

# Economic Commentaries

## Developments in the housing market and their contribution to household debt

**Robert Emanuelsson, Goran Katinic and Erik Spector**

The authors work or have worked in the Financial Stability Department of the Riksbank.<sup>1</sup>

Since the mid-2000s, Swedish housing prices have more than doubled. As housing purchases are funded to a large extent by mortgages, the increasingly high prices have been accompanied by rising household debt.<sup>2</sup>

Price development in the housing market can affect mortgage debt in different ways. A long period of rising housing prices, for example, provides greater scope for existing home-owners to increase their mortgage as their borrowing in relation to the market price of their home decreases. The household can then take out a loan using the home it already owns as collateral, which in practice means that the household takes equity out of the home by increasing its borrowing. This behaviour is more common during periods of rapid housing price growth and is therefore sometimes given as part of the explanation for the subsequent increase in household debt. Moreover, housing prices influence debt with a certain time lag as it takes time before all homes affected by price changes have been sold on the housing market.

Other factors can also affect debt trends. For example, increased construction of houses and tenant-owned apartments as well as conversions of rented accommodation to tenant-owned homes contribute to a rise in the owner-occupied housing stock. In turn, these homes need to be funded to a large extent by mortgages. In addition, debt is also affected by how much households amortise.

In this Economic Commentary, we illustrate how much the above-mentioned factors may have contributed to the development of Swedish households' mortgage debt in the period 2011–2017.<sup>3</sup> Based on the method and the assumptions used in the analysis, the increase in the mortgage stock can mostly be explained by home-buyers having, on average, paid a higher price, and therefore having needed to borrow more money, than the sellers once did, and existing home-owners having increased their borrowing with their home as collateral. Substantial construction of new homes has also affected the rise in the mortgage stock, particularly in recent years.

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<sup>2</sup> According to the financial market statistics from Statistics Sweden, the mortgage stock, which makes up about 80 per cent of total household debt, increased from around SEK 1,200 billion to SEK 3,100 billion in the period 2005–2017.

<sup>3</sup> This is one way of explaining household debt. Other approaches can be found in Finansinspektionen (2015), Hansen (2013) and Jacobsen and Naug (2004). Neither do we claim to explain, in this Commentary, the underlying causes of developments in the factors included in our analysis and that are affected by, for example, income development, interest rates, credit growth and structural factors on the Swedish housing market.

In this Economic Commentary, we illustrate how different factors in the housing market may have contributed to the rise in Swedish households' mortgage debt in the period 2011–2017. The results indicate that the rise is primarily due to home-buyers having, on average, paid a higher price, and therefore have needed to borrow more money, than the sellers once did, and existing home-owners having increased their borrowing with their home as collateral. Substantial construction of new homes has also contributed to a rise in mortgage debt, particularly in recent years.

## A method to illustrate the development in household mortgage debt

One way of illustrating the development of household mortgage debt is to consider a set-up in which the current mortgage stock ( $D_t$ ) depends on three components. The first component comprises the mortgage stock in the previous period ( $D_{t-1}$ ) after the change in debt for mortgage borrowers who do not move house ( $\alpha_{t-1}$ ). The second component consists of the new loans added as a result of households buying homes ( $D_t^{New}$ ). The third component consists of the loans paid back in full by households who sell homes ( $D_t^{Repaid}$ ). This set-up can be described as follows:

$$D_t = D_{t-1}(1 + \alpha_{t-1}) + D_t^{New} - D_t^{Repaid} \quad (1)$$

The new loans added as a result of households buying homes consist of loans taken out to fund both purchases of newly constructed homes and purchases of homes traded in the existing stock. Loans repaid in full during the period have funded the share of the housing stock now being sold. The price can differ between newly constructed homes and homes on the secondary market. Similarly, the loan-to-value ratio ( $LTV$ ) can differ both among those who buy newly constructed homes and between those who buy homes on the secondary market and those who sell homes on the secondary market. Due to accumulated price increases and amortisation, someone who has owned a home for a long time probably has a lower loan-to-value ratio than those buying a home. The turnover on the secondary market can therefore contribute to the increased debt. Furthermore, debt is also affected when rented accommodation is converted into tenant-owned housing. The latter can be considered to be homes added to the owner-occupied housing stock and here, as well, the price and loan-to-value ratio may vary compared to other housing. Overall, this can be expressed as the following two equations for both houses and tenant-owner apartments:

