aged households (in the 35-44 and 45-54 age groups) that have an outstanding mortgage loan on their own home. Thus, over half of households in which the reference person was under the age of 55 had a current mortgage loan. In the older age groups (55-64 and 65 or older), the figure was less than a third. That finding tallies with the life cycle theory.

However, the link between mortgage loan market participation and age varies according to the level of household income. That life cycle pattern is more pronounced for higher-income households. Thus, more than six in ten young or middle-aged households in the top two income quintiles have a current mortgage loan. Furthermore, almost nine out of ten such households own their primary residence. The life cycle theory therefore seems to be borne out more clearly in the case of households with higher incomes and more favourable income prospects. Compared to lower-income households, they have a better chance of securing a loan at a younger age and being able to pay it off. The link between home ownership and age is therefore relatively flat for the top two income quintiles.

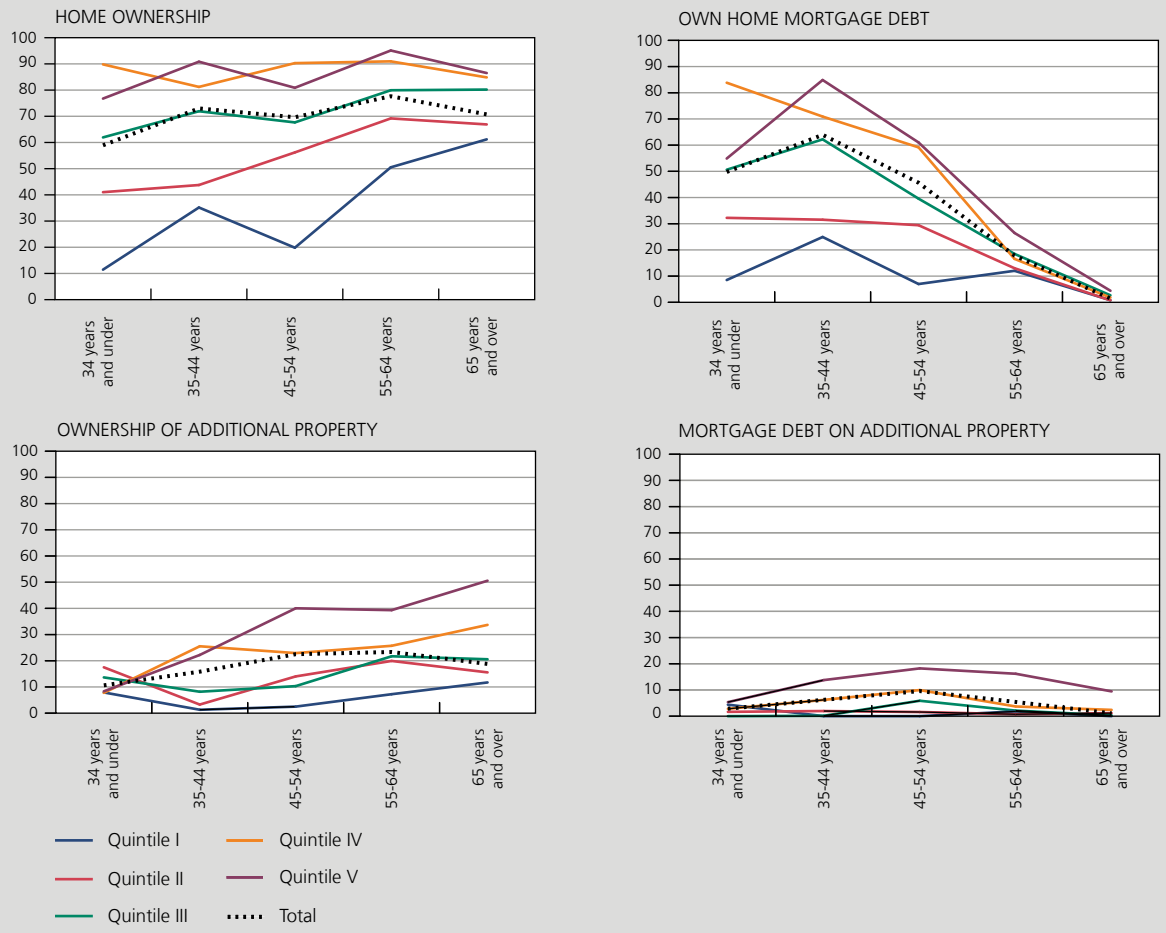
(1) Franco Modigliani together with his student Richard Brumberg laid the foundations of the life cycle theory (see Modigliani and Brumberg, 1954). After Brumberg's untimely death, Modigliani developed his theory in more detail with Alberto Ando (see Ando and Modigliani, 1963).

