



**FINANSINSPEKTIONEN**

# The Swedish Mortgage Market

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**6 APRIL 2017**



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## Summary

Household debt is a crucial matter which FI monitors closely, and the mortgage survey is an important part of this work. Household debt has increased sharply in recent years. During the same period, mortgage rates have fallen and are now at historically low levels, and house prices have also risen rapidly. Finansinspektionen (FI) judges there to be an elevated risk that house prices will fall compared to a normal state, and it is more likely that interest rates will rise than that they will fall.

In order to manage the risks associated with household debt, FI has implemented several measures, such as introducing a mortgage cap, raising the risk weights on mortgages and, in June 2016, introducing an amortisation requirement. Together, these measures have contributed in recent years to making households with new mortgages more resilient, but their full effect on all mortgage holders will take many years to realise and is to some extent offset by other forces.

Amortisation payments on new mortgages have increased since 2011, and the amortisation requirement has further strengthened this development. The percentage of households that amortise and the average size of the amortisation payments increased sharply in 2016. This is in line with FI's previous expectations. FI's analysis shows that new mortgage holders subject to the requirement have changed their behaviour. They are both borrowing less than what would otherwise been the case and buying less expensive homes.

The average loan-to-value ratio for new mortgage holders has been relatively stable in recent years. The average loan-to-value ratio decreased to 64 per cent in 2016, which is one percentage point lower than in 2015. In the stock of existing mortgages, the loan-to-value ratio has been decreasing for several years and in 2016 was 48 per cent.

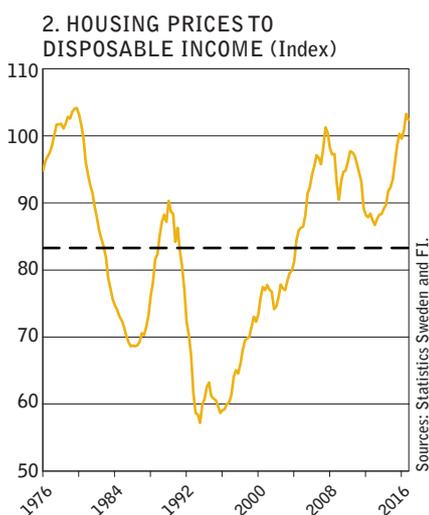
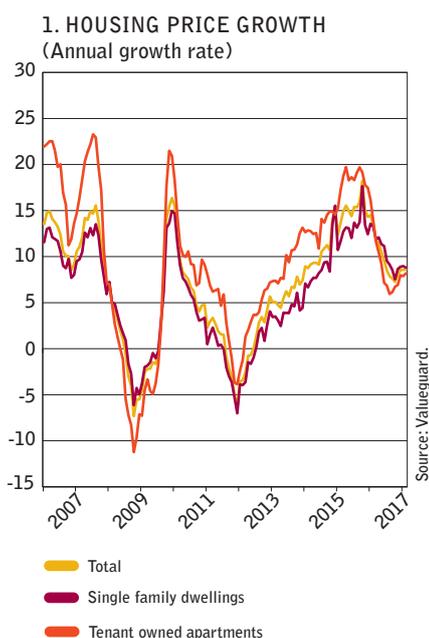
The total debt-to-income ratio for households with new mortgages decreased slightly in 2016 after increasing for several years. The average debt-to-income ratio was 402 per cent in 2016, compared to 406 per cent in 2015.

There continues to be a high percentage of both new and existing mortgage holders that have a high level of debt in relation to their income or in relation to the value of their home. These households could react more strongly to a fall in house prices or to rising interest rates and thus could amplify an economic downturn.

In general, new mortgage holders have good - and growing - margins for making their payments, and this positive trend continued in 2016. Households have become even more financially resilient to shocks according to FI's stress tests. Compared to previous years, more households can handle rising interest rates and unemployment without experiencing a deficit in their monthly payments compared to previous years.

## Background

The debt of Swedish households can constitute a risk for individual households, banks, macroeconomic growth and financial stability. Swedish households hold a total of SEK 3,563 billion in debt, which corresponds to approximately 81 per cent of the GDP. Mortgages represent 82 per cent of household debt. The mortgage survey therefore plays an important part in FI's work to analyse household debt and the risks associated with this debt.



Note: Growth to housing price index (Statistics Sweden) relative growth to households disposable income.  
Dotted line mean for period 1976–2016.

A highly functional credit market is a prerequisite for households to be able to spread out their consumption over their lifetime. For most households, a loan is a necessity when buying a home. However, too much debt poses risks for both households and banks, as well as for the economy at large. During the 2000s, the rate at which household debt increased outpaced the rate at which household income was increasing. Higher debt was driven by rising house prices, which in recent years have been stimulated by low interest rates (Diagrams 1 and 2). Rising income, the financing of more new construction and a growing population are other factors that contributed to the growth in household debt. The trend for households' aggregate debt, high and rising house prices and low interest rates together mean that the risks associated with household debt are now elevated.

Individual households face several risks associated with their debt. When a household borrows money to buy a home, it assumes a payment responsibility for a long period of time into the future, thus making the household more vulnerable to economic shocks during this period. A large debt in relation to the home's market value makes the household vulnerable to a fall in house prices. Falling house prices mean that households with large loans in relation to the value of the home risk finding themselves in a situation where the size of their debt is larger than the size of their assets (negative equity). A large debt in relation to the household's income makes the household vulnerable to the loss of income and changes in the interest rate.

In the event of economic shocks, individual households may be forced to adapt in order to be able to make their interest payments, pay off their loans or restore their balance sheet.<sup>1</sup> Such adaptation usually means they will cut back on consumption. If a large number of households simultaneously reduce their consumption, this could have major negative macroeconomic effects and create or aggravate a recession. It is not enough to merely look at aggregate indicators to gain an accurate overview of these risks. The mortgage survey contains detailed data of the debts of households with new mortgages and is thus an important part of FI's analysis of the risks and vulnerabilities associated with household debt.

FI has taken measures over time to mitigate the various vulnerabilities posed by greater debt. These measures aim to strengthen the resilience of both households and banks. In the autumn of 2010, FI introduced general guidelines limiting the size of loans collateralised by homes, i.e. the mortgage cap. Under these guidelines, new loans collateralised by a

<sup>1</sup> The balance sheet is a compilation of household assets – homes, shares, savings, etc. – and debt.

home should not exceed 85 per cent of the market value of the home.<sup>2</sup> FI has also implemented a risk weight floor for mortgages that ensures that the banks hold more equity that better reflects the credit risks and macroeconomic risks present in their mortgage lending. On 1 June 2016, the amortisation requirement was introduced by FI.<sup>3</sup>

## PURPOSE AND DATA

The purpose of the mortgage survey is to describe the status of the mortgage market and analyse the vulnerabilities and risks associated with household debt. The survey forms an important basis for FI's ability to assess the need for amended regulation of the mortgage market. Information from the survey is also used to evaluate the effects of measures that have already been implemented. In addition, the survey also provides an important basis for FI's supervision of and dialogue with the banks.

FI calculates the payment ability of the households included in the sample by means of monthly calculations and stress tests. As part of its stress tests, FI analysed sensitivity to interest rate hikes, loss of income due to unemployment and fall in house price. The resilience of households is an important element in being able to assess the households' payment ability, and hence the credit risks of banks.

The survey includes data from Danske Bank, Handelsbanken, Länsförsäkringar Bank, Nordea, SBAB Bank, SEB, Skandiabanken and Swedbank. Lending for housing purposes from these eight banks represents almost 95 per cent of the lending on the Swedish mortgage market. The survey consists of three parts:

- *Sample at household level.*<sup>4</sup> Household level information (micro-data) on a large number of new loans issued. The sample includes all new mortgage agreements entered into during the periods 26 August–2 September 2016 and 28 September–5 October 2016. In total, 25,756 households are included in the 2016 survey after the data was cleaned<sup>5</sup>. The data includes information about, for example, households' disposable income, total loans, loans collateralised by homes including unsecured loans related to the home, interest rate levels, any amortisation, the market value of the collateral and the household composition. This is the seventh time FI has compiled such a sample. The previous samples cover the years 2009, 2011, 2012, 2013, 2014 and 2015.
- *Aggregate data.* FI also gathers information about existing loans in the mortgage stock, such as banks' total lending volumes to households for housing purposes. The variables have been predefined by

2 However, it is possible to be granted an unsecured loan to finance a home. For more information about the mortgage cap, see Finansinspektionen's general guidelines (FFFS 2010:2) regarding limitations to the size of loans collateralised by homes.

3 Finansinspektionen's regulations regarding amortisation of mortgages, FFFS 2016:16

4 New loans resulting from customers switching banks or additions to existing loans cannot be separated from strict new loans and are therefore included in the sample. See also the definition in the glossary.

5 "After the data was cleaned" refers to FI's processing of the data reported to the authority. In this process, deficient, extreme or erroneous observations are removed.

### ■ Appendix of diagrams

This report is supplemented by a statistics appendix. The appendix contains the data that forms the basis for the diagrams in the report. There are also additional and more in-depth diagrams for each part of the report.

FI and the banks have summed the underlying data themselves and reported the results at the aggregate level. The form the banks filled in includes information about lending volumes, amortisation volumes and loan-to-value ratios. FI has gathered this type of data since 2006 with figures going back to 2002.

- *Qualitative information.* Through a number of in-depth questions, the banks provide both general and detailed information. These in-depth questions touch on, for example, the banks' methods for determining the value of a residential property, the assessment of household finances, consumer protection aspects related to mortgages and the banks' positions on high loan-to-value ratios and amortisation.

Tables 1 and 2 present a general description of the households in the 2016 sample of new loans. Table 3 summarises the samples from previous years.

TABLE 1. Geographic distribution of borrowers in the sample.

	Greater Stockholm	Greater Gothenburg	Greater Malmö	Other large cities	Rest of Sweden	Total
Percentage of households (%)	28	10	6	20	36	100
Share of volume new loans (%)	40	11	6	18	24	100
Average debt (SEK)	3,019,913	2,464,509	2,035,057	1,927,037	1,400,713	2,122,680
Average market value of the home (SEK)	4,749,685	3,717,170	2,712,679	2,581,863	1,794,820	3,052,181
Average disposable income (SEK/month)	48,144	45,187	41,736	42,186	38,313	42,893

TABLE 2. Age distribution of borrowers in the sample.

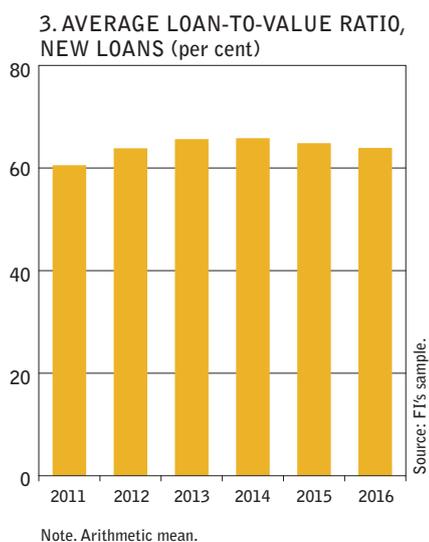
	18-30	31-50	51-65	65+	Total
Share of households (%)	27	20	47	24	9
Share of volume new loans (%)	22	53	19	6	100
Average debt (SEK)	1,722,552	2,445,524	2,117,483	1,379,380	2,122,680
Average market value of home (SEK)	2,071,782	3,386,220	3,228,303	3,030,842	3,052,181
Average disposable income (SEK/month)	35,360	47,135	44,911	32,793	42,893

TABLE 3. Average debt, market values and income in previous samples.