$$D_t^{New} = P_t^N LTV_t^N I H_t^N + P_t^C LTV_t^C I H_t^C + P_t^S LTV_t^S \theta_t H_{t-1} \quad (2)$$

$$D_t^{Repaid} = P_t^S LTV_t^R \theta_t H_{t-1} \quad (3)$$

The first term in equation (2) describes the contribution from newly constructed homes. The size of this contribution will depend on the price of these homes ( $P_t^N$ ), the loan-to-value ratio among those buying them ( $LTV_t^N$ ) and the number of newly constructed units ( $I H_t^N$ ). The second term is the contribution from conversions ( $P_t^C LTV_t^C I H_t^C$ ) that affect new mortgage debt in the same way. The third term in the equation is the contribution from the turnover on the secondary market which depends on the price there ( $P_t^S$ ), the buyers' loan-to-value ratios ( $LTV_t^S$ ) and the share of homes traded ( $\theta_t$ ) in relation to the housing stock ( $H_{t-1}$ ).

Equation (3) describes the level of repaid mortgages. This depends on the price on the secondary market ( $P_t^S$ ), the sellers' loan-to-value ratios ( $LTV_t^R$ ) and the number of traded homes ( $\theta_t H_{t-1}$ ). Combining these two equations with equation (1) gives us the following:

$$D_t = D_{t-1}(1 + \alpha_{t-1}) + P_t^N LTV_t^N I H_t^N + P_t^C LTV_t^C I H_t^C + P_t^S \theta_t H_{t-1} (LTV_t^S - LTV_t^R) \quad (4)$$

This equation is rewritten to describe the change in the mortgage stock as follows:

$$\Delta D_t = D_{t-1} \alpha_{t-1} + P_t^N LTV_t^N I H_t^N + P_t^C LTV_t^C I H_t^C + P_t^S \theta_t H_{t-1} (LTV_t^S - LTV_t^R) \quad (5)$$

## Data and assumptions

To apply the method to Swedish conditions, we need to quantify the different variables in equation (5). We do this by using aggregated *statistics* on housing construction, turnover, housing stock, conversions and loan-to-value ratios for new mortgage borrowers. In addition, we make *assumptions* about the price premiums on newly constructed and converted homes, the difference in loan-to-value ratio between buyers on the secondary market and buyers of newly constructed or converted homes, and the loan-to-value ratio for those who sell their home on the secondary market. Finally, we estimate the rate of change in debt for those who do not move house.

Statistics on housing prices, housing construction, turnover and conversions are based on annual data from Statistics Sweden. Our survey period stretches from 2011 to the end of 2017. During this period, house prices have on average increased from a little over SEK 2 million to almost SEK 3 million while tenant-owned apartment prices have increased from just under SEK 1.4 million to almost SEK 2.4 million. Furthermore, about 64,000 new houses and almost 80,000 new tenant-owned apartments have been completed while a little over 34,000 rented apartments have been converted into tenant-owned apartments. During these years, turnover of housing has been relatively stable and has amounted to about 55,000 houses and 100,000 tenant-owned apartments a year.

The loan-to-value ratio for new mortgage borrowers is based on Finansinspektionen's mortgage survey and during the period 2011–2017 it has on average varied between 64 and 69 per cent for houses and between 68 and 72 per cent for tenant-owned apartments.<sup>4</sup>

We estimate the rate of change in debt for households who do not move house, with the aid of the credit information collected by the Riksbank from the eight largest banks via the credit information agency, Upplysningscentralen (UC).<sup>5</sup> During the period 2011–2017, the rate of change in debt has varied between 1.5 and 2.6 per cent, which means that households who have increased their debt have done so by larger amounts than households who have reduced their debt.