(2) We do not have longitudinal data at household level which would enable us to test the life cycle theory for Belgium. The Household Finance and Consumption Survey (HFCS) provides transverse data on incomes and wealth permitting a range of relevant findings. The latest results of that household survey relate to 2014. In that regard, it is always necessary to bear in mind that variations between age groups observed at a given moment could always be due to cohort effects (certain generations having different financial capacity and/or habits) and may therefore not be due solely to life cycle effects. For a more detailed account of the content of the HFCS and its organisation in Belgium, see Du Caju (2013).

Lower-income households are less inclined to take out a loan to buy a house. They are subject to credit constraints and it is therefore relatively unusual for them to become home owners at a young age. Their chances of acquiring a home increase with age, but are still significantly less than for higher income households. For households in the bottom two income quintiles, the link between credit market participation and age is therefore relatively flatter and the link between home ownership and age is more pronounced.

CHART 4 PROPERTY OWNERSHIP AND MORTGAGE DEBT BY AGE GROUP AND INCOME QUINTILE

(participation rates in % of households)



Source: HFCS 2014.

Still according to the 2014 HFCS data, 18 % of Belgian households owned a property in addition to their own home. That figure was higher than in 2010, when it stood at 16 % [1]. The level of investment by Belgian households in property other than their own home therefore seems to have increased. This type of property ownership also becomes more common with age, and in this case the age profile is more marked for higher-income households. It is mainly households in the top income quintile (three in ten) and to a lesser degree in the next quintile (two in ten) that can afford to buy such property, particularly in middle age or in their later years. Households in the other income quintiles have less chance of owning additional property, and that likelihood barely increases with age.

(1) See Du Caju (2016) for a more detailed analysis of the 2014 results in Belgium, and for a comparison with the 2010 figures.

The purchase of a property other than their own home therefore seems to be an investment which broad sections of the population cannot readily afford, which explains why only 25 % of Belgian households owning such property have concluded a mortgage loan to finance it, compared to 45 % of households in the case of their own home.

The 2014 HFCS reveals that around 5 % of households have an outstanding mortgage loan for the purchase of another property in addition to their own home. In most of those households, the reference person is between 45 and 64 years old. Those households have usually been able to build up financial wealth enabling them to finance all or part of the additional property. For such households, there may be a tax advantage in contracting a home loan to purchase an investment property, because the borrowing costs can be deducted from the income from the property.

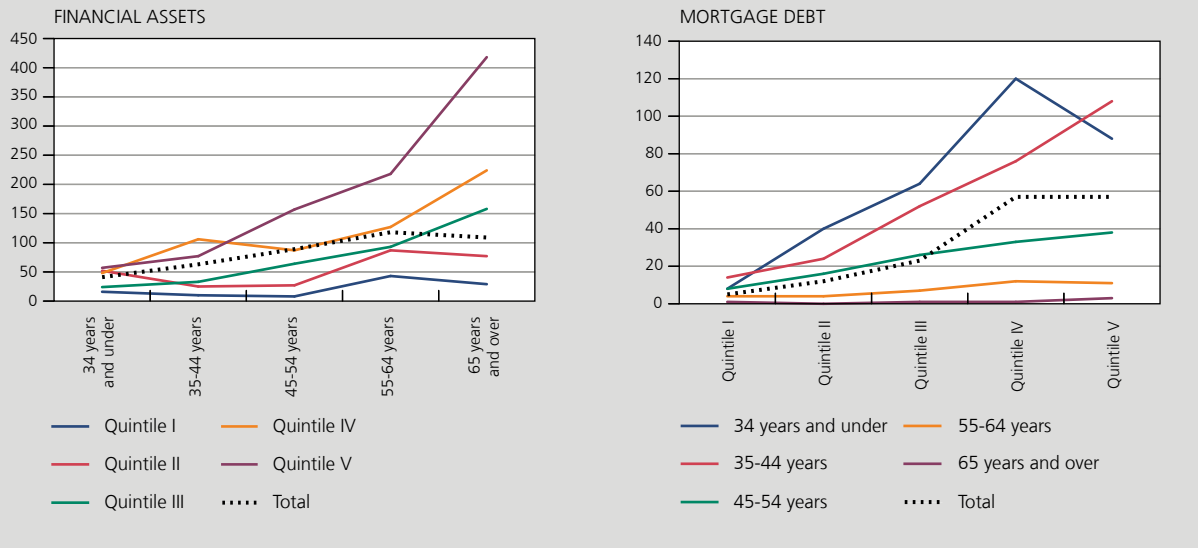
The HFCS results for Belgium in 2014 do indeed show that the average financial wealth of households increases with age, broadly speaking up to retirement age, and subsequently diminishes somewhat, in line with the life cycle theory. However, there are wide variations according to income level : it is households in the bottom two income quintiles that have to tap into their savings as they grow older, so that their wealth declines, while households in the higher quintiles see their wealth increase for longer. They often continue working for longer, they have more additional income derived from their assets, and that income is generally more substantial (rental income, returns on investments). Moreover, they reinvest that additional income, and that gives them better protection against unexpected expenditure or enables them to build up an inheritance. The age profile of financial wealth therefore rises much more steeply (and for longer) in the case of higher income households.

