

PM



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Memorandum 6 - Risks to the macroeconomy and financial stability arising from the development in the households' debts and housing prices¹

Abstract

The aim of this memorandum is to assess the risks to the macro economy and financial stability that are associated with high aggregate debt. This is done by illustrating and concretising the factors influencing risks associated with household indebtedness and housing prices in Sweden, and how these risks may manifest themselves in terms of the macro economy and financial stability.

A key message we wish to convey is that developments in household indebtedness and housing prices are interrelated. Assessments of the long-term levels of housing prices and household indebtedness are sensitive to assumptions regarding long-term expectations of movements in the interest rate and housing prices.

The real interest rate is currently at a historical low. If households are not prepared for a higher real interest rate in the future, sharp corrections may occur in housing prices and the desired level of household indebtedness. There are indications that the long-run interest-rate expectations of households are governed by the prevailing interest rate levels, and are lower than the Riksbank's interest rate projections.

A decline in prices in the housing market could have serious consequences for the macro economy. A core aspect of this would be the impact of housing prices on consumption, which we discuss in this memorandum on the basis of theory and empirical data. One conclusion is that the consequences for consumption and the real economy due to a decline in housing prices are probably even greater in the event of a high loan-to-value ratio and indebtedness from the outset, which has been confirmed by international studies.

¹ The authors would like to thank Hanna Mühlrad for contributing to this memo.

■ We have also concluded that the combination of high indebtedness and a large share of variable mortgage rates exacerbates household sensitivity to interest-rate movements, which could add to the macroeconomic risks.

One factor that distinguishes Sweden from a number of other countries that have experienced problems in the development of their housing market is household savings and residential construction. International studies have shown that current account deficits enhance the risks of financial crises and a fall in housing prices due to low household savings and rising residential investments. High household savings could lessen the risks in Sweden by reducing household requirements to increase savings further in the event of a decline in housing prices. In historical and international perspectives, housing investments are low in Sweden – which has probably reduced the risks; however, there are studies indicating that low residential construction could also entail risks.

In addition to high indebtedness in the household sector possibly having major effects on growth in the real economy, high indebtedness could also increase the risk of financial stability. This is due to structural weaknesses in the Swedish banking system and to the links through which various disturbances can impact these weaknesses.

The Swedish financial system encompasses a banking system that is relatively large vis-à-vis the Swedish economy. Concentration in the banking system is also considerable, with close linkage among the major Swedish banks. Because lending to households for housing purchases accounts for a substantial share of bank assets, problems in the household sector or in the housing market could have a considerable impact on financial stability.

However, not only is the Swedish banking system relatively large with mortgage lending as a significant share of bank business, but there are also direct links between bank funding and housing trends as a result of bank funding via covered bonds. Also, the banks are highly dependent on international capital markets to finance their mortgage lending.

Various links can expose the Swedish banking system's structural weaknesses to disturbances. The links that can reveal weaknesses act through a deterioration in the loan quality of mortgage lending, loan losses on corporate lending and confidence in the Swedish banking system.

Due to the combination of structural weaknesses in the banking system and links that can expose these vulnerabilities, excessively high indebtedness in the household sector could threaten not only the real economy but financial stability, too.

■ Introduction

Household indebtedness and housing prices in Sweden have risen very steeply since the mid-1990s (see Diagram 1). Housing prices have risen more than in several countries that have undergone serious problems in recent years in conjunction with sharp price corrections in the housing market (see Diagram 2). Indebtedness among households in Sweden is high from an international perspective (see Diagram 3). A number of observers have warned of the growth in household indebtedness and housing prices in Sweden, among these the IMF and the EU Commission.² Consequently, an analysis of the risks is a matter of urgency.

In 2010, the Riksbank set up an inquiry into the risks in the Swedish housing market, which was published in spring 2011. The inquiry noted, *inter alia*, that there were explanations for rising Swedish housing prices, in the form of low residential construction, declining real interest rates, rising incomes and a favourable stock market trend.³ It also stated that, although the development of housing prices could be explained by fundamental factors, prices were above a long-term trend. Accordingly, a future price decrease could not be precluded. One reason was that a number of explanatory factors *per se* were at historically abnormal levels. Any change in these explanatory factors would impact on housing prices.

Finansinspektionen (2013) discusses the explanatory factors underlying household indebtedness in Sweden. This memorandum analyses the risks for Sweden's macro economy and financial stability that could have arisen due to the *combination* of how household indebtedness and housing prices have developed.⁴ The risks to the macro economy are discussed initially. This is followed by a discussion of the risks in terms of financial stability.

Risks for the macro economy

This section addresses the risks to the macro economy related to the housing market and household indebtedness.

Initially, the relationship between housing prices and household indebtedness is reviewed. A key question in this context is the risk of a fall in housing prices. Thus, a discussion is pursued regarding the explanatory factors underlying housing prices and household indebtedness and the extent to which the current development in Sweden is sustainable. The role of expectations is of major significance in this context.

Subsequently, the potential consequences of declining housing prices for the macro economy are discussed. A key issue is the correlation between housing prices and household consumption. The impact on household consumption resulting from a decline in housing prices at various levels of household indebtedness is also addressed.

Finally, an analysis is made of a number of specific factors in the Swedish economy that could affect the macroeconomic risks associated with household indebtedness. Firstly, a large share of variable mortgage loans, combined with rising household indebtedness, could have increased household sensitivity to interest rate changes.

² See, for example, IMF (2013) and the EU Commission (2012, 2013).

³ See, for example, Englund (2011) and Claussen et al. (2011).

⁴ Shocks to other variables than housing prices could also cause adjustment patterns due to high indebtedness among households. For example, in this memorandum we also discuss households' sensitivity to interest rate changes.

- Secondly, international studies have shown that a current account deficit, driven by rising residential construction and household savings, could heighten the risks of financial crises and falling housing prices. On the basis of this, what are the macroeconomic risks for Sweden's part?

Trends in household indebtedness and housing prices are interrelated

It is important to state that the trends in household indebtedness and housing prices are interrelated to a considerable extent, since housing purchases are largely funded using borrowed money, which is also largely reflected by the fact that a large share of loans among households has been raised using homes as collateral.⁵ Thus, determining whether price growth in the housing market is sustainable is a key aspect in assessing the risks associated with household indebtedness.

The interest rate and anticipated price trends are significant in explaining housing prices...

One way of assessing the reasonableness of the development of housing prices is to proceed on the basis of user cost.⁶ The idea underlying this approach may be clarified using an example. In an unregulated market, one is faced with the choice of renting or buying a home for a period.⁷ Since a rented home does not require a deposit, a natural comparison is to relate the rent to an entirely loan-financed home purchase. The real rent, H_t , is compared with the expenses associated with a home purchase at the real price, P_t , as follows:

$$H_t = P_t \times [r_t + m_t + \Omega_t - g_{t+1}]$$

where:

r_t = real interest rate on the loan after tax deductions⁸

$g_{t+1} = \frac{P_{t+1}^e - P_t}{P_t}$ = anticipated real price change for housing up to the next period

m_t = operating and maintenance costs, expressed as a share of the housing price, P_t

Ω_t = wealth and property taxes, expressed as a share of the housing price, P_t

The right-hand side of the above relationship is referred to occasionally as the imputed rent.⁹ The correlation above provides a relationship between price and rent, or the price/rent ratio:

$$\frac{P_t}{H_t} = \frac{1}{r_t + m_t + \Omega_t - g_{t+1}}$$

We can draw the following conclusions from the relationship. A lower user cost leads to a higher housing price in relation to the rent. The lower the real interest rate after

⁵ Households that borrow using their home as collateral also represent a key feature in the general equilibrium model that will be used in the following analysis.

⁶ See, for example, Englund (2011).

⁷ One should note that the absence of market-based rents in Sweden impedes this type of analysis (see, for example, Englund, 2011 and Claussen et al., 2011). Englund (2011), however, claims that also in the case of a regulated rental market, one can use this approach as long as the inefficiency effects that arise from regulation do not change significantly over time. Rents and user cost, then, differ only by a constant.

⁸ This is defined as $i_t \times (1 - \tau) - \pi_{t+1}^e$, in which i_t is the nominal loan interest rate, τ the tax rate for interest deductions, and π_{t+1}^e is anticipated inflation.

⁹ This is a simplified application that disregards, for example, risk premiums in housing prices and capital gains taxes. For a presentation that includes these factors, see Svensson (2013).

- tax deductions, operating and maintenance costs, plus wealth and property taxes, the higher the price/rent ratio. Conversely, the higher the anticipated increase in the housing price, the greater the price/rent ratio.

For the sake of simplicity, let's disregard wealth and property taxes, as well as operating and maintenance costs. In such a case, the real interest rate on the loan after tax deductions, less the anticipated real price trend for housing, reflects the anticipated real cost of owning the house for a period and, thus, the user cost.