	2012	2013	2014	2015	2016
Average debt (SEK)	1,659,422	1,703,157	1,893,998	2,071,351	2,122,680
Average market value of home (SEK)	2,221,049	2,332,598	2,519,224	2,864,292	3,052,181
Average disposable income household (SEK/month)	39,421	38,634	39,919	41,750	42,893

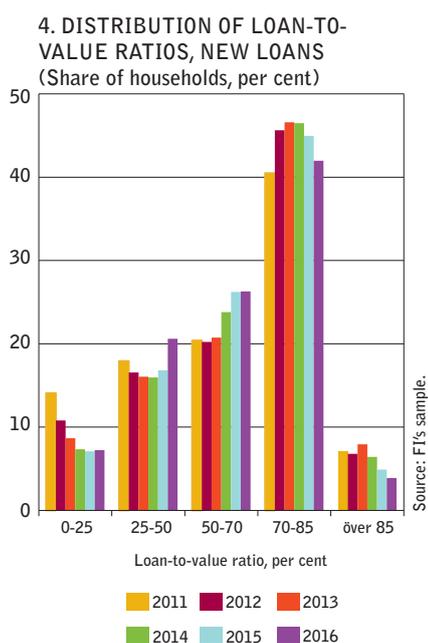
## Swedish mortgage holders

Households with new mortgages are borrowing slightly less than before in relation to the value of the home and in relation to their income. The average loan-to-value ratio for households' new mortgage has been stable since the mortgage cap was introduced and was 64 per cent in 2016. The percentage of households with large debts in relation to both the value of the home or income is still high. The debt-to-income ratio for households with new mortgages decreased slightly in 2016 after having risen since 2011.



Household debt can be related to other quantities to be able to compare households over time. The loan-to-value ratio is calculated as the size of the loan used to finance the purchase of the home divided by the market value of the home. It is an indication of the level of vulnerability of a household if house prices fall. If the price of a home were to fall and result in negative equity, i.e. that the loan-to-value ratio is greater than 100 per cent, there is a risk that a household would find itself in a weakened financial position. To reduce its vulnerability to such a situation, the household can choose to reduce its consumption in order to continue making amortisation payments or payments to savings. If a large number of households simultaneously react in the same manner, this could have a negative impact on macroeconomic growth.

The debt-to-income ratio is another measure of how large household debt is. This ratio is calculated as household debt in relation to disposable income. A high debt-to-income ratio means that the household must dedicate a larger portion of its income to interest rate expenses given the level of the interest rate. The debt-to-income ratio therefore provides an indication of how vulnerable a household is to increases in the interest rate. It also provides an indication of how vulnerable a household is to a loss of income and other shocks to its cash flows.



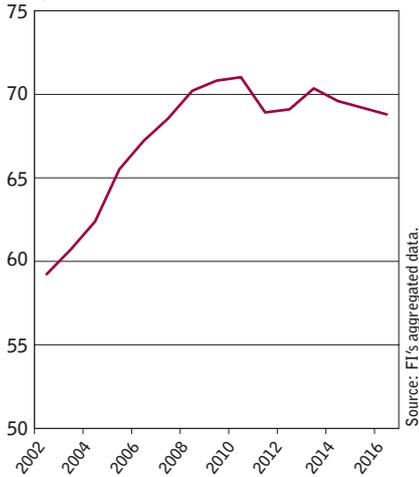
### THE AVERAGE LOAN-TO-VALUE RATIO IS STABLE

The average loan-to-value ratio for new mortgages continued to stabilise and decreased slightly in 2016 to 64 per cent compared to 65 per cent in 2015 (Diagram 3). The decrease in 2016 was primarily due to the decrease in the percentage of households with loan-to-value ratios in excess of 70 per cent (Diagram 4). A high percentage of borrowers continue to have a high loan-to-value ratio. More than 72 per cent of households with new mortgages in 2016 had a loan-to-value ratio of more than 50 per cent compared to 76 per cent in 2015. Twenty-one per cent of the borrowers had a loan-to-value ratio of 85 per cent. The percentage of borrowers who had loan-to-value ratios at the thresholds for the amortisation obligation under the amortisation requirement increased in 2016 (Diagrams B2/B3 in Appendix 2). Even the average volume-weighted<sup>6</sup> loan-to-value ratio for new mortgages continued to stabilise (Diagram 5).

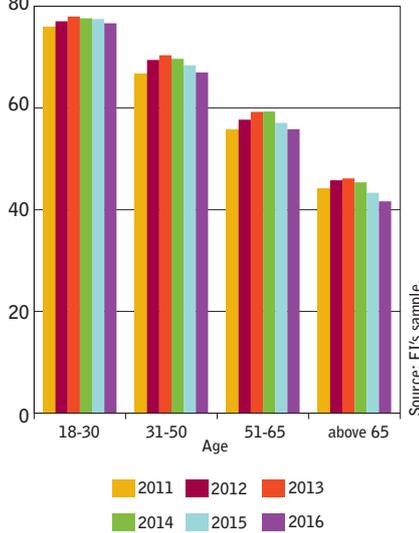
The loan-to-value ratio fell in all age categories for households with

<sup>6</sup> The volume-weighted loan-to-value ratio refers to a volume-weighted average of loans. This calculation takes into account the size of the loan, so large loans have a greater impact on the average.

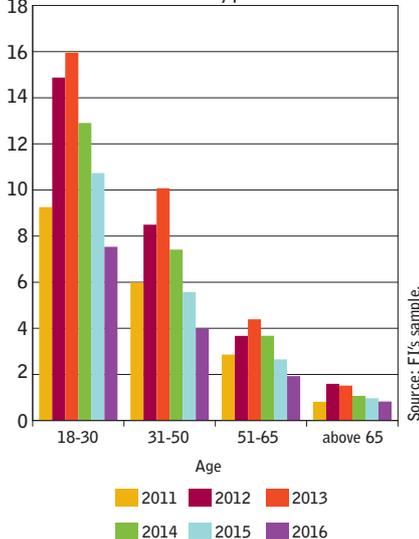
5. AVERAGE VOLUME WEIGHTED  
LOAN-TO-VALUE, NEW LOANS  
(per cent)



6. LOAN-TO-VALUE RATIOS IN  
DIFFERENT AGE GROUPS, NEW  
LOANS (Per cent)



7. UNSECURED LOANS IN DIFFERENT  
AGE GROUPS, NEW LOANS  
(Share of households, per cent)

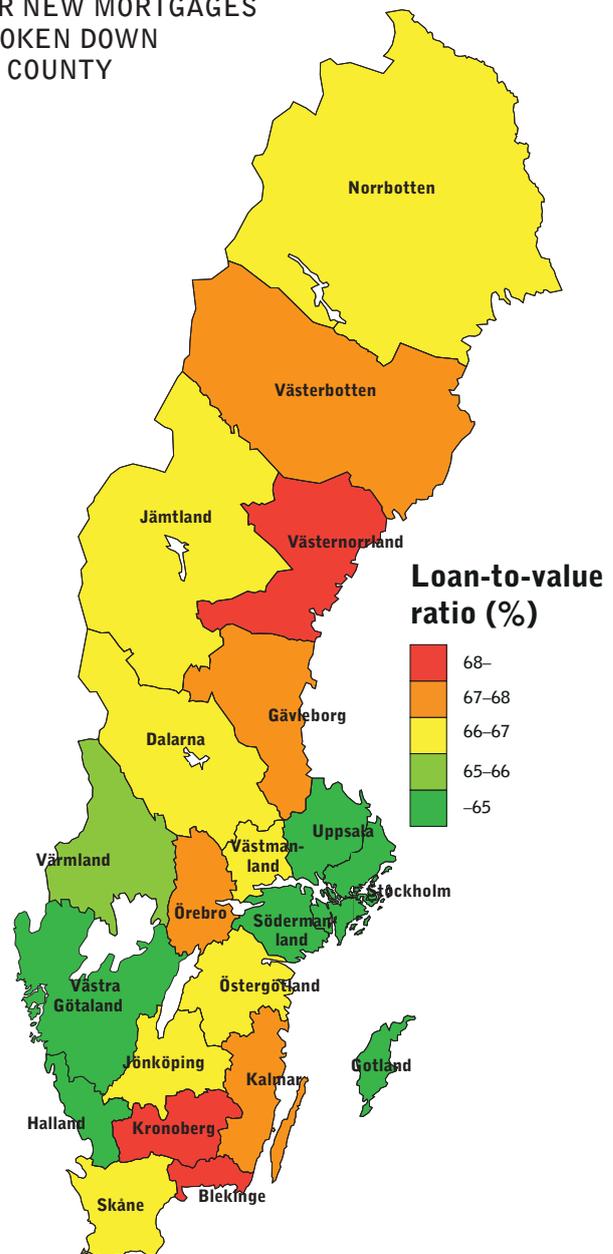


Note. Share of households in each age interval that have taken an unsecured loan.

new mortgages in 2016 (Diagram 6).<sup>7</sup> The loan-to-value ratio has a clear connection to age. Younger households that have not been established on the housing market for as long as older households have higher loan-to-value ratios. This means that older households have been able to amortise and otherwise save for a longer period of time, and also benefit from past price increases on the housing market.

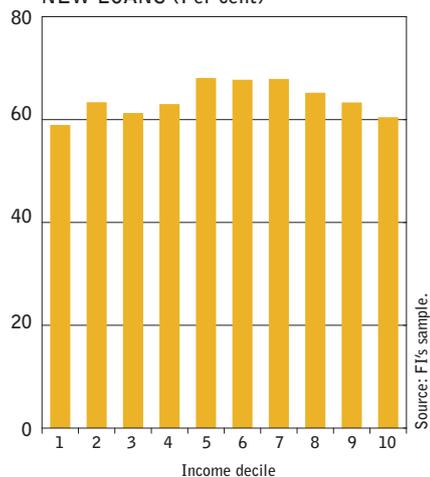
A small percentage of households with new mortgages have loan-to-value ratios in excess of 85 per cent because they have supplemented their mortgages with unsecured loans. The percentage of borrowers with loan-to-value ratios in excess of 85 per cent when buying a home by taking an unsecured loan decreased in 2016 to 4 per cent (Diagram 7). The total volume for unsecured loans related to the home financing

FIGURE 1. AVERAGE LOAN-TO-VALUE RATIOS FOR NEW MORTGAGES BROKEN DOWN BY COUNTY



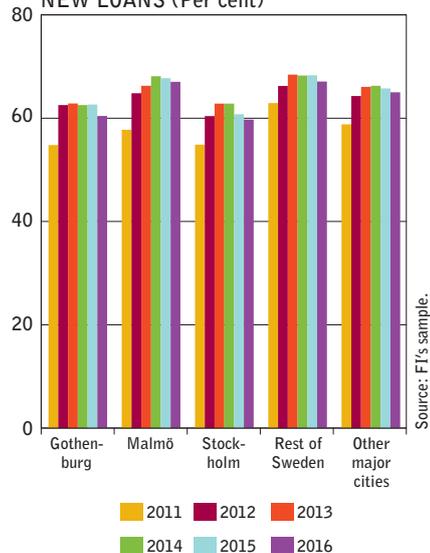
7 FI breaks down households into different age groups based on the age of the primary borrower. Each bank has its own definition of the person in a household with several borrowers who is considered to be the primary borrower.

### 8. LOAN-TO-VALUE RATIO IN DIFFERENT INCOME GROUPS, NEW LOANS (Per cent)



Note. The thresholds for the income deciles are:  
**1:** SEK 0–21,225, **2:** SEK 21,226–25,425,  
**3:** SEK 25,426–30,550, **4:** SEK 30,551–36,500,  
**5:** SEK 36,501–41,190, **6:** SEK 41,191–45,321,  
**7:** SEK 45,322–50,150, **8:** SEK 50,151–56,544,  
**9:** SEK 56,545–65,674 and  
**10:** SEK 65,675–2,298,500.