In general, the results of the survey conducted in Belgium in 2014 therefore do not appear to refute the life cycle theory. The rates of participation in the mortgage loan market and the property market display age profiles in line with those postulated by the theory. What is more, relevant differences are apparent as regards household income levels and property types.

Finally, if we examine the total outstanding mortgage debt of households broken down by age and income we find that, on average, households in the higher income quintiles have larger outstanding mortgage debts.

CHART 5 OUTSTANDING MORTGAGE DEBT[1] AND FINANCIAL ASSETS BY AGE GROUP AND INCOME QUINTILE

(average amounts for all households, in € thousand)



Source : HFCS 2014.

(1) Contracted for own home purchase.

Of course, that is because more of them own their home (and their houses are more expensive), but it is also due to their greater borrowing capacity and to the banks' policy on assessing loan applications. This last factor indicates a generally sound approach to lending by the banks, though it must be said that loans with a higher risk of default are also granted. Consequently, there are pockets of risk in certain segments of the Belgian mortgage market, where it is particularly single-parent households and young households on lower incomes that incur higher risks [1]. Research has also shown that the Belgian mortgage market could be susceptible to unemployment shocks and the potentially associated loss of income for households [2].

The link between debt and income appears to be much stronger for younger households (44 years or under). Younger households can only purchase a property and take out a loan for that purpose if their income and income prospects are sufficiently favourable. Moreover, they can borrow larger sums and buy more expensive properties the higher their income. The link is much weaker or even non-existent for older households. They are less likely to have a current loan to repay, and furthermore, they have often built up financial wealth (especially in the case of the highest income quintiles).

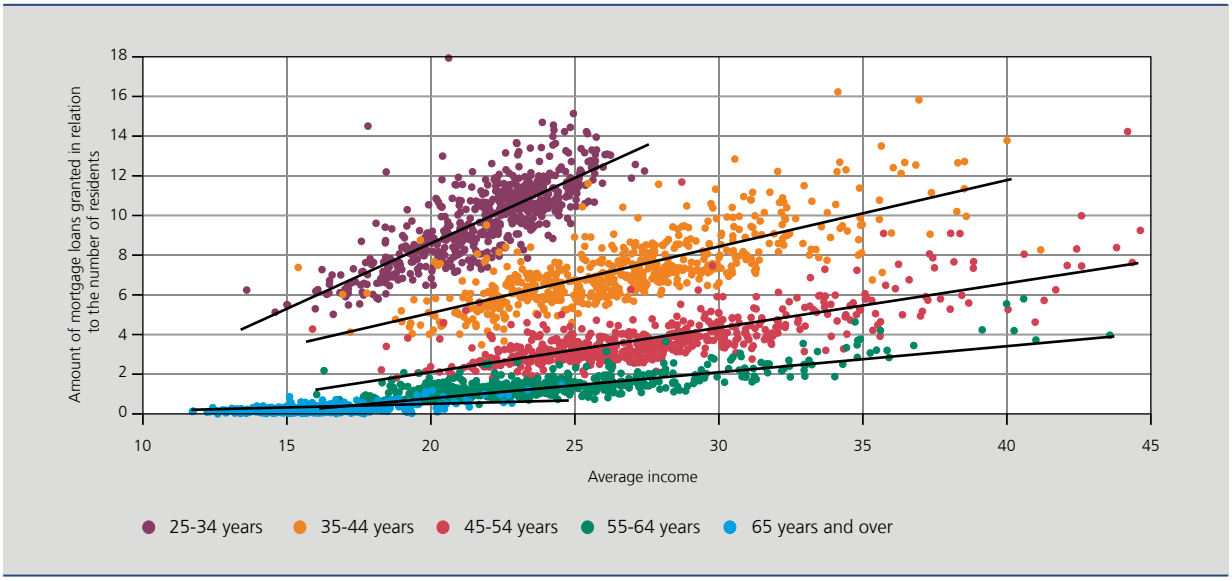
3.2.2 At municipality level

The income profile of Belgian households and their saving and investment behaviour, which change with age in line with the life cycle theory, are also reflected in the geographical distribution of their debts. According to the Central Credit Register data, around two-thirds of the mortgage loans contracted each year are granted to persons in the 25-44 age group. That is evident in chart 6, where each point represents, for a particular municipality and age group, the link between loans granted (in relation to the population) and average per capita income. It is very clear that, in relation to other age groups at the same income level, the amounts borrowed are substantially higher for the population aged between 25 and 34 years, and to a lesser extent for the 35-44 age group.