One problem with the formula above is that the current price, P_t , is also a constituent part of the anticipated price change, $g_{t+1} = \frac{P_{t+1}^e - P_t}{P_t}$. By using a standard approach for an analysis of asset prices, the current price of housing is provided by the anticipated discounted value of future dividends, in this case the value of the residential services/rents:

$$P_t \approx \frac{H_t}{(1+r_t)} + \frac{H_{t+1}^e}{(1+r_t) \times (1+r_{t+1}^e)} + \dots + \frac{H_{t+N}^e}{(1+r_t) \times (1+r_{t+1}^e) \times \dots \times (1+r_{t+N}^e)}$$

in which the approximation works better for a large number of periods.¹⁰

If the formula is used in an example with $N = 100$ periods, a sense is gained of how a change in the real interest rate impacts housing prices and the price/rent ratio. Assume that annual rent is currently SEK 100,000 and anticipated rents move in pace with inflation and, thus, in real terms are expected to be SEK 100,000 for each period ahead. In addition, we can assume that user cost, or the real interest rate after tax deductions in this elementary application, is 10 per cent and is expected to remain so over the entire 100 periods.¹¹ The price of the home is, then, arrived at as follows:

$$P_t = \frac{100'}{1.1} + \frac{100'}{1.1^2} + \dots + \frac{100'}{1.1^{100}} \approx 1000'.$$

Consequently, the current price/rent ratio is $1000/100=10$. Assume that the real interest rate is reduced by 1 percentage point to 9 per cent in the first period and then reverts to its original value of 10 per cent, and all other variables are held constant. The new residential price will then be:

$$P_t = \frac{100'}{1.09} + \frac{100'}{1.09 * 1.1} + \dots + \frac{100'}{1.09 * 1.1^{99}} \approx 1010'.$$

This is some 1 per cent higher than the original price, and the price/rent ratio is also 1 per cent higher. Assume instead that the interest rate is cut by 1 percentage point to 9 per cent in *all 100 periods*. The new price will then be expressed by:

¹⁰ The periodic return on a share, r_t is linked to the dividend, D_t and the expected price in the subsequent period P_{t+1}^e according to $1 + r_t = \frac{D_t + P_{t+1}^e}{P_t} \Rightarrow P_t = \frac{D_t + P_{t+1}^e}{1 + r_t}$. By substituting in the expression for the anticipated price in the subsequent period, which in turn is related to the anticipated price two periods ahead and so forth, one can show that the share price is approximately provided by the expected discounted value of all future dividends, since it is assumed that the expected discounted value of the price in the final period decreases by the number of periods (N) and is so small that one can disregard it completely when N is large. For N periods, the formula $P_t \approx E_t \sum_{k=1}^N \frac{(D_{t+k-1})}{\prod_{m=1}^k (1+r_{t+m-1})}$ applies. Correspondingly, we may view the value of the rent as the dividend related to the home, so that the housing price is provided by: $P_t \approx E_t \sum_{k=1}^N \frac{(H_{t+k-1})}{\prod_{m=1}^k (1+r_{t+m-1})}$.

¹¹ We also envisage that the 10 per cent includes operating and maintenance costs, as well as wealth and property taxes, thus: $r_t + m_t + \Omega_t$.

$$P_t = \frac{100'}{1.09} + \frac{100'}{1.09^2} + \dots + \frac{100'}{1.09^{10}} \approx 1,110'.$$

This is about 11 per cent higher than the original price. With this example, we have attempted to illustrate the major difference between temporary and permanent changes in the real interest rate as regards the impact on housing prices.¹²

Another significant insight is that if a change in the real interest rate in the first period affects the anticipated real interest rate in subsequent periods, the impact on housing prices and the price/rent ratio will lie somewhere between the effect of a temporary and permanent change in the real interest rate.¹³

If one assumes that the user cost /real interest rate is constant at the level r and that rents are expected to grow at a constant rate, g , the long-term relationship between housing prices and rents is provided by the Gordon formula:

$$P = \frac{H}{r - g},$$

where one assumes that $r - g > 0$. The price/rent ratio in long-term equilibrium is thus provided by:

$$\frac{P}{H} = \frac{1}{r - g}$$

We may also include long-term values for operating and maintenance costs and wealth and property taxes to the real interest rate after tax deductions:

$$\frac{P}{H} = \frac{1}{r + m + \Omega - g}$$

From this, it also follows that long-term housing prices may be expected to rise in pace with rent, which is natural, since housing prices reflect anticipated future discounted rents.¹⁴ Let us now return to the example above and apply this formula to the long-term equilibrium. Precisely as in the earlier example, if we assume that rents rise in line with inflation and thus $g=0$ and the real interest rate is 10 per cent, the price will be very near that which we calculated earlier, that is, 1,000'. A reduction of the real interest rate in equilibrium from 10 till 9 per cent means that the price/rent ratio in equilibrium will be 11 per cent higher.¹⁵ Thus, the assumptions regarding the long-term real interest rate have a considerable impact on the price/rent ratio in long-term equilibrium.

Note that if rents/housing prices are assumed to rise by 1 per cent in real terms ($g = 1$ per cent) instead of remaining unchanged ($g = 0$ per cent), this will have the same effect as a 1 percentage point lower real interest rate. Thus, the long-term anticipated rate of increase in real housing prices has major significance for the long-term price/rent ratio.

As shown above, factors such as property and wealth taxes play a role in the user cost, and anticipated future rents should thus be discounted by the real interest rate

¹² For a thorough analysis of temporary and permanent effects of the various components comprising user cost in housing prices, see Svensson (2013).

¹³ See Cochrane (2005) chapter 20.1, especially pages 409-410, for a detailed discussion of how the persistence in the discounting factor r affects asset prices.

¹⁴ As noted earlier, this applies on condition that there is a functioning rental market or that the difference between regulated rents and market-based rents is constant over time.

¹⁵ $[(1/0.09)/(1/0.1)]=0.1/0.09 \approx 1.11$. This is approximately the same result as in the earlier example with a permanent real interest rate change.

■ after tax deductions plus taxes and other costs of the home. Accordingly, changes in these factors, and the difference between permanent and temporary effects, will also affect the discount factor and, thereby, the price/rent ratio.¹⁶

In several contexts, the relationship of the price/rent ratio to a long-term average level has been used as a yardstick to establish whether the housing market is over-valued. A price/rent ratio exceeding the historical average indicates over-valuation. The price/rent ratio may be compared with the P/E ratio for the stock market, which shows share prices vis-à-vis earnings, E .¹⁷ Research has actually shown that the P/E ratio on the stock market tends to display mean reversion in the long term, thus entailing that the P/E ratio across an historical average indicates a weak stock market trend in the future.¹⁸ Similarly, a high price/rent ratio may thus indicate an “over-valuation” in the sense that prices will decline in the future.

Note that the user cost approach offers a natural explanation as to why the price/rent ratio varies around its long-term average in the form of the user cost /real interest rate also displaying variations around its long-term level.

...and household indebtedness

How then does one relate indebtedness more concretely to housing prices? In many contexts, household indebtedness is discussed in terms of debt in relation to disposable income, or the debt ratio, $\frac{D}{Y^d}$, in which D is debt and Y^d is disposable income.

One approach to showing how housing prices and household indebtedness are linked is to expand the expression for the debt ratio by multiplying by the price/rent ratio and the inverse of it as follows:

$$\frac{D_t}{Y_t^d} = \frac{H_t}{Y_t^d} \times \frac{D_t}{P_t} \times \frac{P_t}{H_t}$$

If we assume that the individual wishes to maintain a constant loan-to-value ratio, $\frac{D}{P}$, and wants to devote a constant share of his/her disposable income to residential costs, $\frac{H}{Y^d}$, we gain a direct correlation between the price/rent ratio and the debt ratio:

$$\frac{D_t}{Y_t^d} = \kappa \times \frac{P_t}{H_t}$$

in which $\kappa = \frac{H}{Y^d} \times \frac{D}{P}$

Accordingly, all that was noted above regarding short and long-term changes in user cost and the real interest rate similarly applies for the debt ratio as for the price/rent ratio, subject to the specific assumptions we made.

¹⁶ See, for example, Svensson (2013).

¹⁷ As implied above, the price/rent ratio may be viewed as a direct equivalent to the share price/dividend ratio.

¹⁸ It has been shown that prices drive the return to the average value. That share prices can be predicted in this manner was part of the research for which Robert Shiller was awarded the Riksbank's Economics Prize in 2013. The research results that involve the P/E ratio also largely apply to share prices in relation to dividends. Another key part of Shiller's research findings is that share prices vary “excessively” in relation to dividends.

■ The use of the expression for the long-term price/rent ratio above also provides a direct long-term correlation between the user cost and debt ratio:

$$\frac{D}{Y^d} = \frac{\kappa}{r + m + \Omega - g},$$

in which we have included operating and maintenance costs and wealth and property taxes. We can now draw up an expression for how the household debt ratio in equilibrium could be affected by the various costs of owning one's home.

Completing this requires assumptions regarding how large a share of disposable income is devoted to rents (R/Y^d) for those renting their home and how large debts are in relation to the residential price (D/P) for those who own their home. If one assumes that those who rent their home pay 30 per cent of disposable income on rent and those who buy their home have a loan-to-value ratio of 65 per cent (which is approximately how it appears among households in Sweden), one can now formulate an expression for how the long-term debt ratio changes when the parameters determining the relationship between rents and residential prices change:

$$\frac{D}{Y^d} = 0.195 \times \frac{P}{H} = \frac{0.195}{r + m + \Omega - g}$$

Diagram 4 illustrates how the long-term debt ratio varies in line with various assumptions regarding the real interest rate after tax deductions. The diagram shows that a permanent change of 1 percentage point in the real interest rate after tax deductions entails a change in the debt ratio of some 10-20 percentage points.¹⁹

This, then, involves substantial gearing between the assumption regarding the long-term real interest rate and the long-term debt ratio. One must remember that these types of calculations should be viewed as an illustration of the debt ratio's sensitivity to assumptions relating to the long-term real interest rate and is not an exact description of reality.²⁰

The close link between the real interest rate and the debt ratio in equilibrium is also clear in Walentins' (2013) general equilibrium model, which is based on Swedish data and described in greater detail below. With this model, for example, the real interest rate in long-term equilibrium may be related to the debt ratio in long-term equilibrium (see Diagram 5). The assumption relating to the long-term real interest rate has considerable implications for the long-term equilibrium of indebtedness.