Table A1 in the appendix specifies the assumptions we have made. We assume that newly constructed houses are 20 per cent more expensive than houses on the secondary market the year before they were completed. For tenant-owned apartments, the price premium is assumed to be 30 per cent, but compared to the price that applied two years before the apartment was completed as it normally takes longer for an apartment block to be completed compared to a house. The fact that newly constructed homes are assumed to be more expensive than the prevailing price level on the secondary market when construction starts is primarily due to quality improvements, although the construction companies' price expectations can also affect the premium. Furthermore, households who convert their rented home into a tenant-owned one are assumed to do so for the same price as those who buy a home on the secondary market.<sup>6</sup> Finally, the loan-to-value ratio is assumed to be the same for buyers of newly constructed and converted homes as for buyers on the secondary market.

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<sup>4</sup> See Finansinspektionen (2018).

<sup>5</sup> See the appendix for a discussion on how these estimates have been made. For more information on these statistics, see Winstrand and Ölcer (2014).

<sup>6</sup> In the absence of data on prices for converted rented accommodation, we assume that the prices are the same as those for tenant-owned homes on the secondary market. In all likelihood, however, the price for converted rented accommodation has generally been lower.

### Assumption for the LTV ratio for those who sell their home on the secondary market

An important assumption that needs to be made concerns the loan-to-value ratio of households who sell their home on the secondary market. To estimate this, we need to know how much the sellers bought their home for, how much money they borrowed when they bought their home and the rate of change in debt during the time they have owned it.<sup>7</sup> However, we do not know these variables. To nevertheless form an idea of the loan-to-value ratio for those selling their homes, we can use several data sources and different approaches as a basis.

A starting-point can be to use banks' calculations of the average loan-to-value ratio among existing mortgage borrowers presented in Finansinspektionen's mortgage survey. In 2017, it was estimated to be 55 per cent.<sup>8</sup> However, these calculations do not consider the fact that there may be home-owners without mortgages, which means that the average loan-to-value ratio among home-owners is probably lower than 55 per cent.

To take into account that some home-owners do not have a mortgage, we can estimate the total market value of the privately owned housing stock and then relate this value to the total mortgage debt in the country. This approach generates an aggregated loan-to-value ratio in Sweden of 38 per cent.<sup>9</sup> This is a rough measure, however, and probably not representative of the average home-owner.

As these estimates are so uncertain, another option may be to use an average of banks' calculations of the average loan-to-value ratio for existing mortgage borrowers and the estimated aggregated loan-to-value ratio, which gives a figure of 47 per cent.<sup>10</sup> In the calculations below, the loan-to-value ratio among sellers is therefore assumed to be 47 per cent and it is assumed to be the same for sellers of both tenant-owned apartments and houses. Compared to the average loan-to-value ratio for tenant-owned apartment and house buyers in the period 2011–2017, this is a 23-percentage-point lower loan-to-value ratio among sellers of tenant-owned apartments and a 20-percentage-point lower loan-to-value ratio for sellers of houses.

## Turnover on the secondary market and the increase in debt by those who do not move house affect mortgage debt the most

Based on the available statistics and the assumptions we describe above, we illustrate how different factors may have contributed to the development in household mortgage debt between 2011 and 2017. It is important to emphasise that the results depend to a large degree on the assumptions we have made and that these assumptions are uncertain. Above all, it is the assumption about the loan-to-value ratio for those who sell homes on the secondary market that affects the results the most (see Figures 4 and 5 and the appendix).

<sup>7</sup> The expression may look as follows:  $LTV_t^R = \sum_{k=-\infty}^{t-1} \mu_k LTV_k^S \frac{p_k}{p_t^S} (1 + \alpha)^{t-k}$ .  $\mu_k$  specifies the share of current turnover that consists of homes bought during the period  $k$ .

<sup>8</sup> Finansinspektionen does not present aggregated loan-to-value ratios broken down into house and tenant-owned apartment buyers, which is why we assume that the loan-to-value ratio is representative of both tenant-owned apartments and houses.