### 9. LOAN-TO-VALUE RATIO IN VARIOUS REGIONS, NEW LOANS (Per cent)



amounted to approximately 0.5 per cent of the total mortgage stock compared to 0.7 per cent in 2015. The average unsecured loan for home financing amounted to approximately SEK 160,000 in 2016, which was higher than in 2015 when it amounted to approximately SEK 150,000. Younger households use unsecured loans for their home financing to a greater extent than older households. However, the percentage of younger households with unsecured loans for home financing purposes has decreased in recent years, and in 2016 this reduction was particularly noticeable.<sup>8</sup>

The differences in average loan-to-value ratios between various income groups are relatively small (Diagram 8). Loan-to-value ratios in the middle income brackets. One explanation for why the loan-to-value ratios do not vary much across income groups is that borrowers with higher income also buy more expensive homes. Consequently, the borrowers have approximately the same loan need in relation to the market value of the home. That higher income earners buy more expensive homes can be explained by their tendency to live in metropolitan areas where both income levels and house prices are significantly higher than in the rest of the country.

The average loan-to-income ratio decreased slightly in 2016 compared to 2015 in all of the country's geographic areas (see Diagram 9). The differences in loan-to-value ratios are small between geographic areas. The average loan-to-value ratios are lowest in the largest cities, Gothenburg and Stockholm, where house prices are high, and highest in geographic areas where house prices are low (Figure 1).

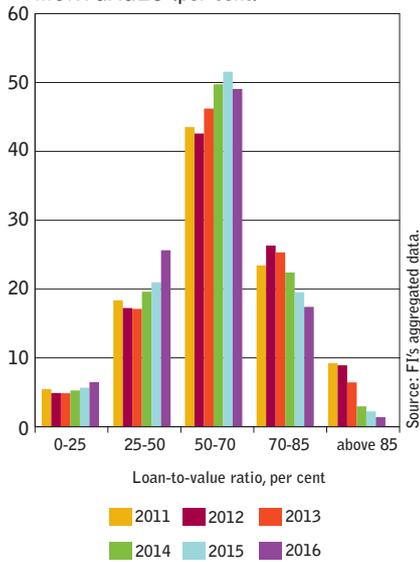
The mortgage survey also contains information about the households' existing aggregate mortgage debt. Existing mortgage holders in general have lower debt than new borrowers, which is because amortisation payments and rising house prices reduced the existing loans in relation to the market value of the homes. The average aggregate loan-to-value ratio was just under 48 per cent in 2016, compared to more than 49 per cent in 2015. The outstanding volume of the existing mortgages are concentrated to borrowers with loan-to-value ratios between 50 and 70 per cent (Diagram 10).

### DEBT-TO-INCOME RATIO FOR NEW LOANS FELL IN 2016

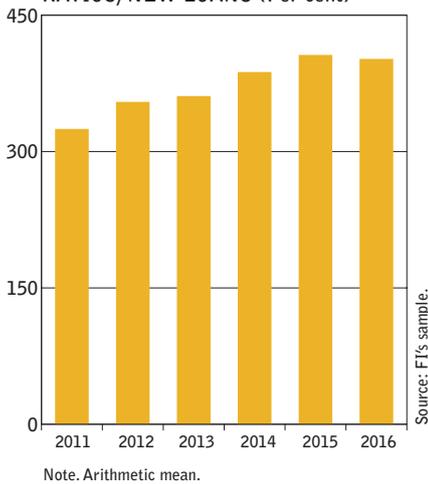
The average debt-to income ratio, i.e. total debt in relation to disposable income, for households with new mortgages fell from 406 per cent to 402 per cent in 2016. This is a change in trend since the average debt-to-income ratio for households with new mortgages has been rising since 2011 when it was 325 per cent (Diagram 11). One explanation for why the average debt-to-income ratio decreased in 2016 is that there was a decrease in the percentage of households with very high debt-to-income ratios, i.e. more than 750 per cent. The implementation of the amortisation requirement may have been one of the triggers behind this change. The amortisation requirement reduces a household's possibilities for taking on large loans in relation to its income through lower margins in the discretionary income calculation (see the box *The amortisation requirement has resulted in households buying less expensive*

8 Unsecured loans households have taken from a different bank than where they have their mortgage are not included in the sample and thus not captured in the dataset. This means there is a risk that this survey to some extent underestimates the scope of the secured loans.

10. AVERAGE LOAN-TO-VALUE RATIOS FOR EXISTING STOCK OF MORTGAGES (per cent)



11. AVERAGE DEBT-TO-INCOME RATIOS, NEW LOANS (Per cent)



12. DISTRIBUTION OF DEBT-TO-INCOME RATIOS (Share of households, per cent)

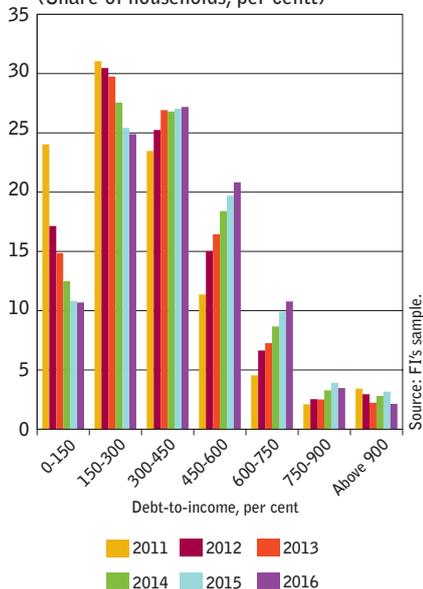
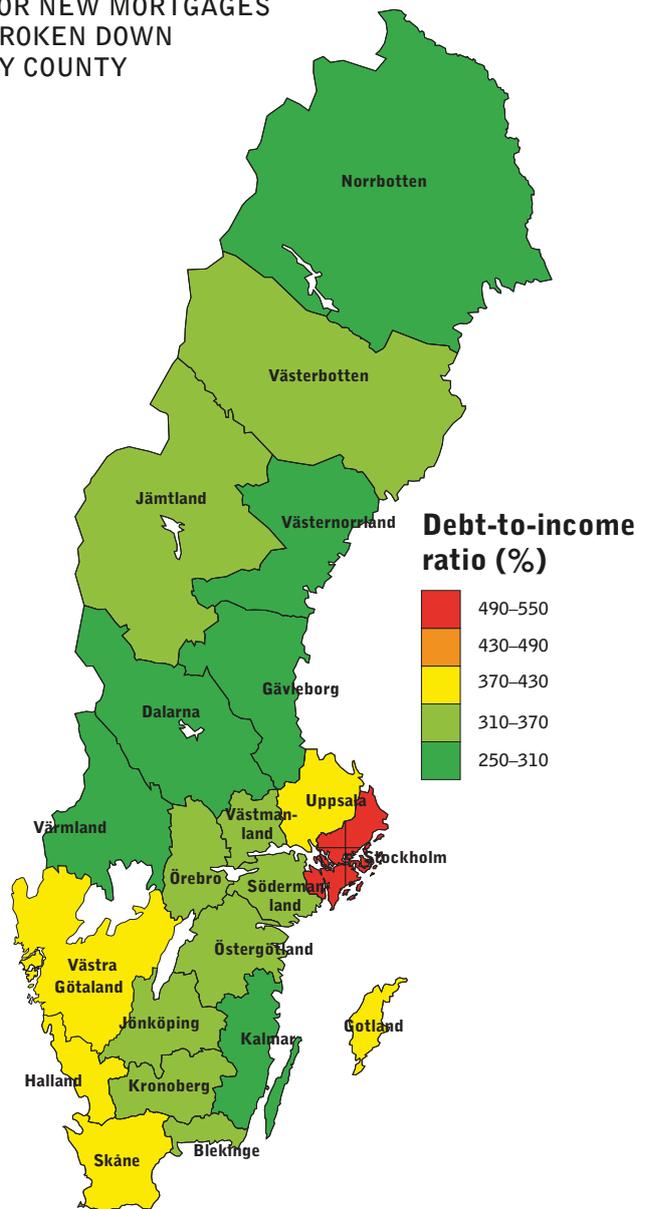


FIGURE 2. AVERAGE DEBT-TO-INCOME RATIOS FOR NEW MORTGAGES BROKEN DOWN BY COUNTY



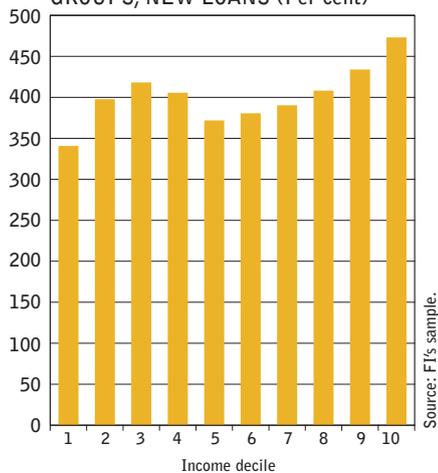
homes and borrowing less on page 13).

There continues to be a large share of households that has a high debt-to-income ratio, i.e. greater than 450 per cent (Diagram 12). The percentage of households with debt-to-income ratios in the interval between 450 and 750 per cent increased from 30 per cent in 2015 to 32 per cent in 2016.

Even if the average debt-to-income ratio for households with new mortgages has decreased as a whole in 2016, it has increased for borrowers in five of the eight banks included in the survey. The banks that reduced the average debt-to-income ratio in their lending also have a smaller percentage of the lending in the sample compared to the previous year.

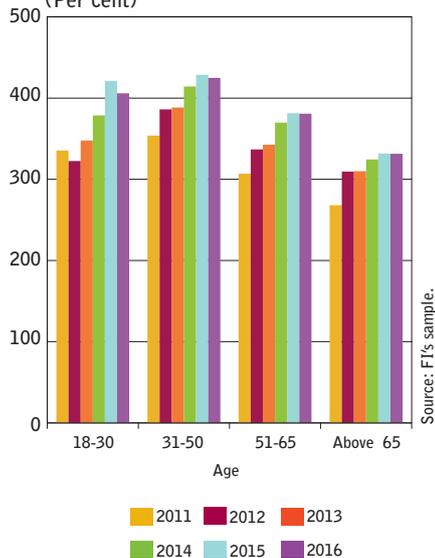
The debt-to-income ratios vary a lot between income groups, although in general households with the highest income have the highest debt in relation to their income (Diagram 13). High-income households most likely have high debt-to-income ratios due to several factors. One such

**13. AVERAGE DEBT-TO-INCOME RATIO IN DIFFERENT INCOME GROUPS, NEW LOANS (Per cent)**



Note. The thresholds for the income deciles are:  
 1: SEK 0–21,225, 2: SEK 21,226–25,425,  
 3: SEK 25,426–30,550, 4: SEK 30,551–36,500,  
 5: SEK 36,501–41,190, 6: SEK 41,191–45,321,  
 7: SEK 45,322–50,150, 8: SEK 50,151–56,544,  
 9: SEK 56,545–65,674 and  
 10: SEK 65,675–2,298,500.

**14. AVERAGE DEBT-TO-INCOME RATIO IN DIFFERENT AGE GROUPS (Per cent)**



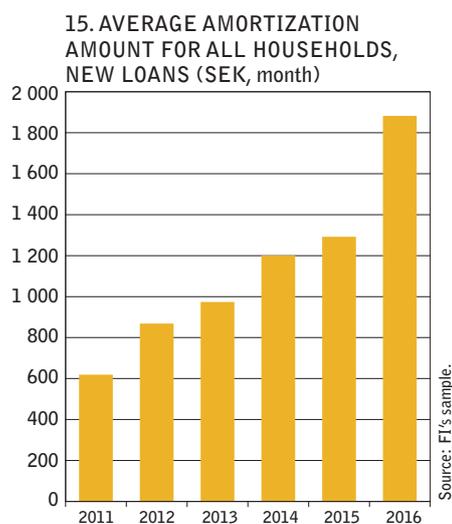
factor is that these households primarily live in large cities where house prices – and hence borrowing needs – are higher. High-income households also have greater wealth and can be considered to have sufficient buffers for handling the increased risk and vulnerability that comes with larger debts.