That the development can be explained does not imply that it is sustainable long term

The analysis above shows that the debt and the level of housing prices that is sustainable in the long-term is highly sensitive to assumptions regarding the real interest rate/user cost. The fact that both housing prices and indebtedness have increased since the mid-1990s has occurred against the background of a decline in many of the factors included in user cost. Exactly how much this has decreased may be difficult to assess, but estimates indicate that it could involve several percentage points. Englund (2011) uses the real mortgage rate after tax deductions with a constant supplement of 7 percentage points as an approximation of user cost. He

¹⁹ The magnitude of the effect depends on the initial level of the real interest rate.

²⁰ Among other factors in conjunction with the user cost approach, the rent was compared with a fully mortgaged home purchase, meaning a loan-to-value ratio of 100 per cent.

■ finds that the price/rent ratio in Sweden has covaried with this measure of user cost. Overall, the real mortgage rate after tax deductions has declined to the extent that the user cost has halved, coinciding with a twofold increase in the price/rent ratio during the same period.²¹

There are also structural factors that imply that the scope for households to carry higher debt has increased, one such factor being the abolition of property tax.²² This entails lower user cost, leading to higher housing prices and, ultimately, to higher indebtedness.

As noted earlier, the price/rent ratio may vary around its long-term level as a result of the user cost varying around its own long-term level. Thus, the fact that low user cost/real interest rate *per se* could explain high housing prices does not indicate that this development is sustainable if the explanatory factor deviates from its normal level.²³ The short-term real interest rate is currently negative, but in the mid-1990s it hovered around 6 per cent (see Diagram 6). The Riksbank's assessment is that a normal level for a short-term real interest rate is about 2 per cent.²⁴

Among other approaches, Birch Sørensen (2013) uses the type of analysis illustrated above, in which housing prices are related to the discounted present value of future, anticipated rents. Applying Vector Autoregressive (VAR) models for 1986–2012, he finds that housing prices in 2012 were between just over 10 per cent and almost 20 per cent above their fundamental value. However, he feels that other factors, such as lower property tax, have reduced residential user cost beyond what is captured in model-based estimates, which could reduce the level of over-valuation. In his general assessment, however, he concludes that “downward pressure” on Swedish housing prices is likely in the future.

It is important to note the difficulty in determining in real time whether the trends in housing prices and household indebtedness are sustainable. In the US ahead of the financial crisis, economists differed as to whether the growth in housing prices was reasonable, with some observers dismissing the possibility of an over-valuation, since there were explanations for the development.²⁵ This differed distinctly from the assessment after the emergence of the financial crisis, with a consensus view that the US housing market was overvalued before the financial crisis.²⁶

Rising housing costs present a risk if household expectations prove incorrect

Given the strong correlation between the real interest rate and indebtedness, both historically and in the calculation examples based on the user cost model, it is reasonable to assume that housing prices and household indebtedness will not continue to grow as they have during the past 15–20 years. As mentioned above, the real interest rate is currently substantially lower than what is viewed as a reasonable

²¹ Englund (2011) compares the inverted price/rent ratio, or the yield, H_t/P_t , with the yardstick of user cost, which is $r_t + 0.07$. He finds that the yield has tracked user cost since the mid-1990s. Overall, both user cost and yield have halved during this period.

²² A number of factors are described by Finansinspektionen (2013).

²³ Englund (2011) notes that user cost is extremely sensitive to the anticipated price trend for residential housing, and that the average, real growth rate in housing prices in Sweden during the period 1995–2009 was 6.6 per cent, compared with a negative price trend over the previous 15 years. If such a difference were to be reflected in anticipations of future capital gains, it could warrant price increases of virtually any magnitude.

²⁴ See, for example, Sveriges Riksbank (2010).

²⁵ See Gerardi, Foote and Willen (2010). Shiller (2000) has shown that periods marked by extreme valuations on asset markets are frequently justified by a “new era” mentality as reflected notably by the debate at the end of the 1990s regarding share prices and the “new” economy.

²⁶ See, for example, Bernanke (2010).

long-term level. If households have included a rising real interest rate in their investment decisions, the effects on housing prices and indebtedness need not be so dramatic. Claussen et al. (2011) showed that model-based forecasts for housing prices, in which the Riksbank's then macroeconomic forecast (which, for example, included a relatively sharp rise in the interest rate) was included as an assumption, did not entail sharply falling housing prices, but instead a levelling out – or, alternatively, a declining growth rate – in housing prices.²⁷

Against this background, the possibility that households are unprepared for rising real interest rates appears as a risk that should be further analysed.

As we have shown, an assessment of a reasonable level of housing prices and debt ratio is highly sensitive to expectations regarding interest rates and housing prices. In PM 4, "The amortisation decisions of households", it is also shown that household selection of the optimal loan-to-value ratio is highly sensitive to changes in the expected mortgage rate.²⁸

The low interest rate level could have changed household expectations of the interest rate level in the more distant future. It was also shown earlier that if changes in real interest rates have persistent effects on expectations of future real interest rates, actual changes in real interest rates will have a greater impact on housing prices and indebtedness.

Thus, when the interest rate situation normalises in the future, this could prompt households to alter their view of the long-term, normal real interest rate, which could lead to major effects on housing prices and indebtedness. As noted earlier, the current real interest rate is much lower than a long-term level. The Riksbank considers the normal repo rate level to be substantially higher than the current level – in the range of 3.5-4.5 per cent, or a real repo rate of 1.5-2.5 per cent.²⁹

Expectations among households reflect a risk that their behaviour has not taken this into account but, instead, has been governed by other appraisals of the long-term interest rate level. Household interest-rate expectations are shaped partly by the prevailing interest rate level, and, over a 5-year horizon, they have for some time been below the Riksbank's assessment of the long-term interval for the variable mortgage rate (see Diagram 7). Diagram 8 shows household interest-rate expectations for one, two and five years ahead, along with the Riksbank's projections for three-month mortgage rates in the short and long term. This is yet another illustration that household interest-rate expectations for the more distant future differ from the Riksbank's forecasts.³⁰ We also saw earlier that the anticipated trend in housing prices plays a major role in the trends for the debt ratio and housing prices, as they are included as a component in user cost. US studies (such as Case and Shiller, 2003 as well as Case, Shiller and Thompson, 2012) show that house buyers

²⁷ Birch Sørensen (2013) found that housing prices adjust slowly to their fundamental values. As stated earlier, although he noted indications of a possible over-valuation, he nonetheless deduced that this did not indicate risks of a dramatic decline in housing prices but, instead, a gradual adjustment towards the long-term level.

²⁸ In conjunction with an increase in the anticipated real, variable mortgage rate by 1 percentage point compared with the average during 1997-2012, the households' propensity to mortgage their homes declines sharply.

²⁹ See Sveriges Riksbank (2010).

³⁰ There is no published survey-based measure of the rate of inflation anticipated by households over a five-year horizon, making it impossible to draw watertight conclusions concerning household expectations for the real mortgage rate. Given that the rate of inflation anticipated by households over a future five-year period hovers around 2 per cent, the patterns for household expectations regarding the nominal mortgage rate also apply in respect of real mortgage rate expectations.

■ tend to extrapolate previous price trends, thereby contributing to additional price increases during an upturn phase. Other research results confirm that this was so in the case of US households ahead of the financial crisis.³¹

There are no corresponding studies for Swedish households, but if household expectations in Sweden track the US pattern, there is a risk that households have underestimated user cost by not being prepared for a slower rise or, indeed, a decline in future housing prices.

Overall, on the basis of the above analysis – despite there being reasonable explanations for the development – one cannot preclude a fall in housing prices in the future. The question, then, is what consequences this development could entail for the macroeconomic development.

Effects on the macro economy in conjunction with a decline in housing prices

One direct effect of a decline in housing prices is that it reduces the value of household assets, while liabilities increase vis-à-vis the assets. This could have significant effects on consumption and, thereby, on demand in the economy, which would spill over into rising unemployment, for example. However, it is important to identify why such effects could arise. A key issue is to analyse the effects of housing prices on household consumption.

Correlation between housing prices and consumer demand – theory and empirics

International studies point to a clear correlation between housing prices and household consumption. Studies of US macro data usually find an elasticity of some 10 per cent between housing prices and consumption. This means that if housing prices fall 20 per cent, consumption declines 2 per cent, thereby representing a rather considerable impact, since consumption growth over protracted periods is about 2 per cent annually, with a standard deviation of approximately 2 per cent. Typically, it is also noted that consumption is more sensitive to housing prices than to prices of financial assets.³²

However, these empirical results *per se* do not provide an explanation as to *why* a correlation exists between housing prices and consumption. There are three primary conceivable reasons: pure wealth effects, credit tightening effects and balance sheet effects.³³

Pure wealth effects cannot explain the correlation between housing prices and consumption as shown in data

One can understand the pure wealth effect by analysing how household consumption reacts to changes in income. Consequently, one way of explaining pure wealth effects is to proceed on the basis of the permanent income hypothesis, PIH (Friedman, 1957).³⁴ This states that consumption is determined by total (discounted) anticipated future income, or permanent income, and not by current income. This entails the significant implication that the correlation between current income and

³¹ See Gelain and Lansing (2013).

³² See, for example, Case, Quigley and Shiller (2013) as well as Cooper and Dynan (2013).