The link between loans obtained and household income highlighted above on the basis of the HFCS data is also evident in the data per municipality. In fact, whichever age group is considered, municipalities with a high per capita income

CHART 6 LINK BETWEEN THE AMOUNTS OF MORTGAGE LOANS GRANTED IN EACH MUNICIPALITY AND AVERAGE INCOMES, BY AGE GROUP

(averages over the period 2006-2015, data in € thousand)



Sources: Statbel, NBB.

(1) See Du Caju (2017) for a more detailed analysis of these pockets of risk on the Belgian mortgage market.
(2) See Du Caju *et al.* (2016).

TABLE 1 DETERMINANTS OF THE AMOUNT OF MORTGAGE LOANS PER RESIDENT IN THE BELGIAN MUNICIPALITIES

(coefficients estimated via a linear regression per age group[1] on the basis of data per municipality for the period 2006-2015)

	Age group				
	25-34 years	35-44 years	45-54 years	55-64 years	65 years and over
Average income	1,729***	1,319***	0,906***	0,048	0,348
Property prices	3,296***	3,154***	2,872***	1,650***	0,028
R^2	0,766	0,828	0,746	0,553	0,361
Number of observations	5 048	5 048	5 048	5 029	4 457

Source: NBB.

(1) Apart from the variables shown in the table, the model includes fixed effects per year and per municipality. The coefficients marked with three asterisks (***) are significant at the 1 % level.

have a higher concentration of loans than those where the average income is lower: that also shows that borrowers' incomes are a significant factor in credit institutions' lending policy. However, the link is much more marked for persons in the 25-34 age group than for those in the older age groups.

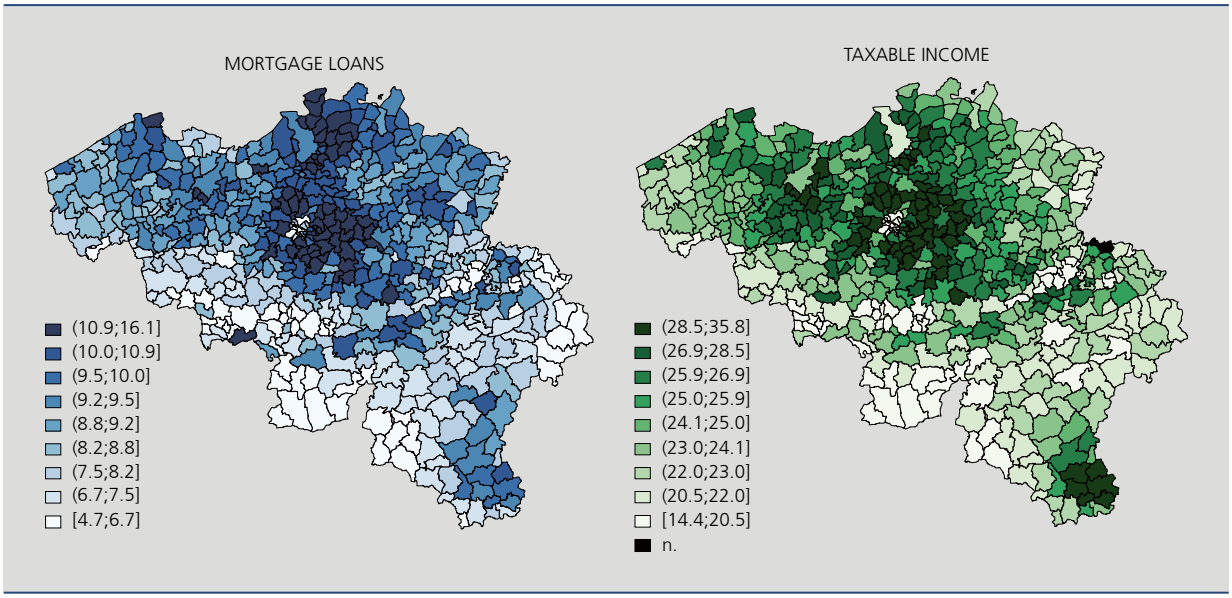
This declining link between the income elasticity of loans according to age can be confirmed by estimating econometric models similar to the model described in section 3.1, this time for each age group. Those models can be formulated as follows:

$$Credits_{i,\,t,\,a} = \alpha_a + \beta_{a,\,r}\, Income_{i,\,t,\,a} + \beta_{a,\,p}\, Price_{i,\,t} + \gamma_i + \delta_t + \varepsilon_{i,\,t,\,a}$$

where α symbolises the age group in question. The estimates of these models also include fixed effects per municipality and per year. They are shown in simplified form in table 1.