The average debt-to-income ratio is highest for households under the age of 50 and thereafter declines with age (Diagram 14). The reduction of the average debt-to-income ratio in 2016 compared to 2015 took place primarily in the youngest age group, 18-30. There is a clear geographic distribution in the households' debt-to-income ratios. Unlike the loan-to-value ratio, the average debt-to-income ratio is higher in large cities than in the rest of the country (Figure 2). It is highest in Stockholm County, where it was almost 526 per cent for households that signed for a new mortgage in 2016.

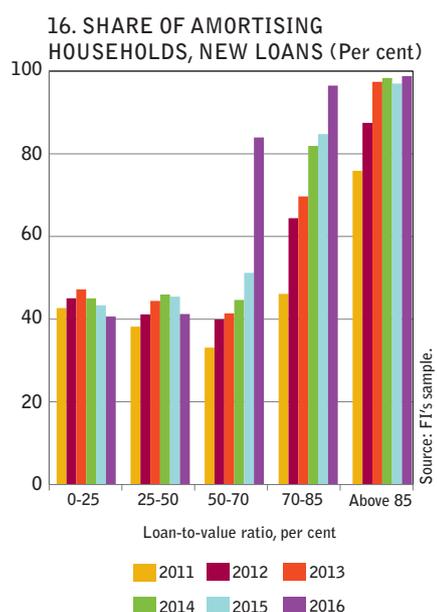
A more comprehensive overview of the risks associated with household debt can be obtained by combining both loan-to-value ratios and debt-to-income ratios. The greatest vulnerability lies with households that have both a high debt-to-income ratio and a high loan-to-value ratio since they are vulnerable to both a fall in house prices and the loss of income, and primarily a combination of the two. The relationship between households' debt-to-income ratios and loan-to-value ratios is relatively weak, although households with high loan-to-value ratios on average have a somewhat higher debt-to-income ratio. The relationship between the debt-to-income ratio and the loan-to-value ratio also decreased in 2016 compared to 2015 (Diagram B2/B3 in Appendix 2). The households with the highest loan-to-value ratios, i.e. greater than 85 per cent, have an average debt-to-income ratio that is lower than the average debt-to-income ratio for all households.

## Amortisation payments rose sharply

On 1 June 2016, FI introduced an amortisation requirement for new mortgages in Sweden. The percentage of households with new mortgages that amortise and the size of the amortisation payments rose sharply after the implementation of the regulation. The percentage of households that amortise increased in particular for those with loan-to-value ratios between 50 and 70 per cent. The increase in amortisation payments is in line with the expectations and the analysis conducted by FI prior to the introduction of the requirement.



Note. Average amortization, SEK month.



Through amortisation, households can reduce their debt over time. In order to counteract the macroeconomic risks associated with highly indebted households, FI introduced the amortisation requirement on 1 June 2016. Pursuant to this regulation, households with a loan-to-value ratio within the interval of 50 and 70 per cent must amortise at least one per cent of the mortgage's original value. Households with a loan-to-value ratio greater than 70 per cent must amortise at least two per cent of the mortgage's original value.

As part of its supervision of banks' mortgage lending, FI checked in this year's survey whether the banks comply with the amortisation requirement. In general, the banks are well in compliance with the regulation. For the individual banks that did not fully comply with the regulation, FI will continue with a more in-depth investigation to determine the cause of the non-compliance and ensure that the requirement is followed in the future.

### MORE HOUSEHOLDS AMORTISED AND THEY ARE AMORTISING MORE

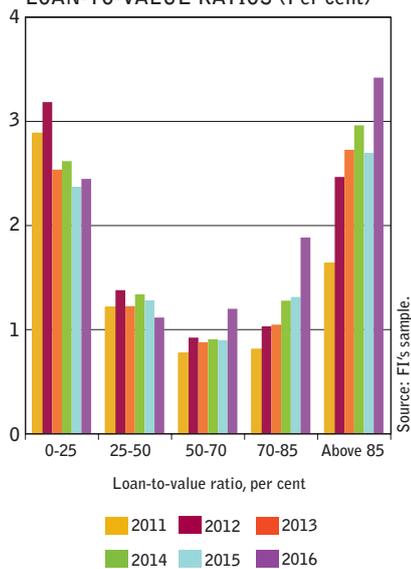
Among all households with new mortgages, 78 per cent amortised to some extent compared to 67 per cent in 2015. The average monthly amortisation amount for all borrowers increased by 48 per cent in 2016 compared to 2015 (Diagram 15). That declining share of amortising households among those with loan-to-value ratios below 50 per cent may be a result of these households actively striving to keep their loan-to-value ratio low in order to avoid the amortisation requirement.

Of those households with new mortgages that have loan-to-value ratios of more than 50 per cent has increased consistently in recent years, there was a marked increase in 2016 in the number of households that amortise new mortgages (Diagram 16).<sup>9</sup> This is in line with FI's previous expectations for the regulation (Finansinspektionen 2016).<sup>10</sup> This applies primarily for households with a loan-to-value ratio between 50 and 70 per cent, where the percentage that amortise has increased from 51 to 84 per cent. Amortisation also increased for households with

<sup>9</sup> In the mortgage survey, FI has information about how much households plan to amortise each month at the time the loan is granted. However, it is not possible to ensure that this actually happens based on the sample data. Lump-sum payments, i.e. amortisation in excess of the set plan, are not captured by FI's data either.

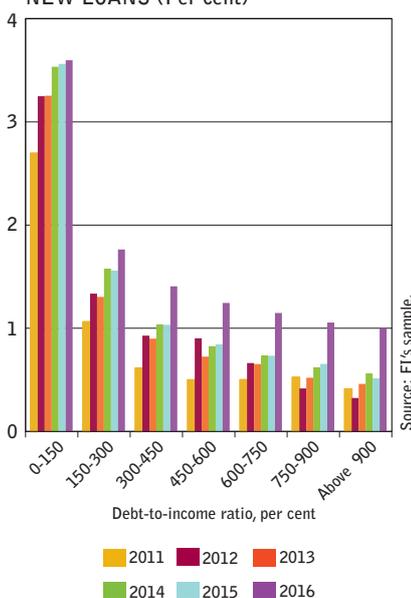
<sup>10</sup> "Draft Decision Memorandum "Regulations regarding mortgage amortisation requirement" (2016) Ref 14-16628

17. AMORTISATION AS A SHARE OF THE LOAN AMOUNT FOR DIFFERENT LOAN-TO-VALUE RATIOS (Per cent)



Source: FI's sample.

18. AMORTISATION AS A SHARE OF THE LOAN AMOUNT FOR DIFFERENT DEBT-TO-INCOME RATIOS, NEW LOANS (Per cent)



Source: FI's sample.

loan-to-value ratios in excess of 70 per cent, with 97 per cent of these households amortising.<sup>11</sup>

A higher percentage of households amortise and greater amortisation volumes among those that amortise resulted in a sharp increase in the size of the amortisation payments in relation to the size of the loan in 2016 for households with new mortgages. For households subject to the requirement, amortisation expenses are increasing in relation to the loan amounts with rising loan-to-value ratios (Diagram 17). The increase in the amortised amount is largest for the households that have a loan-to-value ratio of more than 70 per cent.

The increase in amortisation payments has been distributed across households in all debt-to-income intervals (Diagram 18). For households with debt-to-income ratios greater than 600 per cent, amortisation payments in relation to the size of the loan almost doubled.

Amortisation payments also increased in relation to household income. Households with new mortgages in 2016 amortised on average 4.6 per cent of their income. In 2015, amortisation payments constituted 3.3 per cent of income for households with new mortgages.

Younger households amortise new mortgages more than older households. This is because younger households have higher loan-to-value ratios than older households. In the youngest age group, 18-30, 92 per cent of mortgage holders made amortisation payments on their loans (Diagram 19). However, the increase in the percentage of households that make amortisation payments on new mortgages is relatively evenly distributed across all age categories. Measured as amortised volume in relation to income, in 2016 the youngest households (18-30) increased their amortisation payments the most (Diagram 20).

### The amortisation requirement has resulted in households buying less expensive homes and borrowing less

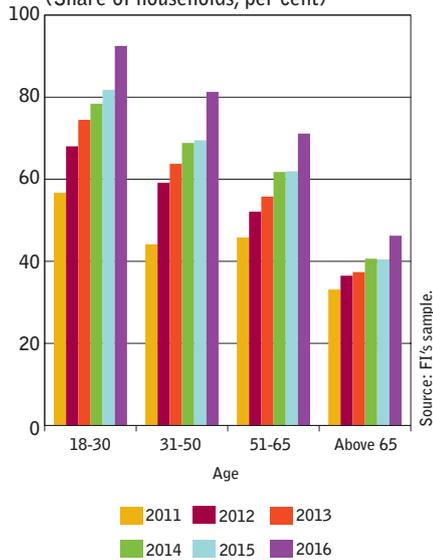
A deeper look shows the effects of the amortisation requirement by studying the size of the debt of new mortgage holders and the price of the homes they are buying. This analysis is based on and shows selected results from FI Analysis 10: The amortisation requirement has reduced household debt.<sup>12</sup> We use data from the mortgage surveys in 2012–2016.

In this analysis, we divide households into three groups. The households that have a loan-to-value ratio between 50 and 70 per cent must amortise at least one per cent of the loan every year according to the requirement – these households are called Group 1. Group 2 consists of households with a loan-to-value ratio of more than 70 per cent. These households must amortise at least two per cent of their loan every year. We use the last group of households as a control group. They have a loan-to-value ratio of below 50 per cent and are not covered by the amortisation requirement. There are no formal

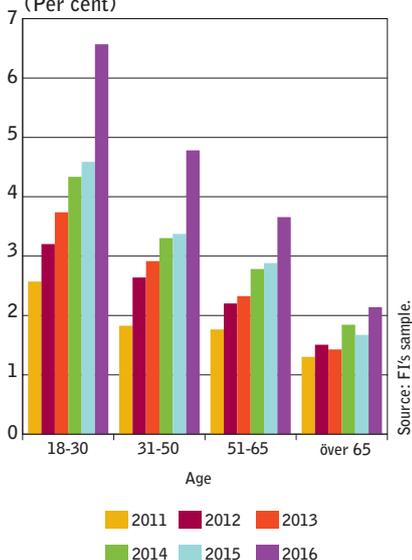
11 When interpreting the diagram, consideration should also be given to the fact that even if the sample refers to a period of time when the amortisation requirement had entered into force, not all of the new loans with a loan-to-value ratio of more than 50 per cent are subject to the requirement. There are some exceptions to the requirement for loans that have a loan-to-value ratio greater than 50 per cent.

12 FI Analysis 10: The amortisation requirement has reduced household debt (2017) <http://www.fi.se/sv/publicerat/rapporter/fi-analys/2017/fi-analys-10-amorteringskravet-har-minskat-hushallens-skulder/>

19. AMORTISING HOUSEHOLDS FOR VARIOUS AGE GROUPS (Share of households, per cent)



20. AMORTIZED VOLUMES AS SHARE OF INCOME, NEW LOANS (Per cent)

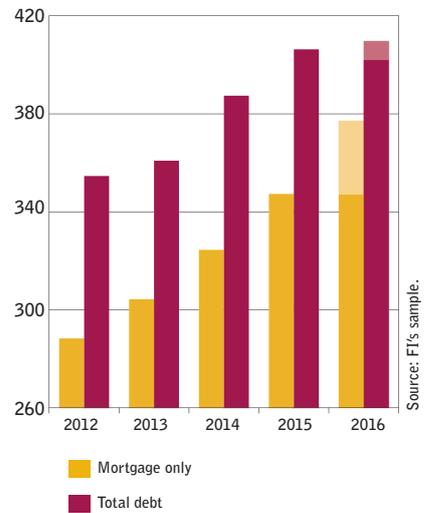


requirements on amortisation for any of the three household groups during the period 2012–2015. For these years, we find that the average debt-to-income ratios for Groups 1 and 2 were higher than for the control group.