³³ An additional possibility is that a common factor drives housing prices and consumption in the same direction, such as expectations regarding future productivity. See, for example, Iacoviello (2011).

³⁴ The life-cycle hypothesis (Modigliani and Brumberg, 1954), has similar implications and assumptions.

■ consumption is weak, since current income represents a minor share of anticipated future income.³⁵

If one widens this model to include shares, consumption is determined by permanent income and share-based wealth. The share price is determined by the anticipated future (discounted) value of dividends, and thus may be viewed as permanent income related to shareholdings. Against this background, changes in share prices can be expected to impact on consumption.

If one also adds housing to this conceptual framework, it could in a sense function as shares, since housing prices may be viewed as any other asset price and, thus, as the anticipated value of future (discounted) dividends, in this case home-related services. Remember, however, that housing is not only an asset but also a consumer durable. As a result, a decline in the housing price leads to a reduction in the anticipated future (discounted) residential costs/rents: it simply becomes cheaper to live. Subject to certain assumptions, the decrease in wealth due to a decline in housing prices will be exactly offset by a decrease in housing costs, resulting in a zero wealth effect on consumption.³⁶ Overall, the wealth effect of housing prices could be small and even smaller for financial assets.

Accordingly, these theories offer no explanation for the strong correlation in the data, either between income and consumption and housing prices and consumption. Moreover, empirical studies typically find that consumption covaries *more* with housing prices than with the price of financial assets.³⁷

Consequently, one must look to other theories to understand the correlation between housing prices and consumption as implied by the data.

Effects of credit tightening and loan collateral

One of the foremost explanations of the strong correlation between income and consumption observed in the data is credit constraints (see, for example, the classic papers by Flavin, 1981, 1985 and Zeldes, 1989). This explanation proceeds on the basis that households cannot borrow limitlessly, as assumed in PIH, but are constrained in their borrowing. This means that even in the case of forward-looking, rational households, a stronger correlation will emerge between consumption and income than that forecast by PIH: households will have a greater marginal propensity to consume. This also applies in the event that only a certain share of the households is subject to credit constraints. The intuitive idea underlying this is that if a portion of households respond strongly in their consumption to changes in income while others behave as permanent-income households, the average effect on consumption due to changes in income will be stronger than if all households were permanent-income households.

Iacoviello (2004, 2005) shows that a strong correlation could arise between consumption and housing prices in line with similar mechanisms. In this type of model, households differ: some households are "impatient", while others may be described as "patient", showing a higher propensity to "save today" to be able to consume more tomorrow. The "impatient" households wish to "consume today" and thus seek loans; the other type of household saves. Loans are raised using the home

³⁵ A consequential effect of this is that only unanticipated income changes impact on consumption.

³⁶ See, for example, Sinai and Souleles (2005), Campbell and Cocco (2007) as well as Buiter (2010).

³⁷ See, for example, Case, Quigley and Shiller (2013).

■ as collateral, which in this context makes it reasonable to assume that the value of the property sets an upper limit for how much the household is permitted to borrow. Rising housing prices permit credit-constrained households to increase their consumption by raising their mortgage through mortgage equity withdrawal (MEW). When housing prices decline, consumption among the credit-constrained households via MEW will decrease, contributing to an overall decline in consumption throughout the economy. Walentin's model, as discussed above, is an estimation of Swedish data using the same type of model as Iacoviello and Neri (2010), which in turn is based on the abovementioned model.

Empirical studies offer micro-data evidence that the consumption of credit-constrained households is more responsive to changes in housing prices than that of non-constrained households; see, inter alia, Cooper and Dynan (2013), Cooper (2013) and Browning et al (2013). This, then, is a conceivable reason for the correlation between housing prices and household consumption that is observed in aggregate data.

Balance-sheet effects

A particularly sizable effect on consumption may arise due to households raising their savings and, thus, reducing their consumption expenditure *to restore the balance sheet*. One interpretation discussed by Dynan (2012) is that households, just like companies, may strive to maintain a certain leverage over time. One hypothesis could be that they wish to maintain a certain distance to avoid becoming "under water", e.g. that the value of the home declines to less than the mortgage. A shock to housing prices entails a sharp shift in leverage vis-à-vis the targeted level, and debt reduction can offset this effect.

To illustrate the emerging effects and how these could impact on the macroeconomic development, household assets, liabilities and income, along with three descriptive debt measures, are shown in Table 1. The three debt measures are also shown in Diagram 9.

Table 1. Household assets, liabilities, income and debt measures, 2011

	Percentage of disposable income	SEK billion	Per cent
Financial assets	319	5,527	
Real assets	307	5,330	
Financial liabilities	174	3,016	
Disposable income		1,733	
Debt ratio (liabilities/disp. income)			174
Leverage (liabilities/total assets)			28
Loan-to-value ratio (liabilities/real assets)			57

The table shows that aggregate household assets exceed liabilities by a healthy margin. Financial assets are approximately twice as large as liabilities. It should be added that financial assets are considerably more unevenly distributed than real assets.³⁸

Now assume that housing prices decline and household real assets lose a total of 20 per cent in value. The household balance sheet would then change, with assets, liabilities and debt measures appearing as they do in Table 2.

Table 2. Effects of a decline in housing prices on household liabilities, assets, income and debt measures.

	Percentage of disposable income	SEK billion	Per cent
Financial assets	319	5,527	
Real assets	246	4,264	
Financial liabilities	174	3,016	
Disposable income		1,733	
Debt ratio (liabilities/disp. income)			174
Leverage (liabilities/total assets)			31
Loan-to-value ratio (liabilities/real assets)			71

A comparison of the figures in Table 2 with the figures in Table 1 clearly shows that lower asset value has affected the relationship of assets to liabilities. After the fall in value, liabilities as a share of total assets (leverage) amount to 31 per cent instead of 28 per cent and liabilities as a share of real assets (loan-to-value ratio) total 71 per cent instead of 57 per cent.

Should households wish to restore the relationship between assets and liabilities, they could do so in essentially two ways. One alternative is to sell assets (especially

³⁸ For one illustration of this, refer to the data from Statistics Sweden and Finansinspektionen's shareholder statistics from June 2013, which show that the average portfolio for households owning shares was worth SEK 301,000, while the median portfolio was worth SEK 22,000 kronor. Meanwhile, however, the 5 per cent with the largest holdings accounted for some 77 per cent share-based wealth.

liquid financial assets) and repay their liabilities. Another alternative is to use current savings to pay off their liabilities. For many households, the first alternative – to sell assets – would be precluded: partly because of a lack of sufficient assets and partly because they have no financial assets at all to prepay liabilities, since the financial assets are so unevenly distributed. Moreover, the financial assets decrease in value if a fall in housing prices coincides with uncertainty on financial markets.

To gain a sense of the magnitude of the effects on the macro economy, it can be noted that if households wished to restore their leverage by reducing their liabilities, they would need to cut them by SEK 275 billion. If households wished to reduce liabilities in order to restore the loan-to-value ratio, they would need to cut their liabilities by SEK 543 billion. As a percentage of disposable income, these reductions represent 16 per cent and 31 per cent, respectively. Needless to say, it is not reasonable to believe that households will immediately save such quantities of their income. But as household consumption comprises a substantial share of GDP, a partial adjustment may also have major effects on the real economy.

Given the stylised mechanisms described above, the question naturally arises regarding the extent that household balance sheets have any empirical relevance for savings behaviour. An initial indication in this respect may be gained if the savings and net assets of households are studied over time (Diagram 10). Diagram 10 shows that all savings are considerably linked to the way the value of household assets is developing. During periods when the value of assets decline, savings tend to increase and during periods when the value of assets rise, savings tend to decline.

One factor highlighted in the Riksbank's inquiry into the housing market in 2011 was the difficulty in taking into account that the trend in household indebtedness had increased since the mid-1990s. The repercussions of a decline in housing prices could have been worse had household indebtedness been high.

Effects of a decline in housing prices on the macro economy are probably greater in conjunction with high indebtedness among households

In recent years, a number of studies have confirmed the fact that high indebtedness exacerbates the economic consequences of a slump in housing prices.³⁹ As noted earlier, household indebtedness has increased sharply in Sweden over the past 15 years or more. This means that a fall in housing prices would occur in a situation of high indebtedness. One way of assessing the consequences that a decline in housing prices could have on the Swedish economy is to construct a scenario based on international experience. Such a scenario is illustrated in the Riksbank's Monetary Policy Report from July 2013. The scenario is based on the average macroeconomic effects experienced in a number of OECD countries, where house prices tumbled amid high indebtedness. In addition to the sharp decline in housing prices, the average sequences were marked by a relatively deep plunge in consumption. Overall, declining demand reduces GDP. The effect on the labour market is considerable, with unemployment rising conspicuously by an average of at most some 5 percentage points.

The balance-sheet effects on consumption discussed above are one reason why a decline in housing prices has a major impact on household consumption if coupled with high indebtedness. Empirical studies of US data reveal that household

³⁹ Refer, for example, to IMF (2012), Dynan. (2012) as well as to Mian, Rao and Sufi (2013).

indebtedness influences household consumption behaviour (see Dynan, 2012, as well as Mian, Rao and Sufi, 2013). The results from the studies indicate that higher indebtedness could explain lower consumption growth, with due account for wealth effects. A possible interpretation of these results, as discussed in the studies, could well be the balance-sheet effects.

To study what impact indebtedness would have on macroeconomic risks, the household's balance sheet is increased twofold, e.g. that both the value of assets and liabilities are doubled compared with the figures in Table 1. The enlarged balance sheet is presented in Table 3.