CHART 7 MORTGAGE LOANS GRANTED TO PERSONS IN THE 25-44 AGE GROUP AND AVERAGE INCOME, BY MUNICIPALITY

(in € thousand per resident aged between 25 and 44 years, averages over the period 2006-2015)



Sources: Statbel, NBB.

According to these estimates, all other things being equal, the income elasticity of loans is 1.73 for the 25-34 age group, 1.32 for the 35-44 age group and 0.91 for the 45-54 age group, and is not significant for the older age groups. Furthermore, an additional statistical test shows that the estimated elasticity for the 45-54 age group is significantly lower than for the 25-34 age group. Loan elasticity in relation to property prices also tends to diminish with age.

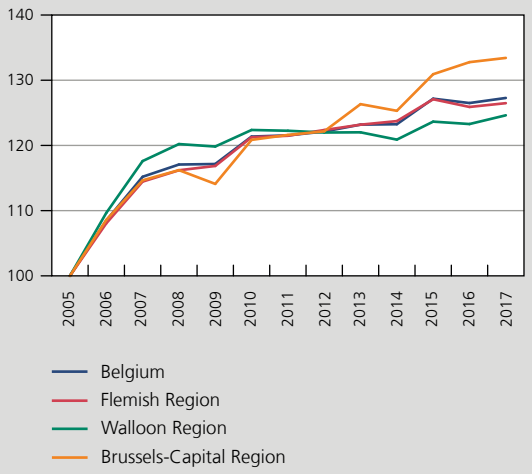
In general, the income level of a municipality's residents thus largely determines the amount of the loans granted to them. That can also be illustrated on the basis of geographical maps, by comparing the distribution of the amounts borrowed per resident aged between 25 and 44 years and the average income distribution between the Belgian municipalities. In chart 7 the similarity between the distributions of these two variables is unmistakable. Thus, the residents of the wealthiest municipalities in the country, most of which are located in the provinces of Flemish Brabant, Walloon Brabant and Antwerp, are also the ones borrowing the largest amounts.

The dichotomy evident in the Brussels-Capital Region is interesting : in the wealthiest municipalities, located in the south and south-east of the city, the amounts loaned are also the highest, in stark contrast with the municipalities in the north-east, where average incomes are generally lower than in neighbouring districts.

3.3 Links with property market developments

According to the estimates presented above, the movement in property prices also had a major influence on the growth of lending during the period considered. That contribution is linked to the rise in those prices in the past ten years, shown in chart 8 in relation to their 2005 level for Belgium as a whole and for the three regions.

CHART 8 REAL HOUSE PRICES[1] BY REGION
(indices, 2005 = 100)



Source : NBB.
(1) Nominal prices deflated by the consumer price index.

However, this link between property prices and lending to households is not always clear-cut, particularly in Brussels. The rise in the prices of houses traded on the secondary market there was steeper than in the other two regions, particularly from 2010 onwards. In real terms, after adjustment to take account of the general rise in consumer prices, house prices in Brussels increased by 10.4 % between 2010 and 2017, compared to 4.9 % for Belgium as a whole. As shown in chart 7, if we exclude the five municipalities in the south and south-east, where incomes are high, the amounts of home loans granted in the Brussels-Capital Region were relatively small compared to the other two regions of the country.

To understand the reasons for this apparent paradox, it is first necessary to identify the factors which may determine property prices in a given geographical area. That is a rather difficult exercise, given the volatility of the data relating to house prices[1]; our approach was based on a brief econometric analysis, the results of which are set out in table 2. The estimate of the market value of housing in a given municipality is closely correlated with the incomes and financial wealth of its residents. In the regressions, this last factor is addressed by the proportion of persons aged 65 years and over in the total population, in the knowledge that a large part of the financial wealth and property of Belgian households is owned by that age group (see subsection 3.2.1). In particular, the relatively rapid rise in household incomes between 2005 and 2009 certainly bolstered demand for housing during that period, and hence also the general rise in prices, while the decline in real incomes during the ensuing years can account for part of the slower pace of price rises after 2009 (Warisse, 2017). The price increase in 2015 can also be linked to the rise in incomes.