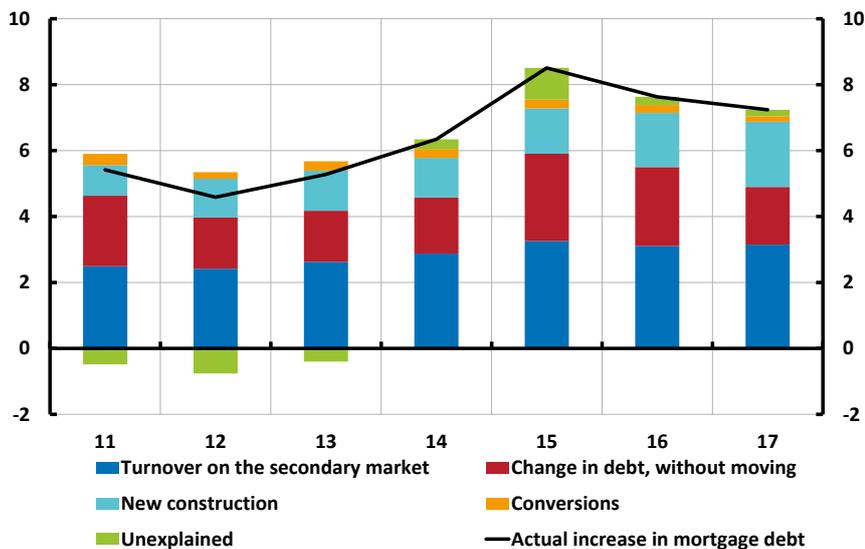
<sup>9</sup> The value of the housing stock is calculated for each county and then added together to give a nation-wide figure for tenant-owned apartments and houses respectively. The corresponding loan-to-value ratios are 41 and 37 per cent for tenant-owned apartments and houses respectively.

<sup>10</sup> Another way of estimating the loan-to-value ratio is to start from those who sell tenant-owned apartments. With the assumption that their loan-to-value ratio when they bought their home was 70 per cent, that they owned the tenant-owned apartment for 10 years and the rate of change in debt tallies with the statistics from UC, this approach gives a loan-to-value ratio of 41 per cent for those selling tenant-owned apartments.

In Figure 1, the black line shows the actual development of household mortgage debt according to Statistics Sweden's financial market statistics. The coloured bars show the contribution to the increase in the mortgage stock based on the method described earlier. As can be seen in the figure, the turnover on the secondary market, the change in debt among those who do not move house, new construction and conversions contribute to the increase in debt. The green part of the bars show the share of the increase in the mortgage stock that cannot be explained by the explanatory factors in equation (5).<sup>11</sup>

**Diagram 1. Different contributions to development of the mortgage stock**

Annual percentage change and contribution to annual percentage change respectively, net contribution



Source: The Riksbank

The largest contribution to the increase in the mortgage stock between 2011 and 2017 has come from the turnover on the secondary market, i.e. an effect of home-buyers having on average paid a higher price, and hence have needed to borrow more money, than the sellers did. The turnover contributed a little over SEK 480 billion or 44 per cent to the increase in the mortgage stock. The fact that new mortgages are taken out on a market with higher housing prices also means that the mortgage stock can increase with a certain time lag as all homes affected by a price rise have yet to be sold.

The second largest contribution to the increase in the mortgage stock, about SEK 330 billion or 30 per cent, can be explained by existing home-owners having increased their loans to a greater extent than they have repaid them. The increase in loans may have been used by households for private consumption, home improvements, purchasing a second home or for repaying any consumption loans they may have. In addition, they may have used them to help family members buy a home. If, for example, parents have mortgaged their home to a large extent in order to help their children buy a home, some of the increase in the mortgage stock has ended up in the contribution from the change in debt for those who do not move house, but it has primarily been driven by the turnover on the secondary market. Furthermore, it should be pointed out that this increase in debt does not necessarily need to affect total indebtedness to the same extent as the mortgage debt if the loan has been used to repay any

<sup>11</sup> The analysis does not consider, for example, second homes. Furthermore, the assumptions made are probably not as representative from one year to the next. The primary purpose is, however, to show the size of the contributions rather than exact levels.

more expensive consumption loans the households may have. Li and Zhang (2017) show that Swedish households have used some of the increased borrowing to repay more expensive consumption loans.<sup>12</sup>