Table 3. Household assets, liabilities, income and debt measures after a twofold increase in the balance sheet

	Percentage of disposable income	SEK billion	Per cent
Financial assets	639	11,054	
Real assets	615	10,660	
Financial liabilities	348	6,032	
Disposable income		1,733	
Debt ratio (liabilities/disp. income)			348
Leverage (liabilities/total assets)			28
Loan-to-value ratio (liabilities/real assets)			57

Table 3 shows that households now have substantially larger assets, both financial and real. However, the households also have higher liabilities. In relation to disposable income, liabilities are 348 per cent. Since the increase in assets and liabilities is proportional, both leverage and the loan-to-value ratio remain unchanged.

Now again allow the value of real assets to fall 20 per cent. The household balance sheet would then change and assets, liabilities and debt measures would appear as presented in Table 4.

Table 4. Effects of a decline in housing prices on household assets, liabilities, income and debt measures in conjunction with an expanded balance-sheet total

	Percentage of disposable income	SEK billion	Per cent
Financial assets	639	11,054	
Real assets	492	8,528	
Financial liabilities	348	6,032	
Disposable income		1,733	
Debt ratio (liabilities/disp. income)			348
Leverage (liabilities/total assets)			31
Loan-to-value ratio (liabilities/real assets)			71

Source: Statistics Sweden and the Riksbank

Just as before, leverage and the loan-to-value ratio will increase. But to restore these measures by prepaying their liabilities, households must now cut their liabilities by SEK 549 billion and SEK 1,171 billion, respectively. These moves represent 32 per cent and 68 per cent, respectively, of disposable income. This is a far greater impact than in the case of the smaller balance sheet.

Naturally, households would not use such a large share of their income over a year to prepay their liabilities. It is also likely that part of any liability adjustment would involve utilising financial assets. But the fact remains that the potential effects linked to a fall in housing prices are exacerbated in a situation in which household liabilities are higher. This also applies if household assets increase correspondingly. These conclusions are completely in line with the research results referred to previously.

We could also invert the above reasoning and similarly decrease the balance sheet in relation to the starting point in Table 1, and arrive at a situation not completely unlike that of 20 years ago (see Diagram 9). We would then have smaller adjustments of consumption resulting from the decrease in housing prices compared with Table 1 and 2, for example. Thus, the enlarged balance sheets and increased indebtedness vis-à-vis income over the past 20 years may have raised the sensitivity of consumption to housing prices.

Via the credit-constraint and loan-collateral effects described above, the effects of the fall in housing prices on consumption could also be greater if they coincide with high indebtedness. The general equilibrium model drawn up by Walentin (2013), as presented earlier, can illustrate these effects. In this model, higher indebtedness is represented by a higher loan-to-value ratio. Impatient households in the model always want to mortgage their home to the maximum. By adding a fixed constraint to how much households can borrow, the effects of a fall in housing prices can be studied at various loan-to-value ratios for households. In conjunction with a price decrease, consumption in the economy will be affected more the greater the loan-to-value ratio (see Diagram 11).

The mechanism functions as follows: the higher the permissible loan-to-value ratio, the more the impatient households consume through home mortgages in the form

of MEW. Thus, given binding loan constraints, a higher loan-to-value ratio will lead to a greater consumption adjustment in the event of a fall in housing prices.⁴⁰ Although the quantitative effects in Diagram 11 differ from those in the tables above, both approaches qualitatively indicate the same result. High indebtedness entails risks in that economic disturbances may have serious effects on the real economy: the higher the indebtedness, the greater the potential sensitivity to disturbances.

The question is how significant the loan-collateral effect is in Sweden. Diagram 12 shows the distribution of the loan-to-value ratio among existing household mortgage loans. While the mortgage cap does not apply retroactively, the rate of home mortgaging cannot be increased above 85 per cent of the current market value for the purpose of increasing consumption, for example. With an unchanged share of households subject to a mortgage cap, a lower permitted loan-to-value ratio means that the potential effects in the model decrease due to the shift in distribution to the left in Diagram 12. To the degree that households mortgage their homes for consumption purposes, the correction in connection with a fall in housing prices will be less. Accordingly, in line with this thinking, the mortgage cap may contribute to mitigating the macroeconomic effects of a fall in housing prices.

In practice, the share of households covered by the mortgage cap will be affected if housing prices fall. Diagram 12 shows that the mortgage cap, as described above, is binding for only 10 per cent of households with mortgages; so many have a loan-to-value ratio exceeding 85 per cent. A 20 per cent drop in housing prices means, however, that a loan-to-value ratio of a maximum 68 per cent ($0.8 \cdot 0.85$) is needed to arrive at a loan-to-value ratio of at most 85 per cent *after a fall in housing prices*. The diagram indicates that about *two-thirds* of all households with mortgage loans have a loan-to-value ratio of 68 per cent or more. Thus, to the degree that Swedish households have increased their mortgage loans to provide scope for consumption, a decrease in housing prices could considerably reduce this potential.⁴¹ Analysis of Swedish micro-data could provide guidance as to how significant the consumption channel deriving from mortgaging the home is for Swedish households. US and Canadian studies indicate it has been important for consumption growth in these countries (see Mian and Sufi, 2011 as well as Bailliu, Kartashova and Meh, 2012).

High indebtedness and variable-rate mortgage loans increase household sensitivity to interest rates

All other things equal, higher indebtedness entails that a larger share of income is earmarked for interest payments, thereby raising the sensitivity to movements in interest rates. Diagram 13 illustrates the effects of interest-rate changes on household interest expenses at various debt ratios. The figure is based on the uncertainty of the repo rate level three years ahead, as published by the Riksbank in its Monetary Policy Report. This uncertainty is described by means of a distribution

⁴⁰ A highly simplified example illustrates this: An impatient household will want to mortgage up to the maximum limit of 50 per cent and thus buys a home for SEK 100. Assume that housing prices rise 10 per cent annually, permitting the household to increase its home mortgage each year and consume for SEK 5 (50 per cent of the higher price of the home). If housing prices cease to rise or, indeed, decline, the household can no longer consume by mortgaging its home, leading consumption to fall by SEK 5. Assume instead that the household could mortgage the house to 100 per cent. This means that a housing price increase of 10 per cent will allow the household to consume for SEK 10 (100 per cent of the home price increase). If housing prices decline or stop growing, consumption falls by SEK 10 rather than SEK 5. The reduction in consumption is thus larger with a higher loan-to-value ratio.

⁴¹ One remaining possibility for households to increase their debt is to raise an unsecured loan. Compared with mortgage loans, however, such loans generally entail a higher interest rate and stricter amortisation requirements.

■ that is later translated into a distribution of actual household mortgage rates. Given various leverage rates, the distribution across the actual mortgage rate is then used in calculating a distribution of actual (nominal) loan expenses.

An initial observation is that the higher the debt ratio for a given interest-rate level, the greater the interest expenses for the household when leverage increases (the distribution shifts to the right). But we also note that the spread in interest expenses grows larger in line with interest-rate variations. Since interest expenses impact on the scope for other consumption, the households' consumption expenditure may be more affected by interest-rate changes the higher the debt ratio.

A large and growing share of mortgage loans among households carries a variable interest rate (see Diagram 14). The large share of mortgage loans with variable interest rates has been noted as a risk, among others by the EU Commission (2012, 2013). Currently, both the nominal and real repo rates are very low from the historical perspective (see Diagram 6). In the future, when the interest-rate level normalises, this could have a major impact on the households' interest expenses.

A rising share of variable rate mortgage loans could contribute to making household consumption more sensitive to interest-rate changes (see Johansson et al., 2011). This may appear strange at first sight. Johansson et al. (2011) explain, quite accordingly, that it has no significance in a neoclassical conceptual framework with forward-looking consumers, or permanent-income households. However, in models featuring heterogeneous households – similar to the models described above to study loan-collateral effects (Iacoviello, 2004, 2005, and Walentin, 2013), with a group of impatient "borrowers" and a group of patient "savers", the consumption of the impatient households will be more sensitive to interest-rate changes.

This effect can be recognised by remembering that interest expenses affect disposable income more directly if the interest rates on mortgages are variable. A permanent-income household will adjust its consumption slightly in line with changes in disposable income (since permanent income, which determines consumption, does not change much). Impatient households, however, will be sensitive to variations in disposable income. Since a higher share of "variable-rate mortgages" does not affect consumption among permanent-income households, but raises sensitivity to consumption among impatient households, total consumption will be sensitive to interest-rate changes in conjunction with variable mortgage rates. International studies also offer some empirical support for this (see Johansson et al., 2011).

To provide a realistic example of the households' interest-rate sensitivity, the micro-data from Finansinspektionen's mortgage loan study can be studied. Using this material, standard calculations can be drawn up to note the status of household income and expenses, for example in various conditions regarding interest-rate levels. Using these calculations as the starting point, it is possible to build a picture of how sensitive households are to interest-rate increases and the consumption effects arising among households. Table 5 shows how large a share of households that would see negative margins in their discretionary income calculations due to a rise in the interest rate on household loans. In addition, the table shows how large a share of disposable income is accounted for by the deficits.