In order to estimate what the debt-to-income ratios in Groups 1 and 2 would have been if FI had not implemented the amortisation requirement, we scale up the average observed debt-to-income ratio in the control group in 2016. This method is described in FI Analysis 10: The amortisation requirement has reduced household debt. We then weigh together the effects of the three groups to one average debt-to-income ratio for all households in the mortgage survey. According to this estimate, the actual average debt-to-income ratios based only on mortgages in Mortgage Survey 2016 are 30 percentage points lower than if FI had not introduced the amortisation requirement (Diagram R 1.1). The corresponding reduction in debt-to-income ratios based on new mortgage holders' total loans is smaller and amounts to 8 percentage points.

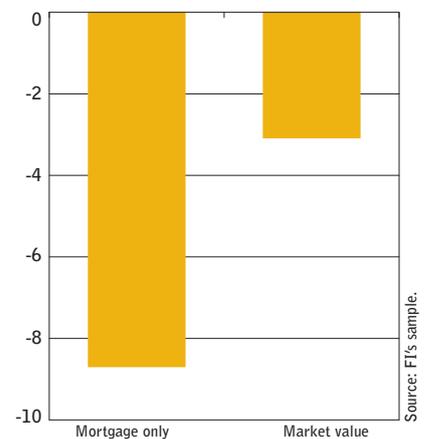
We use the same approach to study whether the amortisation requirement has affected the price of the homes that were bought. We find that households that purchased single-family dwellings and holiday homes chose less expensive homes than they would have without the amortisation requirement. We find the greatest effect in holiday homes, where households with new mortgages bought holiday homes that are up to 30 per cent less expensive than if FI had not implemented the amortisation requirement. The holiday homes that were bought are most likely less expensive because they are smaller or in less attractive locations. The households that bought single-family dwellings and must amortise at least 2 per cent chose to buy homes that are almost 10 per cent less expensive as a result of the amortisation requirement. Households that buy tenant-owned apartments, however, bought homes that were equally expensive after FI introduced the amortisation requirement. When we weigh together the effects, we find that the amortisation requirement has resulted in households buying homes that on average are approximately 3 per cent less expensive.

R 1.1. AVERAGE DEBT-TO-INCOME RATIO, SECURED MORTGAGES, AT DIFFERENT LEVELS OF LOAN-TO-VALUE RATIOS (Per cent)



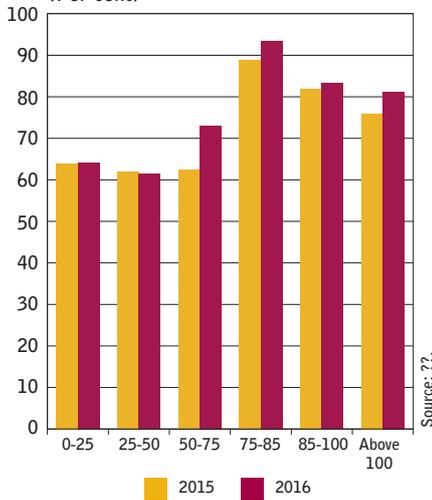
Note. Debt-to-income ratios from each mortgage survey. The dashed parts of the bars for 2016 show the expected debt-to-income ratios without the amortisation requirement.

R 1.2. EFFECTS OF THE AMORTIZATION REQUIREMENT ON MORTGAGES AND MARKET VALUES OF HOUSING (Share of households, per cent)



Note: The diagram shows the change in per cent of the debt-to-income ratios for mortgages and the market values for homes resulting from the amortisation requirement. The estimation of the effects for each group (including the control group) was based on the estimated effects presented in FI Analysis 10: The amortisation requirement has reduced household debt.

21. SHARE OF HOUSEHOLDS THAT AMORTISE, EXISTING LOANS (Per cent)



Source: ??

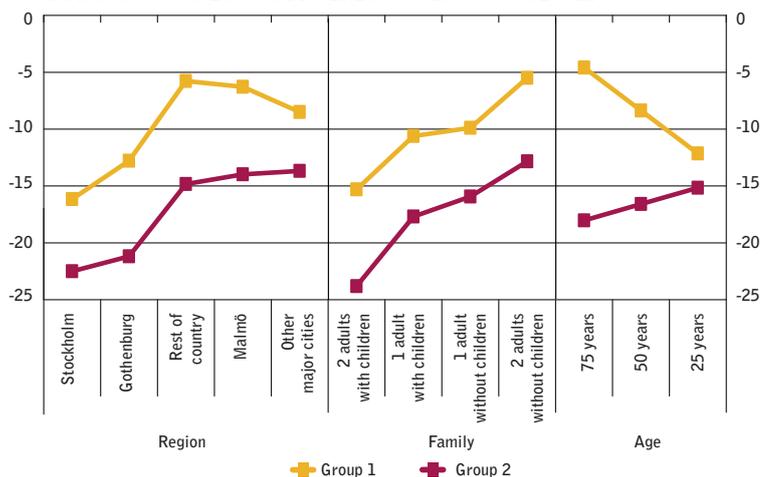
As a whole, we find that the households subject to the amortisation requirement chose to buy slightly less inexpensive homes, which has meant that their loans are smaller, but household debt slowed more than prices (see Diagram R 1.2). This may be because the amortisation requirement has resulted in households choosing homes that are smaller or located in less attractive areas. It may also be because households to a greater extent chose to finance the purchase of the home using savings.

Even in the stock of existing mortgages, the percentage of households with loan-to-value ratios greater than 50 per cent amortised (Diagram 21). The increase compared to the previous year is not as large as for the new mortgages. Greater amortisation in the stock of mortgages can in part be explained by the impact from new mortgages, which are included in the stock of mortgages, as well as a greater willingness to amortise and changed behaviour among households with existing mortgages.

### Distribution effects of the amortisation requirement

A deeper look shows how the amortisation requirement has affected different categories of households. The method and results are described in more detail in FI Analysis 10: The amortisation requirement has reduced household debt.<sup>13</sup> In the analysis, a model is estimated where household debt-to-income ratios are explained by where the household lives, the household's family composition, the age of the borrower and the amortisation requirement. Households have been divided into three groups based on whether they will amortise one or two per cent of their loan every year or if they do not need to amortise.<sup>14</sup>

R 2.1. EFFECTS OF THE AMORTISATION REQUIREMENT ON DEBT-TO-INCOME RATIOS (MORTGAGES) FOR DIFFERENT TYPES OF HOUSEHOLDS



Note: Group 1 represents the households that amortise one per cent (loan-to-value ratios between 50 and 70 per cent) and Group 2 households that amortise two per cent (loan-to-value ratios of more than 70 per cent). The diagram shows the change in percent of the debt-to-income ratio from the implementation of the amortisation requirement. The figure indicates how different groups are affected compared to if the same group had not been subject to the amortisation.

13 FI Analysis 10: The amortisation requirement has reduced household debt (2017) <http://www.fi.se/sv/publicerat/rapporter/fi-analys/2017/fi-analys-10-amorteringskravet-har-minskat-hushallens-skuldere>

14 The groups are the same as in The amortisation requirement has resulted in households buying less expensive homes and borrowing less, on page 13.

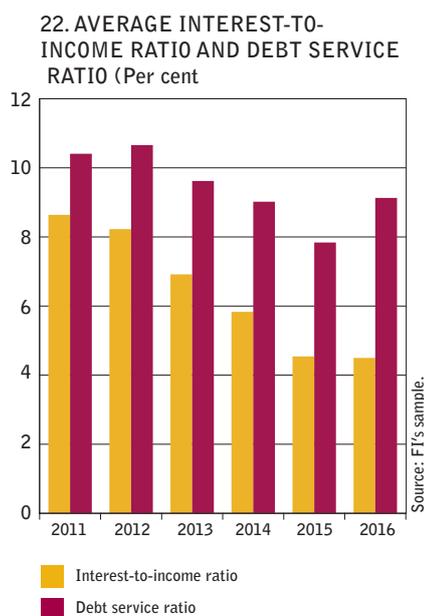


The amortisation requirement has resulted in households buying less expensive homes and thus borrowing less. The effect is greatest for the households that must amortise at least two per cent a year (Diagram R 2.1). The amortisation requirement had the greatest effect in Stockholm and Gothenburg, where the debt-to-income ratios for households with new mortgages was 15–20 per cent lower as a result of the amortisation requirement. The analysis also shows that families with children borrowed less as a result of the amortisation requirement. We do not find any indication that the amortisation requirement had a particularly large negative impact on younger home buyers, but rather the older households reduced their loans the most.

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## Households' payment ability

Both banks and FI assess mortgage holders' payment ability. FI's calculations and stress tests show that households' payment ability is continuing to improve. As a whole, FI makes the assessment that the risk for widespread credit losses for the banks as a result of mortgages is small.



Note. Shows interest service and total debt service as a share of household disposable income. The payments are based on the interest rate and amortisation amounts established when the loan was granted.

A customary method for measuring household debt is to look at the interest-to-income ratio or debt service ratio. These ratios show how much of their disposable income households spend on mortgage payments. The interest-to-income ratio only pertains to interest payments, while the debt service ratio also includes amortisation. The average interest-to-income ratio for new mortgage holders has fallen in recent years, but was stable in 2016 (Diagram 22). Up until 2015, the average debt service ratio also fell, but it increased in 2016 compared to the previous year, which means that amortisation payments have increased.

### BANKS' ASSESSMENT OF HOUSEHOLDS' PAYMENT ABILITY

Before the banks grant a mortgage, they conduct a detailed assessment of a household's economic situation and repayment ability via a discretionary income calculation. These calculations are key from a consumer protection perspective, but also are an important part of the banks' risk management. This is why FI has been following the banks' methods for a long time. When applying for a loan, a household provides information about, for example, income and other debts. The bank deducts taxes and housing-related expenses from the income, as well as operating expenses, interest rate expenses (which are calculated using a higher interest rate than the current rate) and amortisation payments. The banks also make deductions for subsistence costs. In order for a mortgage to be granted, most of the banks' internal instructions say that the household may not have a deficit after these deductions are made.

The mortgage survey for the year shows that the average standardised costs are lower in 2016 than they were in 2015. The average standardised cost for one adult has decreased from SEK 9,200 to 8,500. All banks starting this year are including the amortisation requirement in their discretionary income calculations. The average discretionary income interest rate has increased slightly compared to last year and was approximately 7 per cent in 2016. This can be compared to the average actual mortgage rate in the sample, which was approximately 1.65 per cent.

The banks say that they are restrictive in granting loans to households that have a deficit in their discretionary income calculations, but that they sometimes make exceptions. Such exceptions are normally granted when the household has other major assets, additional income that has not been included in the calculation, a low loan-to-value ratio or parts of the loan that are a temporary bridging loan.<sup>15</sup> In the sample, the loan-to-value ratios in 2016 had similar distribution for all households, regardless of whether they had a deficit or surplus.

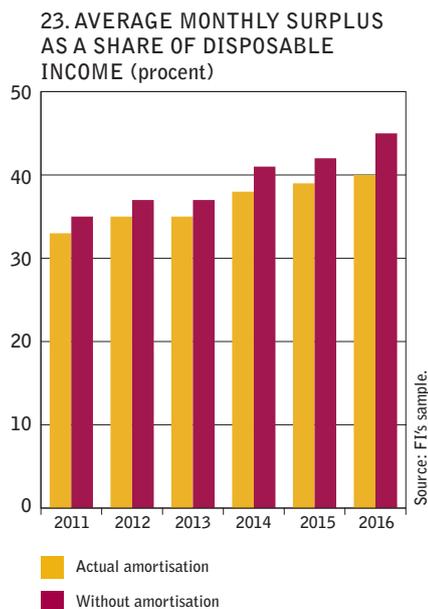
<sup>15</sup> A bridging loan is a temporary loan granted for the period between when the household has paid for a new mortgage but not yet received payment for the old apartment that the household has or intends to sell.