Some characteristics specific to the municipalities, such as the standard of living, may also influence the prices charged on the property market. That applies, for example, to municipalities where a fairly large part of the area is devoted to recreational facilities or other types of open space such as parks or woodlands.

TABEL 2 FACTORS INFLUENCING THE PRICES OF PROPERTIES TRADED ON THE SECONDARY MARKET

(coefficients estimated by means of linear regressions[1])

	Dependent variable: Average price per municipality[2]
Average income[2]	0.286
Share of persons aged 65 years and over in the total population	1.056
Population density (in relation to the land area in residential use)[2]	0.096
Proportion of land used for recreational purposes and other open spaces in the total area[2]	0.040
R^2	0.135
Number of observations	5 035

Source: NBB.

(1) The estimates were made for the period from 2005 to 2015. Apart from the variables shown in this table, they include a binary variable for each year and random effects. All the reported coefficients are significant at the 1 % level.

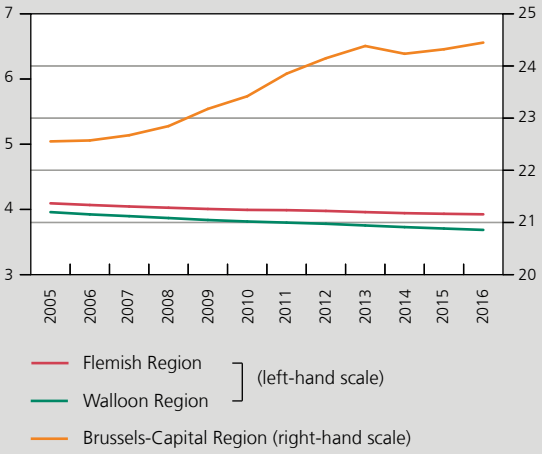
(2) Variable expressed as a logarithm.

Apart from individuals' financing and borrowing capacity, other factors which may also influence property prices relate to the supply, such as the availability of housing or building plots. This supply rigidity is the main reason why house prices are generally higher in densely populated urban areas, and the Brussels-Capital Region is no exception. As there has been no significant increase in the area of land for residential use in Brussels, the population growth there over the past ten years is probably behind the above-average rise in house prices. As chart 9 shows, the population density in Brussels increased from 22 600 persons per km² of residential area in 2005 to 24 400 in 2016, which is equivalent to a rise of almost 8 % over eleven years. In contrast, during that same period the population density declined slightly in the other two regions, owing to the increase in the residential area available for house building, which was greater in Wallonia than in Flanders.

(1) In this connection it should be borne in mind that these data only concern properties traded on the secondary market and take no account of new builds. They therefore concern only a limited proportion of the housing stock in a given municipality.

CHART 9 NUMBER OF RESIDENTS IN RELATION TO THE AREA OF RESIDENTIAL LAND

(thousands of persons per km²)



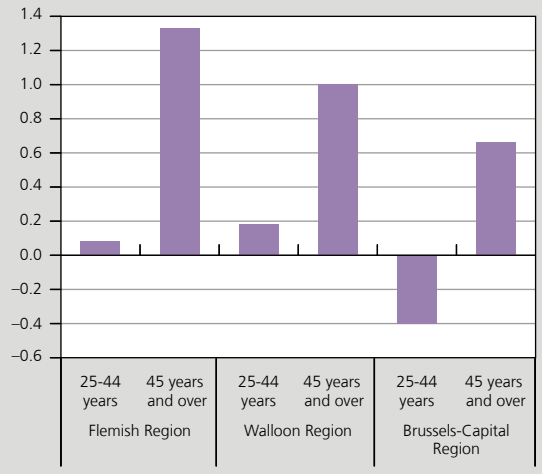
Source: Statbel.

The fact that the steeper rise in house prices in Brussels was not reflected in the volume of mortgage loans granted is due largely to demographics and to the predominance of rental properties on the capital's housing market.

A considerable proportion of the population taking up residence in Brussels over the past ten years in fact comprises young, single adults, particularly students, or persons in the 18-30 age group[1] whose incomes are relatively low

CHART 10 REAL GROWTH OF AVERAGE INCOMES

(annual averages over the period 2006-2015, data deflated by the consumer price index)



Source: Statbel.

(1) This particularly concerns immigrants.

compared to the Belgian average (Deboosere *et al.*, 2009; de Maesschalck *et al.*, 2015; Van Hamme *et al.*, 2016). At the same time, the population that left Brussels and moved to Flanders or Wallonia included many young households (mainly persons in the 30-45 age group). This change in the population of Brussels was thus accompanied by a decline in the average income of persons aged between 25 and 44 years, the age group that generally accounts for a large share of mortgage loan applications, while the incomes of persons resident in Flanders and Wallonia increased overall (see chart 10).