Table 5. Deficits in calculations in connection with rising interest rates, all households in the sample with mortgage loans

Deficit as a percentage of disposable income, per cent	Percentage-point rise in mortgage loan rate				
	1	2	3	4	5
<= -10	0.0%	0.3%	1.7%	4.1%	7.3%
-9	0.0%	0.1%	0.5%	0.9%	1.1%
-8	0.0%	0.2%	0.6%	0.9%	1.2%
-7	0.0%	0.4%	0.8%	1.2%	1.3%
-6	0.1%	0.5%	1.0%	1.3%	1.4%
-5	0.1%	0.7%	1.0%	1.1%	1.6%
-4	0.2%	0.9%	1.3%	1.6%	1.8%
-3	0.5%	1.3%	1.5%	1.5%	1.8%
-2	0.9%	1.2%	1.5%	1.9%	1.9%
-1	1.5%	1.6%	1.7%	1.7%	2.0%
Total	3.4%	7.3%	11.6%	16.2%	21.4%

Note. The living expenses used in the calculations derive from Statistics Sweden's study "Household Budget Survey (HUT)", 2009. Living expenses do not include housing costs (interest, charges and amortisation) but do cover goods and services (food, clothes, insurance, consumables, media so forth) that a household requires to maintain a reasonable consumption standard. Information from HUT has been computed on the basis of changes in consumption per capita between 2009 and 2012. Interest expenses, which vary in the calculations, are added to these expenses.

Sources: Finansinspektionen, Statistics Sweden and the Riksbank

The final row in the last column of Table 4 shows that if the interest rate for households increases by 5 percentage points, the percentage of households that experience negative margins will total 21.4%. The top row in the same column indicates that more than one-third of these households (or 7.3 per cent of all households in the random sample) have a deficit of at least 10 per cent of disposable income. With a minor rise in the interest rate, for example 3 percentage points, a total of 11.6 per cent of households will end up with a negative margin. One tenth of these households (1.7 per cent of all households) will experience a deficit exceeding 10 per cent of disposable income.

Instead of including all households in the random sample in the calculations, one may redo the same exercise using the 50 per cent of households with the highest debt ratio. By this means, the effect of higher indebtedness on the households' sensitivity to changes in interest rates can be illustrated. Table 6 presents deficits for households with indebtedness exceeding the median value.

Table 6. Deficits in calculations in connection with a rise in interest rates, households in the sample with mortgage loans and debt ratio above the median

Deficit as a percentage of disposable income, per cent	Percentage point rise in mortgage rate				
	1	2	3	4	5
<= -10	0.0%	0.6%	3.3%	8.0%	13.9%
-9	0.0%	0.2%	1.1%	1.7%	1.8%
-8	0.0%	0.4%	1.1%	1.5%	2.0%
-7	0.0%	0.8%	1.5%	1.8%	1.8%
-6	0.1%	1.1%	1.7%	1.8%	1.9%
-5	0.2%	1.4%	1.4%	1.6%	1.9%
-4	0.5%	1.4%	1.7%	2.0%	2.0%
-3	1.1%	1.7%	2.0%	1.7%	2.1%
-2	1.4%	1.4%	1.7%	2.1%	2.2%
-1	1.5%	1.8%	1.7%	2.0%	2.0%
Total	4.9%	10.8%	17.1%	24.2%	31.7%

Note. See Table 4.

Sources: Finansinspektionen, Statistics Sweden and the Riksbank

The results for the households with a debt ratio exceeding the median value shows that a considerably larger share of households with the higher debts are hit by negative margins in the event of a rising interest rate. Almost 14 per cent of households with a debt ratio exceeding the median face deficits of 10 per cent of disposable income or more in conjunction with an interest-rate rise of 5 percentage points. Thus it is clear that resistibility, gauged as the surplus during interest-rate increases, is worse among those with a higher debt ratio. Though the mechanisms are not the same in the aggregated calculations as in calculations using micro-data, the conclusions are similar. Household consumption could be severely impacted in connection with a rise in interest rates; in addition, higher indebtedness coincides with greater sensitivity.

However, in a scenario with falling housing prices, a large share of mortgage loans carrying a variable interest rate could facilitate monetary policy in efforts to counteract the negative repercussions for the macro economy. Lind (2013) claims that this was a significant explanation underlying the minor effects on housing prices in Sweden in connection with the financial crisis. The sharp cuts in the repo rate had an immediate impact on household mortgage rates (see Diagram 15a).

Nonetheless, if market interest rates rise sharply compared with the repo rate, during a period of financial uncertainty, for example, this would also have a more immediate effect on household interest expenses and consumption. A decline in Swedish housing prices could make funding more costly and more inaccessible for the banks.⁴² If the banks elect to transfer this cost increase to lending rates, the large share of variable rate mortgage loans could counteract, or in the worst case, eliminate the effects of cuts in the policy rate. Developments during the financial crisis show that monetary policy had a major impact on variable mortgage rates,

⁴² See PM 7, "Consequences of a higher loan-to-value ratio for the funding of mortgage loans using covered bonds."

■ despite the financial stress being manifested in a steep increase in spreads between the repo rate and mortgages rates (see Diagram 15b).

However, it is important to underscore the fact that the repo rates cannot necessarily be cut to such a large extent as in 2008-2009 in conjunction with any future price decrease in the Swedish housing market.

The significance of high savings and low housing construction in Sweden

International studies indicate that housing prices and debt trends are not alone in possessing predictive powers regarding financial crises and falling housing prices; the progress of the current account also serves as an indicator.

An IMF study from 2009 shows that a current account deficit increases the likelihood of a future fall in housing prices. In other contexts, a robust correlation has been identified between housing price booms and current account deficits; see Bergin (2011) plus the references noted in the study. For example, Ireland, the US and Spain displayed current account deficits during the sharp rise in housing prices that preceded the crashes in their housing markets. Barrell et al (2010b) show that the current account has the capacity to predict the occurrence of financial crises in OECD countries. Sweden, which has also displayed sharply rising housing prices, differs from the aforementioned countries as a result of its substantial current account surplus. A key question here is how this might affect the risks.

To begin with, one must ask what the correlation between the current account and housing price booms depends on. Since the current account reflects the difference between savings and investments, low savings could be related to rising housing prices or risks for future falls in housing prices. Armelius and Dillén (2011) discuss the correlation between low savings and the risks of declining housing prices. There are two different reasons why low household savings represent a risk in connection with rising housing prices (and increased indebtedness among households). Firstly, it may be a sign that imbalances are building up due to excessive optimism regarding the future, since what is being eroded is the anticipated future income. Secondly, the macroeconomic repercussions of a fall in housing prices could be substantially worse in conjunction with low household savings.⁴³ One explanation for this is the loan-collateral effects on consumption, as described above. If low savings reflect the fact that higher consumption is being financed by an increase in home mortgaging, the effects on consumption could be considerable should housing prices fall.

Household savings in Sweden are relatively high and have risen in recent years (see Diagram 16). We noted earlier that there is a risk of households saving more in a bid to restore their balance sheets in conjunction with a decrease in housing prices. This risk could be alleviated if the savings are initially high. We also saw earlier that if certain households finance their consumption through higher home mortgages, this could give rise to consumption effects in conjunction with a fall in housing prices. The relatively high savings in Sweden could be an indication that this phenomenon is not so widespread but, as noted above, studies of micro-data are desirable in order to clarify the issue of consumption and home mortgages.

⁴³ Armelius and Dillén (2011) also conducted their own empirical study on the basis of the data used by the IMF (2009). They found that the probability of a future fall in housing prices increases in conjunction with a low household savings ratio and that the consequences of a decline in housing prices would be aggravated by a low savings ratio.

■ A current account deficit may also reflect a combination of low savings and high (housing) investments, as in the US ahead of the financial crisis. The countries most clearly hit by the “boom-bust-cycles” in the housing market in connection with the global financial crisis – such as the US, Ireland and Spain – displayed a very steep rise in housing investments as a share of GDP during the years preceding the crisis.

The developments in the US present an illustrative example. When demand in the housing market receded, substantial excess capacity emerged in the construction sector, leading to structural problems in the economy when capital and labour had to be moved to other sectors in the economy. This explains one aspect of the high unemployment (from a historical perspective) with which the US continues to grapple.⁴⁴ Housing investments in the US were a key component in the growth of demand both before and after the financial crisis. Also in this context, Sweden differs from many other countries that have experienced sharply rising home prices, since, as a percentage of GDP, housing investment has been low in recent years, both from a historical and an international perspective (see Diagram 17).

Englund (2011) states that the supply of housing in Sweden has not responded strongly to the price trend, which would be expected according to Tobin’s Q analysis.⁴⁵ An interesting parallel may be drawn with the study by Mian, Rao and Sufi (2013). When analysing the trend in the housing market in various geographic areas in the US, they find that the areas in which supply has been inelastic are also those hit by the greatest fluctuations in housing prices and the macro economy. One possible interpretation of this is that the inelastic supply of housing in Sweden has made housing prices highly sensitive to variations in demand, which instead could *raise* the risks. An increase in housing construction *in the future* could also impact the relationship between supply and demand and have the effect of reducing housing prices.⁴⁶

Conclusions regarding risks to the macro economy

The overall picture gained when studying macroeconomic stability in the light of the households’ indebtedness is that there are risks, and the greater the indebtedness, the higher the risks. We have also attempted to illustrate and concretise what the risks could be and how they can manifest themselves. But macroeconomic risks are not the sole potential problem resulting from high indebtedness. High household debt can also threaten financial stability.

Risks to financial stability

The risks to the real economy posed by household indebtedness that were described in the previous section could have repercussions on financial stability should such risks emerge. The impact on financial stability could arise via, for example, loan losses. But there are other links through which financial stability could be affected by excessive indebtedness in the household sector. Confidence in Swedish banks and the housing market, for instance, is crucial. The combination of these various links

⁴⁴ According to Mian and Sufi (2012), sluggish consumption demand due to the trend in the housing market is the key explanation underlying the weak progress in employment in the US following the financial crisis.