## FI'S ASSESSMENT OF THE HOUSEHOLDS' PAYMENT ABILITY

FI evaluates the margins for the households in the sample by conducting its own calculations of the households' monthly surplus.<sup>16</sup> FI uses the interest rate that applies at the time the loan is granted, and not a higher imputed rate of interest, as the banks do. Hence, FI's calculations cannot be compared directly with those of the banks. Households' resilience to rising interest rates is instead analysed through stress tests (see "Stress tests indicate good margins"). In some cases, it is interesting to see the effect of amortisation and FI therefore makes two calculations, one without amortisation and one with the actual amortisation agreed upon when the mortgage was granted.

The banks use both different standardised expenses and discretionary income interest rates. The stress tests treat all households equally and therefore uses the average of the banks' standardised costs and discretionary income interest rates.<sup>17</sup> Standardised costs are dependent on the household's type of housing, size and composition, and does not refer to the households' cost level at the time the mortgage is granted. Instead, standardised costs refer to the costs that are judged to be necessary and therefore cannot be avoided if the household were to encounter financial difficulties. FI calculates the households' net income by deducting tax, in accordance with a pre-determined scale, from gross income and then adding child benefits.<sup>18</sup>

In order to be able to make a unified assessment of different borrowers and banks, FI uses the average of the banks' various calculations for subsistence costs per month. These costs decreased in 2016 because some banks lowered their standardised costs. FI would like to take a cautious approach to the households' resilience and has therefore chosen to use the subsistence costs for 2015. The subsistence costs in 2015 amounted to almost SEK 9,200 for one adult and SEK 22,700 for two adults and two children.<sup>19</sup> Costs for previous years and 2016 have thus



Note. Actual amortisation is according to what was established when the loan was granted.

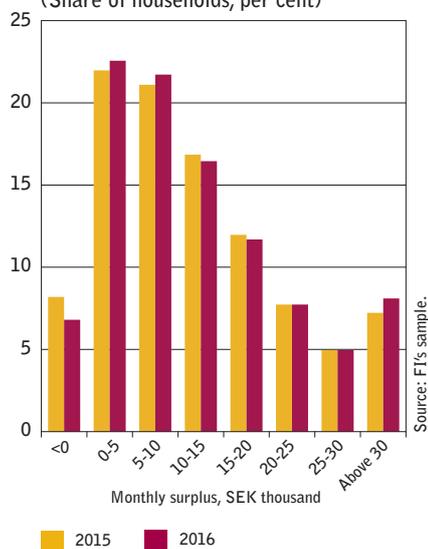
<sup>16</sup> See Appendix 1 for a more detailed description of FI's calculation of monthly surplus.

<sup>17</sup> The banks have access to more detailed information about households, and may therefore use household-specific information such as actual tenant-owned apartment charges and operating expenses for single-family dwellings that are based on the size of the home of the household. Because FI does not have access to sufficiently detailed information about the homes of the households, standardised costs are used instead. Hence, FI's calculations are not as precise for individual households as the banks' calculations. Furthermore, the banks can also sometimes take into consideration the financial assets of households in their assessment of household payment ability. Because FI lacks such information, this is not possible in FI's analysis. The banks' methods for determining households' ability to pay vary between banks. By using a standardised calculation that is the same for all banks, FI is able to make consistent comparisons between banks.

<sup>18</sup> According to the tax schedule, income less than SEK 5,400 per month is not taxed, income between SEK 37,500 and 5,400 is taxed at 30 per cent of the gross amount, income between 53,750 and 37,500 is taxed at 50 per cent and income above 53,750 at 60 per cent.

<sup>19</sup> The Swedish Consumer Agency's benchmarks for 2016 are between SEK 6,350 and SEK 17,480 for each household size. The Swedish Consumer Agency states that its calculations are based on a fundamental need for goods and services required to cope with daily life in society, irrespective of the household's income. It represents neither a subsistence minimum nor excessive consumption, but rather a reasonable standard of consumption. Costs for, for example, pre-school are not included. For further information see Swedish Consumer Agency Report 2013:4 (Swedish only): "Konsumentverkets beräkningar av referensvärden".

24. HOUSEHOLDS' MONTHLY SURPLUS AT AN INTEREST RATE OF 7 PER CENT (Share of households, per cent)



been calculated using the Consumer Price Index with a fixed interest rate (CPIFI). The reason that FI has chosen CPIFI and not the consumer price index (CPI) is to avoid counting interest expense twice.<sup>20</sup>

### HOUSEHOLD MARGINS ARE SOUND

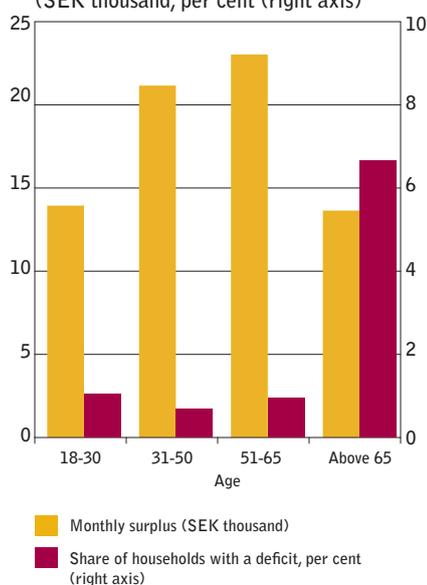
The margins of households are sound in general. According to FI's calculations, households in the sample have on average a surplus of SEK 20,000 per month after housing and other subsistence costs are paid.<sup>21</sup> This means that the surplus is 40 per cent of the disposable income, which is slightly higher than in 2015 when the average surplus was 39 per cent (Diagram 23).

One cause behind the increase in the surplus of households since 2011 is that interest rates on average have decreased. However, the average rate in 2016 is the same as in 2015. Even at the given interest rate level, there are fewer households in 2016 compared to 2015 that have small margins (Diagram 24). Hence, the increased surplus of households between 2016 and 2015 depends on factors other than the level of the interest rate.

Among all households, almost 12 per cent had less than SEK 5,000 in surplus every month, given the calculations of their actual interest rate. This is largely the same as in 2015. The percentage of households with a deficit at the time the mortgage was granted amounted to 1.3 per cent in 2016, which can be compared to 2.2 per cent in 2015.

As in previous years, the youngest (18-30) and oldest (65+) households have the lowest average monthly surpluses including agreed amortisation (Diagram 25). The surpluses for households in the age group 18-30 have increased from SEK 12,800 in 2015 to approximately SEK 13,900 in 2016. One per cent of the households in age group 18-30 have a deficit, according to FI's calculation. The corresponding figure for 65+ households is 6.6 per cent, which is lower than in 2015 (8.5 per cent). For the other age groups, the average surplus falls between SEK 21,000 and 23,000, which is more than SEK 500 higher than in 2015. Less than one per cent of these households show a deficit.

25. MONTHLY SURPLUS IN DIFFERENT AGE GROUPS (SEK thousand, per cent (right axis))



### STRESS TESTS INDICATE HEALTHY MARGINS

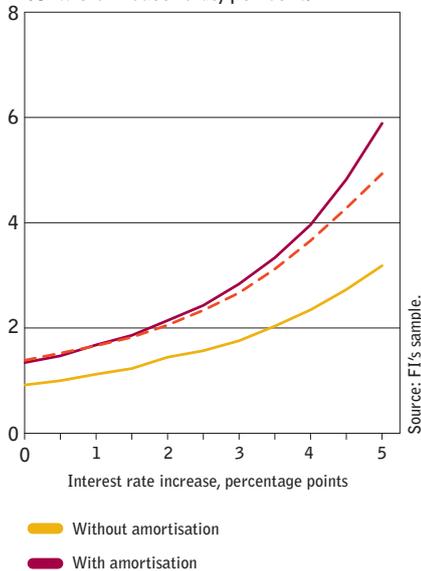
In order to study the resilience of households to changes in their financial circumstances, FI performs so-called stress tests. In the stress tests, FI estimates how the households' payment ability is affected by rising interest rates, unemployment, or a drop in the value of the home. Interest rate increases and unemployment lead to the households having smaller monthly surpluses, while a drop in house prices leads to an increase in the households' loan-to-value ratio. FI has analysed four negative scenarios:

- higher interest rate
- higher unemployment
- a combination of higher interest and a fall in the price of the home

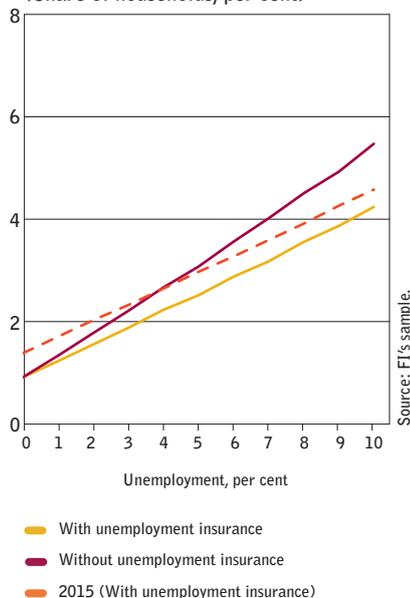
<sup>20</sup> The calculation only applies to subsistence costs. The cost for the home is calculated as the average of the banks' calculations.

<sup>21</sup> The calculation is based on the banks' average standardised costs using the actual interest rate and the actual amortisation schedule.

**26. HOUSEHOLDS WITH A DEFICIT FOLLOWING AN INCREASE IN THE INTEREST RATE**  
(Share of households, per cent)



**27. HOUSEHOLDS WITH A DEFICIT FOLLOWING AN INCREASE IN UNEMPLOYMENT**  
(Share of households, per cent)



- a combination of higher unemployment and a fall in the price of the home.

In the first two scenarios, the share of households that would have a deficit in their monthly calculation is calculated, and in the last two scenarios the share of households that would both have a deficit and a loan-to-value ratio exceeding 100 per cent is calculated.

The fact that a household has a deficit in the stress tests does not necessarily mean that it would have difficulties paying its loan instalments if a similar scenario were to happen in reality. For example, the household could draw on savings to cover temporary deficits. The household might also have the possibility of cutting back on consumption or agreeing with the bank on a temporary suspension of its amortisation instalments, which is possible given certain conditions according to FI's amortisation requirements, and deferring interest payments. A deficit in accordance with FI's calculations can therefore not be equated to credit losses for the banks. At the same time, there may also be expenses that are not captured by FI's monthly calculations that the households cannot avoid. The fact that a household has a surplus in FI's stress test is therefore no guarantee that it will not suffer payment difficulties.

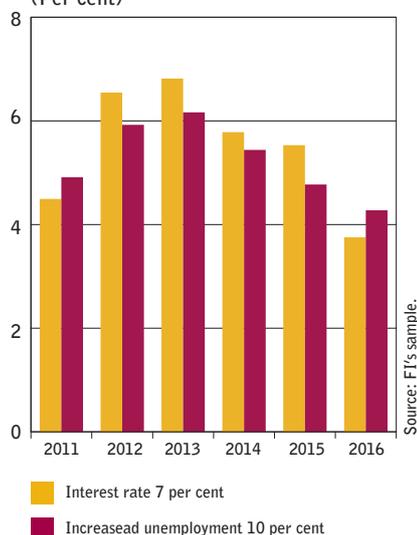
The stress tests only show the extent to which the households could be expected to handle their payments and thus are not an indication of the effects the households' adjustments could have on the economy. As a whole, the stress tests show considerable improvement in household resilience since 2015. This applies in particular to a comparison where households may be exempted from the amortisation requirement. One probable cause for this is that the banks include amortisation payments in their discretionary income calculations. The fact that amortisation payments can be paused if necessary make it possible to use them as a sort of buffer.