Comparatively speaking, new construction of homes, which has increased sharply in recent years, has contributed slightly less to the increase in the mortgage stock. This is primarily because new construction comprises a small share in relation to the total housing stock of owner-occupied homes. In total, new construction has contributed a little over SEK 230 billion or 21 per cent since 2011 to the increase in the mortgage stock. Conversions of rented apartments into tenant-owned apartments have also contributed to the increase in the mortgage stock, but this contribution is smaller and amounted to a little over SEK 40 billion or 4 per cent. The part that our method cannot explain has increased debt by slightly under SEK 10 billion or less than 1 per cent.<sup>13</sup>

Overall, the different contributions have caused the mortgage stock to increase by about SEK 1,090 billion during the period 2011–2017. This can be compared to the actual increase of SEK 1,100 billion.

## Concluding remarks

Based on the method and the assumptions used in this Economic Commentary, the development in mortgage debt between 2011 and 2017 can be mainly explained by home-buyers having on average paid a higher price, and hence having had to borrow more money, than the sellers once did, and by existing home-owners having taken out new loans using their home as collateral. It is important to point out that both contributions have probably mainly been driven by sharp price rises on the Swedish housing market, even though households' decisions to borrow, given banks' willingness to lend, have also affected the debt trend. It is not possible for a household to take out a loan on its existing home unless scope for such has been provided either by price increases, amortisation or a low level of borrowing when the purchase was made. The difference between the buyer's and the seller's loan-to-value ratio will be governed by these factors in a similar way. Price growth on the housing market has therefore been of considerable significance for the development of household debt.

The fact that existing home-owners have taken out new loans to such a large extent using their home as collateral may also be of significance for the assessment of the risks associated with household indebtedness. The 2007–2008 financial crisis showed that higher borrowing with the home as collateral during a period of rising housing prices can lead to over-indebtedness and reduce consumption if housing prices decline. This is particularly true if the borrowing has been used to fund private consumption.<sup>14</sup> The extent to which borrowing with existing homes as collateral has occurred in order to fund private consumption in Sweden is currently unclear as such information is not available. This scope for borrowing may decrease, however, if housing prices fall or if credit terms are tightened. In a bad scenario, this could further exacerbate an economic recession.

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<sup>12</sup> Another explanation for the positive debt growth may be that existing home-owners initially amortise to give themselves scope to borrow more in the future in order to renovate their homes. This could then be seen as a transaction in which the household buys a renovated home from itself.

<sup>13</sup> If we instead assumed a loan-to-value ratio in line with banks' calculations for the average loan-to-value ratio among existing mortgage borrowers, the unexplained part would rise to about SEK 190 billion or 17 per cent of the increase in the mortgage stock between 2011 and 2017.

<sup>14</sup> See, for example, Bunn and Rostom (2014).

## References

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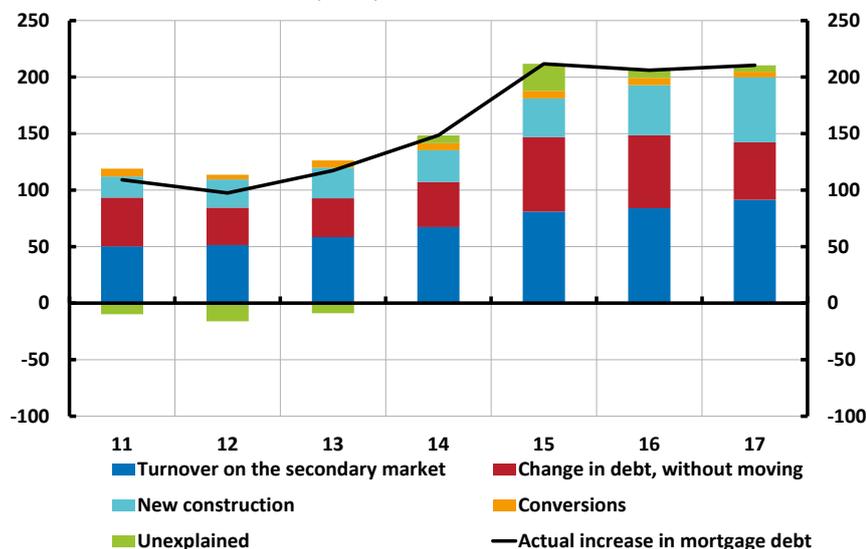
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## Appendix