⁴⁵ As opposed to Englund, however, Birch Sørensen (2013) claims that housing investment in Sweden has responded *more* to the housing price trend than in many other comparable countries.

⁴⁶ Englund (2011) claims that the housing price trend in Sweden is essentially sustainable only if it is assumed that the supply is permanently inelastic. Contrary to this, Birch Sørensen (2013) believes that his analysis indicates that, since Sweden has already seen a substantial relative increase in housing investment, the risk of a “delayed supply response” is slight.

■ and structural vulnerabilities in the Swedish banking system makes it vital to consider household indebtedness in any analysis of financial stability.

This section analyses some of the risks that household indebtedness presents for financial stability. This is undertaken, firstly, by discussing structural vulnerabilities in the Swedish banking system and subsequently, by turning to the links, which, combined with the vulnerabilities, give rise to financial stability risks associated with indebtedness.

Structural vulnerabilities in the banking system affect the risks presented by household indebtedness

To analyse and understand the financial risks to financial stability associated with household indebtedness, it is important to recognize the structural vulnerabilities in the banking system. All other factors remaining equal, a less vulnerable banking system entails that the risks associated with a high household indebtedness are smaller while greater vulnerabilities lead to greater risks at a given level of indebtedness. Factors that are important when it comes to vulnerability are the banking system's size, concentration and interconnectedness as well as the system's funding structure, and the risk assessments made regarding the banks' activities.

Not least because of its size, the Swedish banking system is the core component of the Swedish financial system. Relative to GDP, Swedish banking assets total some 400 per cent (see Diagram 18) which, compared with other countries, indicates that the system is of substantial size. The banking system's size means that problems that arise could become very extensive, while the cost of managing them could be high.

Of total deposits and lending, the four major banks (Handelsbanken, Nordea, SEB and Swedbank) hold a market share of about 70 per cent. A substantial share, almost 50 per cent, of the major banks' lending, consists of lending to households (see Diagram 19). In turn, a major portion of this is lending for housing purposes. Overall, this makes the Swedish banking system highly concentrated and closely linked with residential mortgaging. Consequently, developments in the household sector and housing market could be of direct significance for both the condition of individual banks and the banking system as a whole.

But the major banks are not linked solely because all four are exposed to mortgage lending to Swedish households; these four banks are also linked by cross-holdings in each other's securities (see Diagram 20). Combined, such holdings total some 40 per cent of equity. This means that the Swedish banking system is not only relatively large but is also concentrated and closely linked.

Swedish banks fund major portions of their operations by borrowing on international financial markets (see Diagram 21). Market funding is approximately as large as deposits, which are high from an international perspective.⁴⁷ Covered bonds comprise a key feature of the banks' funding, accounting for almost 50 per cent of total market funding. These bonds are issued using mortgage loans as collateral, thereby creating direct linkage between the banks' funding and the status of household indebtedness.

⁴⁷ See, inter alia, Reserve Bank of Australia (2012) for an international comparison.

■ Diagram 21 shows that the banks do not fund their operations solely in SEK but also to a sizable degree in foreign currencies. A breakdown of market funding in SEK and foreign currencies (see Diagram 22) shows that more than 50 per cent of funding is undertaken in foreign currencies. Compared with other countries, the dependence of Swedish banks on foreign funding appears substantial.⁴⁸

In addition to the geographic distribution of funding, maturity mismatches represent a key factor in the banking system's stability. Maturity mismatches provide an indication of the degree to which long-term commitments to customers are backed by funding based on matching maturities. If the maturity of funding is excessively short in relation to the banks' long-term commitments, or if the funding sources are too unstable, this may be a sign of an excessively large structural liquidity risk. One way of identifying this risk is to use the Riksbank's structural liquidity measure (see Diagram 23). This measure weighs a combination of various types of funding vis-à-vis a weighting of various assets. More long-term and stable funding is given a higher weighting while more liquid assets are attributed a lower weighting.

A value for the structural liquidity measure – the ratio of weighted funding and weighted assets – of less than 100 per cent indicates excessive maturity mismatches. Diagram 23 shows that the major Swedish banks in recent years have improved their status in terms of the structural liquidity measure. This could be interpreted as a sign that structural liquidity risks have fallen. But although this structural liquidity measure has risen, it is still not 100 per cent, indicating the continued presence of excessive structural liquidity risks in the major Swedish banks.

In addition to deposits and market funding, the banks use their equity to finance operations. The proportion of equity-funded assets in the Swedish banking system is approximately 5 per cent (see Diagram 24), which is low from an international perspective (see Diagram 25).

One reason that Swedish bank equity in relation to assets is less than that of the banks comprising the international benchmark group is that the risks associated with Swedish bank businesses are deemed to be relatively minor. This entails that the Swedish banks' equity in relation to risk-adjusted assets is high by international comparison (see Diagram 26). But household indebtedness has risen sharply in recent years, resulting in the risks both to the real economy and of financial instability being deemed to have increased. Consequently, it is not easy to determine whether risks in the major Swedish banks continue to be as small as the risk weightings appear to indicate.

In summary, it may be concluded that, even if Swedish banks are currently deemed to be financially strong, there are structural vulnerabilities in the banking system that contribute to making the status of household indebtedness a risk to financial stability. The Swedish financial system comprises a banking system that is large in relation to the Swedish economy. Lending to households for housing purchases accounts for a sizable share of the banks' assets. There are also direct links between the banks' funding and the developments in the housing market. At the same time, concentration in the banking system and linkage among the banks are high, and the banks are also highly dependent on international capital markets to fund their mortgage lending. Against this background, high and growing household indebtedness poses risks to financial stability. The following sections discuss the

⁴⁸ See, inter alia, Reserve Bank of Australia (2012).

■ channels through which the vulnerabilities, when coupled with household indebtedness, could give rise to these risks.

Various channels imply that disturbances could hit the banking system's vulnerabilities

Due to excessively high debt in the household sector, the structural vulnerabilities in the banking system could be exposed to various types of disturbances. These disturbances could damage the banking system via various channels. The presentation below discusses three channels that are particularly relevant in respect of the Swedish banking system's structure. These are the credit quality of mortgage lending, loan losses resulting from corporate lending and confidence in the Swedish banking system.

High indebtedness contributes to worse credit quality in the banks' mortgage lending

High indebtedness in the household sector could affect the banks' mortgage lending in a number of ways. The primary manner is through direct loan losses; however, a shift in the risk linked to household mortgages could also impact the banks.

Minor increases in mortgage loan losses could also play a role

In Sweden, losses on mortgage lending have been low historically. A cautious approximation of losses on mortgage loans during the crisis of the 1990s indicates that these amounted to some 0.25 per cent of mortgage lending.⁴⁹ This has contributed to making the estimated risk in the banks' mortgage lending very low.

A number of factors could explain why Swedish households meet their mortgage obligations to such a large extent. One such factor is that, in Sweden, a house or tenant-owned apartment cannot generally just be handed over to the bank in order to avoid all debt associated with the dwelling. Another factor is that, by tradition, the Swedish social welfare safety net has been well-developed, which has led to a general perception that loan losses on Swedish mortgage lending can never be substantial. However, the past 20 years have seen changes that could entail that historical losses are not necessarily indicative of potential future losses. For instance, reform of the social welfare safety net in recent years could have weakened the Swedish households' financial strength in the event of an economic downturn. Meanwhile, structural changes have occurred in the housing market, such as a higher aggregate debt ratio, a higher loan-to-value ratio among first-time buyers and a larger share of mortgage loans carrying a variable interest rate, as well as a larger proportion of interest-only loans. Combined, the deterioration of the social welfare safety net and structural changes in the housing market have raised the risk of loan losses arising on mortgage lending, implying that the assessed risk in bank lending may underestimate the actual risk. This means that incipient loan losses – while remaining so small that they do not pose a threat to the bank's capital relations – could adversely impact the general impression of loan losses in the banks' mortgage lending. In turn, this could contribute to a decline in the confidence in the Swedish banking system, which in turn could threaten financial stability.

⁴⁹ See Finansinspektionen (2012).

■ High indebtedness could contribute to greater sensitivity in the mortgage portfolio

In addition to the possibility that the banks could become exposed to direct losses, high household sector indebtedness could entail greater sensitivity in respect of the banks' capital ratios. For example, under certain conditions, high indebtedness may reduce the banks' capital ratios without directly reducing the banks' equity. This is because of a rising risk-weighted assets. To illustrate this point, assume a situation in which housing prices fall. All other factors remaining equal, lower housing prices entail that the households' loan-to-value ratio increases. If, initially, households are highly leveraged, the higher loan-to-value ratio is interpreted as deteriorating credit quality through both the greater possibility of a household becoming distressed (probability of default, PD) and through the increase in bank loss in conjunction with household insolvency (loss given default, LGD). These quantities are two central factors in the calculation of the banks' risk-weighted assets, that is in the computation of what constitutes the numerator in bank capital ratios. This means that the banks' capital ratios, for example in a situation of falling housing prices, could decline due to excessively high indebtedness without the banks incurring any direct losses on mortgage lending. This link to stability risks is dealt with by Hellebrandt et al (2009) and others.