**Interest rate sensitivity**

Interest rates are currently at historically low levels and there is reason to expect them to go up in the future. The fact that households have buffers in their finances helps them handle higher interest rate expenses. They can also protect themselves against higher interest rates by fixing their mortgage rate for a long period of time. FI's sample shows that approximately four out of five households have an average interest rate adjustment period of less than one year, which is somewhat higher than last year.

FI calculates households' sensitivity to interest rates by increasing the mortgage rate in order to see how many households would have a deficit in their monthly calculation. The interest rate increment is added to the actual interest rate that the household agreed to pay at the time of loan application. Hence, the highest interest rate increment of 5 percentage points entails an average interest rate of 6.7 per cent, because the average interest rate in the sample is 1.7 per cent. Interest expenses in the stress test are calculated using households' aggregate loans – not just mortgages – because in a scenario of increasing mortgage rates it is reasonable to assume that interest rates would rise for all of the households' debt. The stress test also affects fixed interest rates. This means that the interest rate sensitivity of households is overestimated in the short term. Over time, however, fixed interest rates will also be affected by the interest rate increment if interest rates rise permanently.

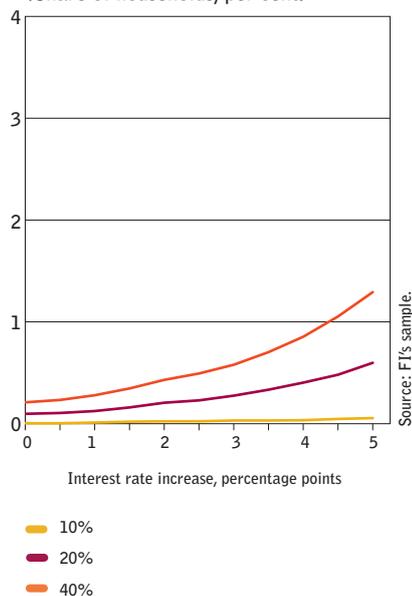
28. SHARE OF HOUSEHOLDS WITH A DEFICIT AT AN INTEREST RATE OF 7% OR FOLLOWING AN INCREASE IN UNEMPLOYMENT OF 10% (Per cent)



Note. Calculation with increased unemployment is based on an interest rate of 2%.

Source: FI's sample.

29. HOUSEHOLDS WITH DEFICIT AND LTV OVER 100 PER CENT, COMBINED INTEREST RATE INCREASE AND FALL IN HOUSE PRICES, NEW LOANS (Share of households, per cent)



Source: FI's sample.

An increase to the interest rate of 5 percentage points would mean that the share of households with a deficit rises from just over one per cent to 6 per cent (Diagram 26). The debts of these households also equal 5.5 per cent of the total lending volume. However, if households can suspend their amortisation payments, only 3.2 per cent have a deficit. The share of households with a deficit increases the most in the age group 65+. This group also has the highest share of households with deficits before the stress test. Households with a high debt-to-income ratio are also overrepresented among those with a deficit in the event of a 5 percentage point increase to the interest rate, which is natural because the debt-to-income ratio can be said to be an indicator of interest rate sensitivity. Fewer households have small margins compared to last year. In 2015, an interest rate increment of 5 percentage points and an assumption that households can defer their amortisation payments resulted in approximately 5 per cent of the households having a deficit. The difference between 2016 and 2015 is due to a decrease in the percentage of households with the smallest margins (Diagram 28).

### Unemployment

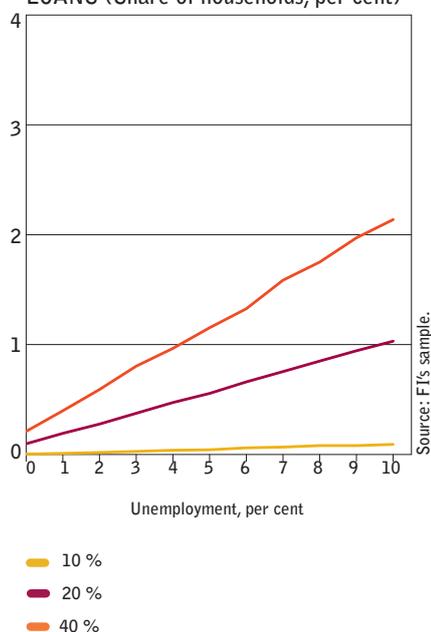
Unemployment can bring about a sharp deterioration in a household's financial situation, especially if those affected do not have unemployment insurance. FI has analysed the ability of households to cope with interest payments and other housing and subsistence costs given a simulated increase in unemployment.<sup>22</sup> The stress test is not dependent on present unemployment levels in Sweden or the sample. The risk of households in the sample being affected by unemployment is probably lower than for society at large, because the banks require households to have a solid financial position before being approved for a mortgage. The rise in unemployment in the stress test thus cannot be interpreted as the Swedish unemployment rising by a certain number of percentage points from the current level.

In practice, the stress test is a simulation in which a share of borrowers under 67 years of age are randomly assumed to become unemployed, whereupon the income of the household declines.<sup>23</sup> The new income of the households then forms the basis for a new monthly calculation, and in the same way as for interest rate sensitivity, FI studies how many households would have a deficit. The stress test is performed once with the assumption that some of the borrowers are covered by unemployment insurance, and once with the assumption that no borrowers are

22 In the stress test for unemployment and a decline in the prices, it is assumed that households suspend their amortisation payments.

23 FI assumes that 73 per cent of borrowers are covered by an unemployment benefit fund. In terms of unemployment benefit funds, it is assumed that income drops to 80 per cent of original income in the first 200 days and subsequently to 70 per cent of the original salary up to 300 days. Income may however not exceed the maximum amount of SEK 760 per day. Of those unemployed, 28 per cent are assumed to be in long-term unemployment. Long-term unemployment refers to households that have been unemployed for more than 200 days and therefore receive lower compensation. Furthermore, it is assumed that the benefits of 30 per cent of those in long-term unemployment expire. The income of these people and those affected by unemployment and who are not covered by an unemployment benefit fund amounts to SEK 365 per day, known as the basic amount. In order to ensure that the outcome is robust, the random selection is repeated 10,000 times. Every borrower under the age of 67 can become unemployed in the stress test, which means that both borrowers in households with more than one adult can be affected. The diagrams show an average of all outcomes.

**30. HOUSEHOLDS WITH DEFICIT AND LTV OVER 100 PER CENT, COMBINED UNEMPLOYMENT AND FALL IN HOUSE PRICES, NEW LOANS (Share of households, per cent)**



covered. None of the banks state that they generally require borrowers to have unemployment insurance to be granted a loan.

Diagram 27 shows that 4.2 per cent of households have a deficit in their monthly calculation if 10 per cent of the borrowers are assumed to be unemployed. Such households account for around 3.2 per cent of the total lending volume in the sample. If none of the borrowers have unemployment insurance, the share with a deficit would be around 1.2 percentage points higher. The share of households with a deficit in equivalent categories was up to 0.5 percentage points higher last year, which corroborates the view that the margins of households have increased slightly. Because the banks require mortgage holders to have a sound financial position, an unemployment level of 10 per cent among borrowers in the sample would probably imply a much higher level for the population as a whole.

**Household margins have improved over time**

In order to investigate how households' resilience has changed over time, FI made two standardised calculations for 2011-2016. The first calculates the share of households that have a deficit in the monthly calculations at a 7 per cent interest rate. The second calculation studies the share of households that have a deficit at a 2 per cent interest rate and an unemployment rate that is 10 percentage points higher. Diagram 28 shows that there are fewer households with small margins compared to 2013.

**Decline in house prices combined with higher stress**

FI also develops the stress analysis by combining interest increments or higher unemployment with declining house prices. The results show the share of households that end up with a deficit in addition to negative equity, i.e. the value of their home being less than the size of their loan. The aim of the analysis is to provide an indication of how many households would continue to be in debt if they were forced to sell their house due to impaired payment ability. As already pointed out, households in practice can also adapt in ways other than by selling their homes if their situation changes. If a similar scenario had happened in reality, it is therefore not certain that households that end up with a deficit in the analysis would be forced to sell their homes.

If the interest rate increases by 5 percentage points at the same time as house prices decline by 20 per cent, more than 0.6 per cent of households would have a deficit at the same time as their loan-to-value ratio would exceed 100 per cent (Diagram 29). If prices were to fall by 40 per cent, the corresponding figure would be instead 1.3 per cent of households. In the same stress test in 2015, 2.5 per cent of the households have a deficit and a loan-to-value ratio of more than 100 per cent.

In a scenario of house prices declining 20 per cent and 10 percent of the borrowers becoming unemployed, one per cent of households with new mortgages would have a deficit and simultaneously a loan-to-value ratio exceeding 100 per cent (Diagram 30). If prices were to drop double that amount, by 40 per cent, 2.1 per cent of households would have a deficit while the value of their home would be less than their mortgage. In the 2015 sample, this figure was 2.5 per cent.

The stress tests show as a whole that most households that have taken out new mortgages have sufficient margins for handling negative scenarios such as higher interest rates, higher unemployment or a decline

in house prices. Even in the event of severe stress, few of the households experience problems with their payments. All stress tests also show that the number of households with the smallest margins have decreased compared with the previous year, even if the improvement in some cases is very small.

### Consumption effects in a negative scenario

A deeper look shows the impact on macroeconomic vulnerabilities by calculating how many households are expected to reduce their consumption if an unfavourable scenario were to unfold. We use the same calculations as in FI Analysis 9: Households' interest rate adjustment periods – an economic vulnerability?<sup>24</sup>

Sweden has had very low interest rates for a long period of time.

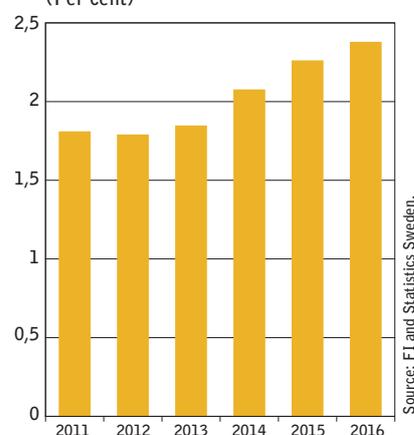
This has kept households' interest expenses low and stimulated consumption, but household debt has increased sharply at the same time and households are more likely to choose variable rates for their loans. This combination has made households sensitive to rising interest rates. The high sensitivity of households to interest rates means that relatively small changes in interest rates could have a relatively large impact on the margins and consumption of indebted households.

Assuming that all households decrease their consumption to the same extent that their interest rate expenses rise, we are able to calculate the consumption reduction in a scenario of rising interest rates.<sup>25</sup> Our calculation of aggregate statistics from Statistics Sweden indicates that household consumption in 2016 would be almost 2.4 per cent lower if the interest rate increased by 3 percentage points (Diagram R 3.1). The potential consumption reduction due to a rise in interest rates has gradually increased in recent years. This is because households have larger debts and shorter interest rate adjustment periods.

The calculations show the direct effect of higher interest rate expenses on consumption. A rise in interest rates could also mean that households become more pessimistic about the future, and thus increase their buffer savings, which further reduces consumption. An interest rate increase can lead to falling house prices and thus further increase the reduction in consumption. At the same time, households already have considerable savings that can be used during times of financial stress. The consumption effects could thus be smaller than what is shown here.

The results of this deeper look show that a change in the interest rate can

R 3.1. DECREASE IN HOUSEHOLD CONSUMPTION AT AN INTEREST RATE INCREASE OF 3 PERCENTAGE (Per cent)



Note: The diagram shows an estimated reduction in consumption given an interest rate increase of three percentage points that is assumed to occur over the course of one year.