**Diagram 2. Different contributions to development of the mortgage stock**

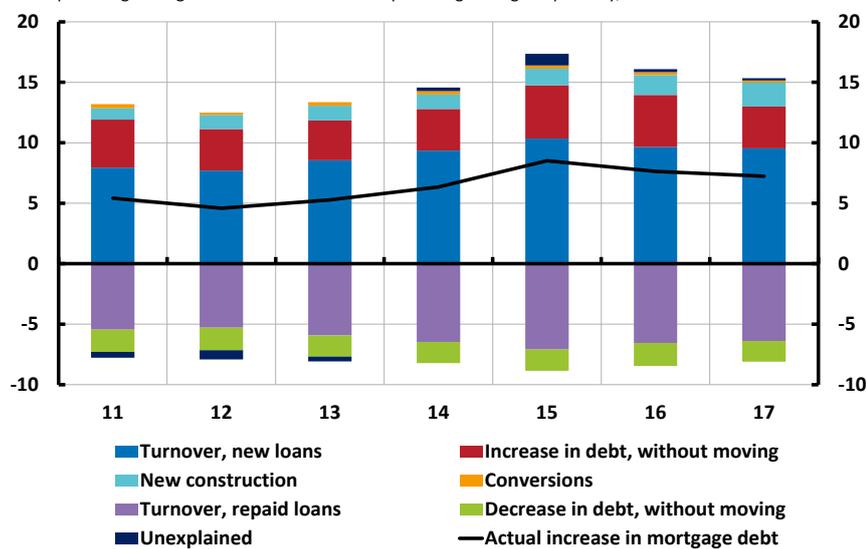
SEK billion and contribution in SEK billion respectively, net contribution



Source: The Riksbank

**Diagram 3. Different contributions to development of the mortgage stock**

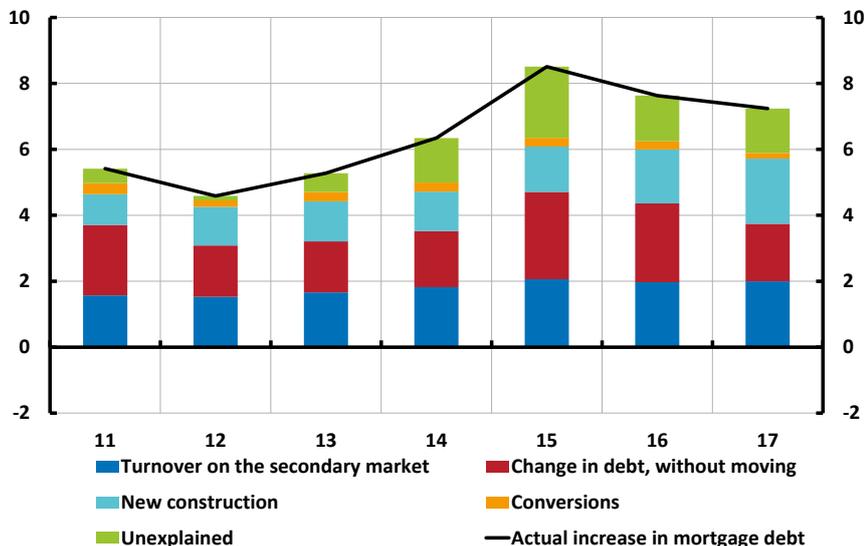
Annual percentage change and contribution to annual percentage change respectively, net contribution



Source: The Riksbank

**Diagram 4. Different contributions to the development of the mortgage stock, higher level of sellers' loan-to-value ratio**

Annual percentage change and contribution to annual percentage change respectively, net contribution