It is therefore likely that among persons moving to Brussels over the past ten years and looking for somewhere to live, a larger proportion turned to the rental market, which is substantial in the capital. We do not have chronological data on the proportion of individuals resident in a rental property, but according to the data from the latest census conducted by Statbel in 2011, only 39 % of Brussels residents were owner-occupiers, compared to 71 % in Flanders and 66 % in Wallonia. That also means that a large proportion of the residential properties in the Brussels-Capital Region can actually be regarded as investment properties. Also, as is evident from the results of the HFCS (see subsection 3.2.1.), that type of investment is becoming increasingly popular with Belgian households. Assuming that this trend is likewise reflected in property transactions in Brussels, it is highly plausible that the strong demand on the rental market was reflected in increased demand for investment properties which therefore supported the rise in house prices. As was also demonstrated in section 3.2.1., it is usually older people with high incomes who purchase a residential property not intended to be their main home. Such purchases are therefore largely funded out of their own resources, which is probably why the amounts of loans granted in Brussels do not reflect the rise in property prices.

4. International comparison of the fundamentals of loans to households

The statistics presented so far point to the existence of a very close link between mortgage loans granted to individuals and their incomes. They also suggest that there is a link between loans and house prices, but it is not clear-cut, since the link may be weaker in some areas, such as Brussels, where the proportion of renters is higher. In such cases, property prices may be influenced to a greater extent by demand for properties to let out – demand that generally comes from fairly wealthy individuals seeking investment properties – than by main home purchases financed largely by mortgage loans.

TABLE 3 HOUSEHOLD LOANS AND SOME OF THEIR DETERMINANTS IN THE EURO AREA COUNTRIES

(averages for the period 2010-2016; percentage annual change, unless otherwise stated)

	LU	FI	**BE**	FR	DE	NL	AT	**EA**	IT	PT	EL	ES	IE
Net loans to households, 2010 to 2016 (in % of GDP)	4.0	2.6	**2.5**	1.8	0.8	0.6	0.6	**0.5**	0.3	–1.9	–2.0	–2.1	–2.8
Real average income growth of persons aged from 25 to 49 years	–0.9	–0.1	**–0.1**	–0.2	0.4	0.5	–0.6	**–0.6**	–1.6	–1.3	–7.1	–2.7	–0.6
Real house price growth	3.6	0.2	**0.6**	0.0	2.3	–2.3	4.3	**–0.7**	–3.6	–1.1	–6.8	–4.8	–2.4
Percentage of owner[1]	68	68	**70**	59	44	58	48	**61**	68	75	72	83	71
Growth of the population aged from 25-49 years	2.1	–0.2	**0.0**	–0.3	–1.1	–0.8	–0.3	**–0.8**	–0.7	–1.4	–1.4	–1.3	–0.1

Sources: EC, HFCS 2014, OECD.
(1) Owner-occupier households, in % of total households in 2014.

Mortgage lending, property prices and residents' incomes may explain, at least in part, the sometimes divergent movements in lending to households in the euro area since the 2008 crisis. First, as regards the link between loans and incomes, the decline in the real incomes of persons under the age of 50 certainly depressed lending in the great majority of countries (such as Italy, Portugal, Greece and Spain). It had less impact in Belgium where lending was down by an annual average of 0.1 % between 2010 and 2016, compared to a decline of 0.6 % in the euro area as a whole (see table 3).

Next, the relatively strong rise in house prices in Belgium probably favoured the increase in Belgian household debt, whereas those debts sometimes dropped sharply in other euro area countries. That effect was all the more marked in that Belgium has a high rate of home ownership, with the notable exception of the Brussels-Capital Region. The way in which use of the rental market affects the link between lending and house prices may also explain why the relatively strong price growth in Germany and Austria, averaging 2.3 % and 4.3 % respectively from 2010 to 2016, was not accompanied by a comparable rise in lending to households. In fact, these two countries also have quite a low proportion of owners in their population.

Finally, the demographic factor, and particularly the structure of the age pyramid, must not be overlooked, because the volume of lending in an economy is naturally linked to the proportion of the resident population of an age to take on debts. In Germany, in particular, population ageing has significantly depressed the level of mortgage lending since the late 1990s (Geiger *et al.*, 2016). In that regard, it is worth noting that the population in the 25-49 age group has been generally stable in Belgium since 2009, whereas it has tended to decline in many other euro area countries.

Conclusion

In contrast to what happened in most other euro area countries, household mortgage debt continued to increase in Belgium after the 2008 financial crisis, reaching over 60 % of GDP at the end of 2017. Owing to the risks to financial stability presented by excessive household debt, this situation requires the attention of the macroprudential authorities. In that connection it is particularly relevant to look at the reasons for household debt in Belgium.