Source: FI and Statistics Sweden.

24 FI Analysis 9: Household interest rate adjustment periods - an economic vulnerability, (2017) <http://www.fi.se/sv/publicerat/rapporter/fi-analys/2017/fi-analys-9-hushallens-rantebindningstid--en-ekonomisk-sarbarhet/>.

25 This assumption means that there are no other distribution effects in the consumption reduction. However, it is conceivable that households with high or low margins will reduce their consumption to varying extents.

have increasingly larger effects on household consumption. An interest rate increase of 3 per cent could slow consumption by 2.4 per cent. Household debt thus constitutes a major macroeconomic vulnerability.

## Appendix 1 – FI’s monthly calculation

The banks’ discretionary income calculation contains detailed information about mortgage holders’ household-specific information that is registered upon loan application. This includes actual tenant-owner apartment charges and operating costs for the individual household. In the absence of information, the banks use standardised costs, depending on household size and composition, and type of home. FI’s monthly calculation employs an average of these standardised costs (see below) for all households of the same type. The standardised costs only take into account the type of home, and not its size. Because the size of a home can have a major bearing on costs, such as for heating, FI’s calculations are not as precise for individual households as those of the banks.

TABLE B1. FI’s standardised costs in the monthly calculation (SEK)

Agency	2016	2015	Swedish Consumer
<b>Cost of living</b>			
1 adult	9,300	9,200	6,350
2 adults	16,100	15,900	11,090
per child	3,500	3,400	2,930
<b>Operating expenses</b>			
Single-family dwelling	4,000	4,000	
Tenant-owned apartment	3,100	3,400	
Holiday home	2,100	1,700	

The standardised costs in the table are estimated by an average of the standardised costs stated by the banks for 2015. The extrapolation uses CPIF. To the right are the standardised costs for 2015 that were used in the 2015 report (the new stress test for 2011-2014 are based on a backward extrapolation of the costs from 2015, even then with CPIF) and the Swedish Consumer Agency’s estimates of costs to achieve a reasonable consumption standard.

## Appendix 2 – Relationship between loan-to-value ratios and debt-to-income ratios for households with new loans

The diagram below shows the loan-to-value ratio and debt-to-income ratio for each household in the survey. Each dot represents one household.

DIAGRAM B2. Sample 2016: Relationship between loan-to-value ratio and debt-to-income ratio, new loans

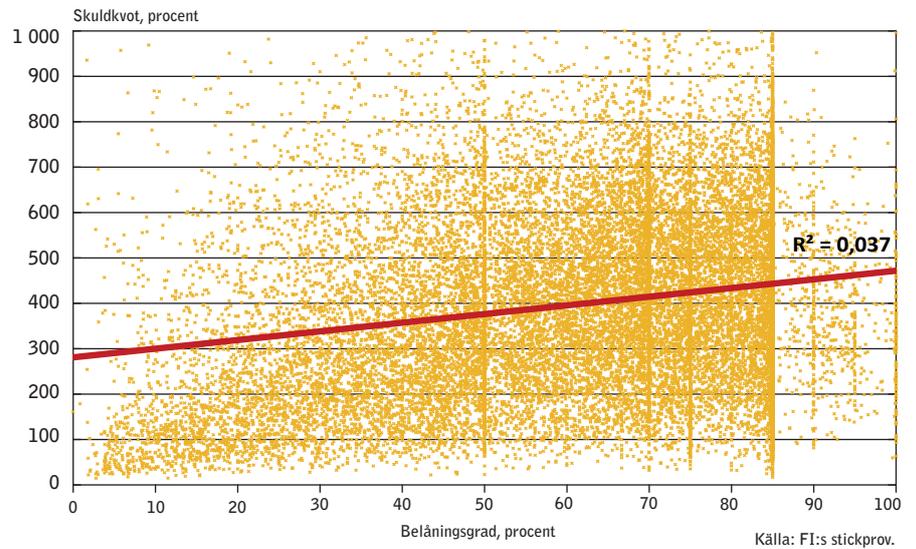
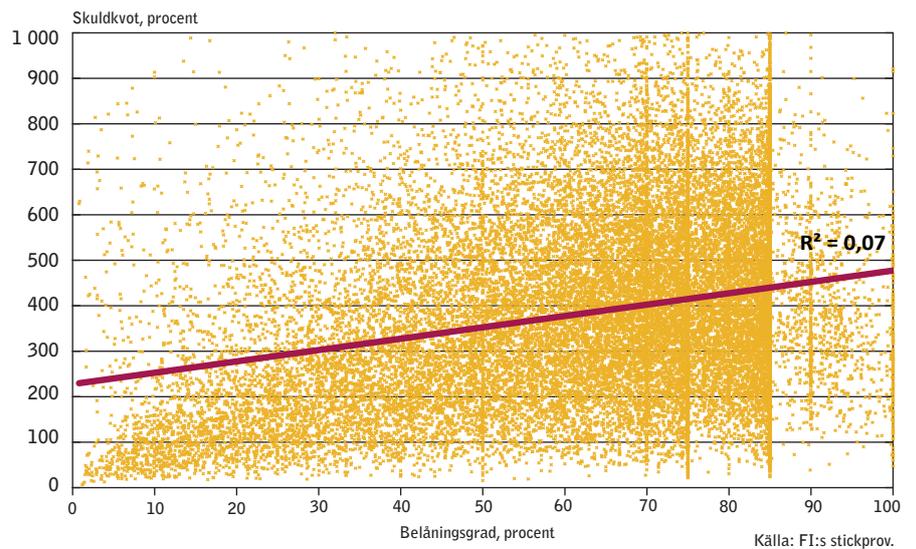


DIAGRAM B3. Sample 2015: Relationship between loan-to-value ratio and debt-to-income ratio, new loans



## Glossary

**Debt service ratio** The debt service ratio is calculated as households' total interest and amortisation expense in relation to disposable income.

**Debt-to-income ratio** A measure of debt that is calculated as the households' total debt divided by their annual disposable income.

**Discretionary income calculation** The calculation and analysis that is usually conducted by the bank when a borrower applies for a loan. It is a measure of how much of a household's disposable income is left after paying housing and subsistence costs.

**Discretionary income interest rate** An interest rate used in the calculation of discretionary income to determine households' interest expenses. This interest rate is higher than the current interest rate to test the resilience of households to interest rate increases.

**Disposable income** A household's income after tax but before paying for all lending costs, housing costs and subsistence costs. The banks' definitions of household income can differ slightly since several of the banks only include income from employment or business and tax-free income (such as child benefits) while others also include capital income.

**Income deciles** Income deciles are created by sorting households according to their disposable income. Each income decile contains one tenth of the households in the sample, where income decile 1 contains households with the lowest income, and income decile 10 the households with the highest income.

**Interest-to-income ratio** The interest-to-income ratio is calculated as the household's actual interest rate expense divided by the household's disposable income and demonstrates how much of its income the household spends on interest rates expense.

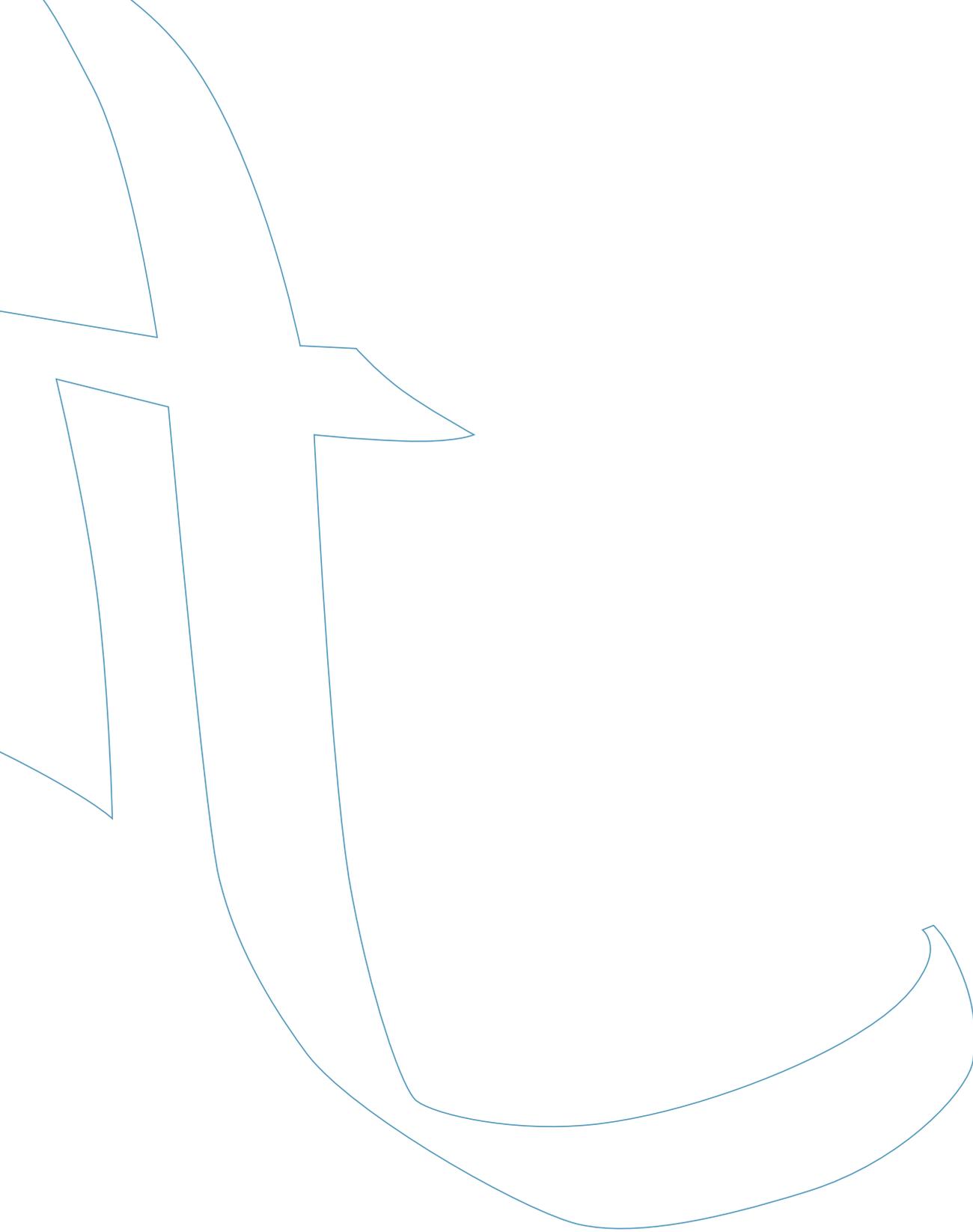
**Loan-to-value ratio** The ratio between the size of the loan and the market value of the home. In the mortgage survey, the calculation of the loan-to-value ratio differs slightly between the sample and the data for existing loans (the mortgage stock). For existing loans, the loan-to-value ratio is calculated using the loans collateralised by homes. In the sample, any unsecured loans attributable to financing a home have been included in the loan-to-value ratio calculation.

**Mortgage stock** The total volume of outstanding loans collateralised by homes.

**New loans** New loans or strict new loans refer to new mortgages taken out by either new or existing borrowers. For existing borrowers, the new loan may refer to a loan on either new collateral or existing collateral. For the latter, the loan-to-value ratio must increase by more than 50 per cent to be calculated as a new loan within the framework of the mortgage survey. For new borrowers, the loan may be the result of switching banks. It is not possible to distinguish these loans from other loans and they are therefore included in FI's data. Loans with renegotiation terms or existing loan agreements that are extended are not included.

**Standardised cost** Estimated average amount for various housing costs and subsistence costs.

**Unsecured loans** A loan that is granted without any collateral or security. In this survey, unsecured loans only include loans issued at the same time as a loan that is collateralised by a home or that can be related to financing a home in any other way.



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