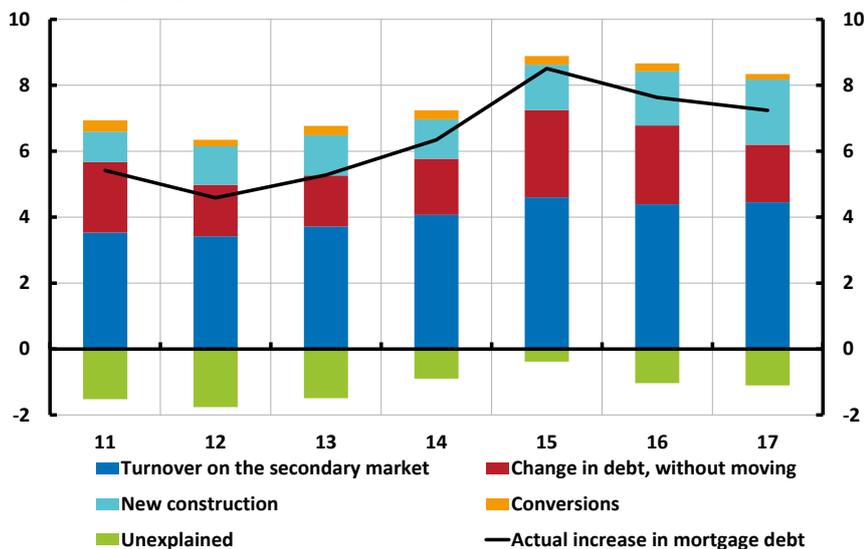


Source: The Riksbank

Note. In these calculations, it is assumed that the loan-to-value ratio among sellers is on a par with banks' calculations of the average loan-to-value ratio of 55 per cent and this is assumed to be the same for sellers of both tenant-owned apartments and houses. Compared to the average loan-to-value ratio for tenant-owned apartment and house buyers in the period 2011–2017, this is a 15-percentage-point lower loan-to-value ratio among sellers of tenant-owned apartments and a 12-percentage-point lower loan-to-value ratio for sellers of houses.

**Diagram 5. Different contributions to the development of the mortgage stock, lower level of sellers' loan-to-value ratio**

Annual percentage change and contribution to annual percentage change respectively, net contribution



Source: The Riksbank

Note. In these calculations, it is assumed that the loan-to-value ratio among sellers is on a par with the aggregated loan-to-value ratio of 38 per cent and this is assumed to be the same for sellers of both tenant-owned apartments and houses. Compared to the average loan-to-value ratio for tenant-owned apartment and house buyers in the period 2011–2017, this is a 32-percentage-point lower loan-to-value ratio among sellers of tenant-owned apartments and a 29-percentage-point lower loan-to-value ratio for sellers of houses.

**Table A1. Assumptions in the calculations**

Variable	
Price premium newly constructed houses compared to the previous year $((P_t^N/P_{t-1}^S) - 1)$	20 per cent
Price premium newly constructed tenant-owned apartments compared to two year ago $((P_t^N/P_{t-2}^S) - 1)$	30 per cent
Premium converted tenant-owned apartments $((P_t^S/P_t^C) - 1)$	0 per cent
LTV premium newly constructed houses $(LTV_t^N - LTV_t^S)$	0 percentage points
LTV premium newly constructed tenant-owned apartments $(LTV_t^N - LTV_t^S)$	0 percentage points
LTV premium conversions $(LTV_t^C - LTV_t^S)$	0 percentage points
LTV premium paid-off houses $(LTV_t^R - LTV_t^S)$	-20 percentage points
LTV premium for paid-off tenant-owned apartments $(LTV_t^R - LTV_t^S)$	-23 percentage points

**Explanation of the contribution from turnover on the secondary market**

We can see from equation (5) that the contribution to the change in debt in the mortgage stock comes from the rate of change in debt for those who do not move house, new construction, conversions and turnover on the secondary market. Equation (5) can be rewritten, however, in order to illustrate more clearly that it is not turnover itself that affects debt, as follows:

$$\Delta D_t = D_{t-1}\alpha_{t-1} + P_t^N LTV_t^N I H_t^N + P_t^C LTV_t^C I H_t^C + P_t^S LTV_t^S \theta_t H_{t-1} \left(1 - \frac{LTV_t^R}{LTV_t^S}\right) \quad (6)$$

The expressions for the contributions from purchases of newly constructed homes, converted homes and purchases of homes on the secondary market look the same and depend on price, loan-to-value ratio and number respectively. The following expression  $\left(1 - \frac{LTV_t^R}{LTV_t^S}\right)$  determines the impact from turnover, which is governed by differences in loan-to-value ratios between buyer and seller, where the latter's loan-to-value ratio is also a result of amortisation and price rises during ownership of the home. If the rate of amortisation and price increases has been small (large), the expression in brackets (and therefore the contribution from turnover) will be small (large). It is hence not the turnover itself but rather price and borrowing effects that determine the change in mortgage debt.