The volume of mortgage lending in recent years in Belgium, which depends partly on the macroeconomic environment, may have been influenced by various other factors, such as the bank's supply strategies, government tax measures, or monetary and macroprudential policies. These are not the only aspects. A number of determinants relating to demographics and the characteristics (age and income) of Belgian households were also identified as factors explaining the increased debt.

In general, variations in mortgage debt – both over time and between individual households, municipalities or even countries – are consistent with the life cycle theory. This implies that young households with favourable income prospects are able to contract loans and purchase a property, and that in middle age or in their later years, they can save more and build up assets. Empirically, this life cycle is observed mainly in the case of households with relatively high incomes and more favourable income prospects.

Indeed, the data used for this study clearly indicate a close, positive link between the growth of mortgage debt and the trend in residents' incomes, but the link varies from one age group to another. In particular, the link between debt and income is strongest for persons in the 25-44 age group, but tends to diminish for the older age groups. The main factor explaining this is that older persons have greater real and financial assets which they may use for investment purposes or for limiting their need for bank finance.

House prices also determine the amount of mortgage loans. However, in some regions, such as Brussels, where a relatively high proportion of residents are renters, this link between house prices and lending is weaker.

Despite the finding that variations in mortgage debt depend largely on household income – reflecting a sound lending policy on the part of banks – there are also pockets of risk on the Belgian mortgage market, concentrated on groups of households which devote a large part of their income to debt repayment, and which have only meagre financial reserves to cover any loss of income. The prudential supervision authority needs to keep a close eye on these pockets of risk. These findings prompted the Bank to take steps to ensure that credit institutions are resilient enough to cope with any shock affecting the mortgage market.

Bibliography

Ando A. and F. Modigliani (1963), "The 'life-cycle' hypothesis of saving : aggregate implications and tests", *American Economic Review*, 53(1), 55-84.

Deboosere P., T. Eggerickx, E. Van Hecke and B. Wayens (2009), *The population of Brussels : a demographic overview*, Brussels Studies, Synopsis n° 3, January.

de Maesschalck F., T. De Rijck and V. Heylen (2015), *Over the border : socio-spatial relations between Brussels and Flemish Brabant*, Brussels Studies n° 84, February

Du Caju Ph. (2013), "Structure and distribution of household wealth : an analysis based on the HFCS", NBB, *Economic Review*, September, 41-62.

Du Caju Ph. (2016), "Structure and distribution of household wealth in Belgium : initial findings of the second wave of the Household Finance and Consumption Survey (HFCS)", NBB, *Economic Review*, September, 27-43.

Du Caju Ph. (2017), *Pockets of risk in the Belgian mortgage market : Evidence from the Household Finance and Consumption Survey*, Bank for International Settlements, *IFC Bulletin*, No. 46, December.

Du Caju Ph., F. Rycx and I. Tojerow (2016), *Unemployment risk and over-indebtedness : a microeconometric perspective*, ECB, Working Paper Series, 1908.

Geiger F., J. Muellbauer and M. Rupprecht (2016), *The housing market, household portfolios and the German consumer,* ECB, Working Paper Series, 1904.

Gomez-Salvador R., A. Lojschova and Th. Westermann (2011), *Household Sector Borrowing in the Euro Area : A Micro Data Perspective*, ECB, Occasional Paper Series, 125.

Hermia J.-P. (2018), *Brussels-Capital Region demographic barometer 2017*, Focus n° 22, January.

Modigliani F. and R. H. Brumberg (1954), "Utility analysis and the consumption function : an interpretation of cross-section data", in Kenneth K. Kurihara, ed., *Post-Keynesian Economics*, New Brunswick, NJ. Rutgers University Press, 388-436.

Monnet E. and C. Wolf (2017), *La démographie détermine-t-elle le cycle immobilier ?*, Banque de France, Rue de la Banque n° 41, April.

Simon A. and Y. Essafi (2017), *Concurrence générationnelle et prix immobiliers*, Revue d'économie régionale et urbaine n° 1, January.

Van Hamme G., T. Grippa and M. Van Criekingen (2016), *Migratory movements and dynamics of neighbourhoods in Brussels*, Brussels Studies n° 97, March.

Warisse Ch. (2017), "Analysis of the developments in residential property prices : is the Belgian market overvalued ?", NBB*, Economic Review*, June, 61-77.

Wolswijk G. (2005), *On some Fiscal Effects on Mortgage Debt Growth in the EU*, ECB, Working Paper Series, 526.