How rapidly a price change has an impact on the entire mortgage stock will depend on the turnover's share of the housing stock ( $\theta_t$ ). If, for example, 10 per cent of the stock is traded each year, it will take 10 years for a price change to have full impact. In other words, a high turnover would result in mortgage debt reaching a given level more rapidly. After a period of rapid price increase, the difference between the buyer's and seller's loans will be considerable and a high turnover would therefore lead to mortgage debt rising more rapidly. But for a given development in prices and loan-to-value ratio, the turnover does not affect the long-term level of the mortgage stock. A high turnover can, together with rapid price increases, be a sign of overheating. On the other hand, a subdued turnover can be a sign of lock-in effects.

**Explanation for how the change in debt among those who do not move house is estimated**

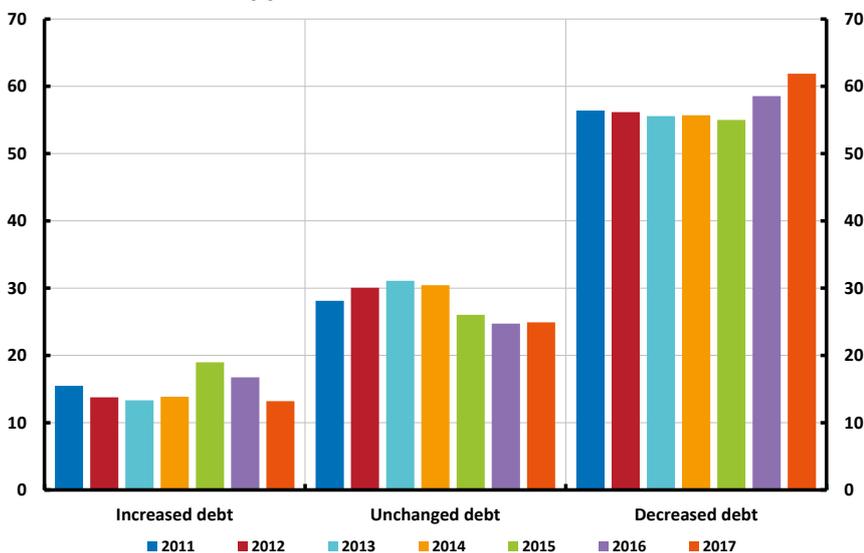
Change in debt is defined as the difference between debt increase and debt reduction for households who do not move house. We relate the difference between debt increase and debt reduction to the total mortgage stock the year before to obtain positive and negative rates of change in debt. We have limited these estimates to households that do not move house in order not to include debt increases and debt reductions that are, for example, due to households moving to more expensive or cheaper homes. We have looked at the households' postcodes and if this has not changed, the household is assumed not to have moved. It may be the case that households move house within the same postcode and hence affect the rates of debt increase and debt reduction.

There are other reasons that may affect the rates of debt increase and debt reduction and that we have not controlled for. One example is households that convert their rented apartment into a tenant-owner apartment and who have previously had a mortgage for, for example, a second home. When they then take out another mortgage to fund the converted home, this increases the household's total mortgage and hence also affects the rate of debt increase.

Figure 6 shows the share of households with mortgage debt that have decreased, increased or kept their mortgage debt unchanged between two years, given that they have not moved house. The figure shows that the share of households who increase and decrease their debt was relatively constant during the period 2011–2017. The majority of households with mortgages choose to reduce their debt, while 15–20 per cent of households choose to increase it. The share that increase their debt, however, do so to a significantly greater extent than those who reduce their debt, which means that the aggregated rate of change in debt will be positive.

**Diagram 6. Change in mortgage debt**

Per cent of households with a mortgage



Note. The calculations are based on households who do not move between two years.

Source: The Riksbank