Using data from Finansinspektionen's mortgage market survey in 2013, the way this could impact the banks can be illustrated. From the data, an average PD and LGD for households making up the random sample can be deduced. This average is used to calculate a risk weight. Subsequently, by changing some constituent parameters, one can see how large the result is for the calculated risk weighting. For example, it is assumed that persons with a loan-to-value ratio of 75 per cent or more are assigned a higher LGD of 25 per cent in cases in which the reported figure is less than 25 per cent.⁵⁰ This means that, in the event of insolvency of the particular household, it is assumed that the bank loses at least 25 per cent of the loan granted. The calculations indicate that a change in credit quality entails an increase of one-fifth in the risk weighting. Thus, a capital ratio calculated solely on the basis of these exposures would decline by slightly less than one-fifth due to the change. If this change were carried further into the banking system's capital ratios, the impact would obviously be considerably less, since mortgage lending represents only part of total assets. Moreover, it is not the banks' capital but rather the risk-weighted assets that lead to the altered capital ratios. In situations in which there is a risk-weighted floor in the Pillar II regulatory framework, the banks' capital ratios will initially be higher. This is because the risk-weight floor, in accordance with the Pillar II requirement, results in the banks having to hold more capital, despite the fact that the risk-weighted assets used in calculating the capital ratio remain unchanged. But when PD and LGD are altered, the risk weightings are still affected and, thus, also negatively affect the capital ratios. In circumstances in which international comparisons of bank capital ratios are significant, a decline could affect the confidence in the Swedish banking system.

Loan losses on corporate lending can be affected by household indebtedness

The overall developments in the real economy play a major role, not only for households, but also for companies. A fall in housing prices, as based on Swedish experience, appears to give rise to minor loan losses for the banks and their mortgage lending but could, as noted in the previous section, entail major repercussions for the real economy. In particular, this applies in the event of high

⁵⁰ This means that the average LGDs in the random sample rise by about one-fifth.

■ household indebtedness. The consequences for the real economy include lower demand, which hits companies and leads to rising bankruptcies. The correlation between the development in the real economy and bankruptcies became apparent in the Baltic countries during the 2008-2009 financial crisis, for instance; but has also been documented by, for example, Åsberg-Sommar and Shahnazarian (2009). The loan losses that could arise in adverse circumstances could be extensive. For example, the loan losses in the Riksbank's stress test totalled some SEK 260 billion over a three-year period.⁵¹

One of the mechanisms that could give rise to a correlation between the economic trend and bankruptcies is exemplified by Erlingsson et al. (2013). The method used simulates the effect of a fall in housing prices using an agent-based model.⁵² By simulating the development in housing prices in this type of model, the impact on the real economy of an endogenously driven decline in housing prices may be studied. Appendix 1 includes a non-technical account of the model and a description of its calibration.

By adapting the model to Swedish conditions, one can illustrate that a fall in housing prices could coincide with an economic downturn that reduces the demand for housing. The simulations also show that a drop in housing prices per se prompts households to reduce their consumption, in turn leading to a rise in corporate bankruptcies. The simulations also show that an economic crisis risks leading to corporate problems in the form of lower margins and less resilience. If companies do not have the time to build up liquidity, this could result in a renewed crisis that leads to a steep increase in the number of corporate bankruptcies, thereby further amplifying the economic downturn.

As noted in Diagram 27, there is also empirical evidence indicating that corporate bankruptcies rise in conjunction with a sharp economic downturn. To a certain extent, this covariance may be attributed to a deteriorating economic climate, but computations also suggest that the fall in consumption tends to spark an increase in the rate of bankruptcies and that this correlation also applies to non-Nordic countries (see Appendix 2).

Besides the fact that loan losses could affect the banks by reducing their capital, they could also lead to higher funding costs (see Diagram 28). One such effect could arise due to lending to banks being viewed as more risky, for example. An increase in funding costs can be handled in at least two ways: either the banks can pass on the cost increase to customers, which could further exacerbate the economic situation; or the banks could decide not to pass on the costs to customers, thereby leading to lower earnings and, subsequently, to lower capital in the banks.

In summary, it appears that disturbances that affect a highly indebted household sector could result in loan losses for the banks. Such losses are viewed as arising primarily via the fact that the households' demand – and thus the overall economic development – give rise to loan losses on the banks' exposures to non-financial companies. However, it is not the status of the banks' capital alone that could give rise to stability problems in conjunction with high indebtedness; the banks' funding could also be adversely affected.

⁵¹ See the Riksbank (2013b).

⁵² See Erlingsson et al (2013) for more details.

■ High indebtedness could lead to funding risks for the banks

As noted earlier in this section, a substantial portion of the banks' mortgage lending is funded by covered bonds. In a situation where households are heavily indebted and housing prices are plummeting, the banks' funding potential via covered bonds could deteriorate considerably. This is analysed in the Riksbank's Memorandum 7, "Consequences of higher loan-to-value ratios for the funding of mortgage loans using covered bonds". Since covered bonds account for a considerable share of the banks' funding, this means that there is a direct link between trends in the household sector and the housing market, via the banks' funding, and financial stability.

However, not only a plunge in housing prices that leads to excessive indebtedness could lead to financial instability. If the developments in household indebtedness or housing market were to erode confidence in the Swedish economy or banking system, financial stability could be threatened due to the impact on the banks' access to market funding. Essentially, such a situation could arise solely because the banks' financiers change their view of conditions in the Swedish banking sector or their perception of the risks associated with mortgage funding.⁵³ This could occur, inter alia, via the factors discussed above, e.g. due to an unfavourable housing market trend or the fact that the banks' loan losses increase for some reason or other. It could also occur due to events in international financial markets not directly connected to the Swedish economy. In such circumstances, the effects need not necessarily be limited to funding via covered bonds; funding through uncovered instruments could also be affected. Due to the Swedish banks being so highly dependent on market funding, while still showing signs of structural liquidity risks, the risks to financial stability are significant.

One example of when uncertainty on the financial markets impacted funding through covered bonds was observed in 2008-2009. Uncertainty regarding the Swedish banks' involvement in the Baltic countries compelled the Swedish National Debt Office and the Riksbank to take a number of actions to improve the banks' funding situation. This is described in greater detail in Memorandum 7, "Consequences of higher loan-to-value ratios for the funding of mortgage loans using covered bonds". The course of events in 2008-2009 highlights the stability risks linked with excessive dependence on market funding.

⁵³ See, inter alia, Woodford (2010) for a discussion of factors that could impact credit granting in the economy.

■ Interacting factors and structural vulnerabilities entail risks

Based on the discussion above, the conclusion is that high indebtedness in the household sector poses risks to financial stability. The risks arise through a combination of the structural vulnerabilities of the Swedish banking system and the presence of a number of channels through which high indebtedness can impact on the banking system.

The primary vulnerabilities are that the banking system is large, concentrated and interlinked, combined with substantial dependence on market funding. There are also indications of structural liquidity risks in the banking system, along with a low assessment of the risk level attached to mortgage lending. The channels through which disturbances could affect financial stability are the worsening credit quality of mortgage lending, loan losses on corporate lending and eroded confidence among the financiers funding the banks.

The fact that the Swedish banking system is relatively large, concentrated and interlinked means that if one of the major banks encounters problems due to mortgage lending disorders in the housing market or debt-related problems in the household sector, for instance, the entire banking system, and thus the stability of the financial system, would be affected.

Since mortgage lending accounts for a large share of the banks' assets, and the assessed risk in this lending is low, even minor indications of problems in the mortgage loan stock could lead to a revision of previous assessments. In a situation where the major Swedish banks are largely dependent on market funding, not least from abroad, and also meet their long-term commitments using short-term and unstable funding, any decline in confidence could swiftly impact the stability of the financial system.

However, even if it should turn out that the direct risks deriving from the banks' mortgage lending are small, there are other links through which the households' indebtedness could affect financial stability. Excessive indebtedness could lead to the amplification of the effects of macroeconomic disturbances. For instance, a fall in housing prices could lead to a serious macroeconomic downturn, with low demand fuelling corporate bankruptcies. This would impact on the banking systems, since the banks have considerable exposures to the Swedish corporate sector. The banks' funding would also be adversely affected in such circumstances, partly through housing prices having a direct effect on covered bond-based financing and also because overall confidence in the banking system influences all types of market funding.

In summary, high household indebtedness, combined with structural vulnerabilities in the Swedish banking system, risks threatening financial stability. The risks could be mitigated either through greater resilience among the households or by reducing the vulnerabilities in the banking system.

■ Summarising conclusions

Indebtedness among households and housing prices in Sweden have risen sharply over the past five years, and to a greater extent than in a number of other countries that have experienced major problems in connection with falling prices in their housing markets, thereby indicating the presence of risks. This memorandum has been aimed at illustrating what these risks may be and how they can manifest themselves, in terms of both the macro economy and financial stability.

A key message we wish to convey is that trends in indebtedness and housing prices are interrelated. By means of a user cost approach, we have shown that both housing prices and household indebtedness are interrelated with the residential costs of households. The calculations are sensitive to assumptions regarding long-term expectations concerning interest rates and housing prices. Also, the Riksbank's Memorandum 4, "Mortgage prepayment decisions of households" shows that household selection of the optimal loan-to-value ratio is highly sensitive to changes in the anticipated level of mortgage rates.

The real interest rate is historically low at present. If households are not prepared for rising real interest rates in the future, sharp corrections could arise in housing prices and the households' desired level of indebtedness. There are indications that the households' long-run interest-rate expectations are governed by the current level of interest rates, and are lower than the Riksbank's interest-rate projections.

A decline in housing prices could have serious consequences for the macro economy. A core factor in this is the impact of housing prices on consumption, which we discussed in this memorandum on the basis of theory and empirical evidence. One conclusion was that the consequences for consumption and the real economy following a slump in housing prices are probably higher in the event of initially high loan-to-value ratios and indebtedness, as confirmed by international studies. We have illustrated this phenomenon by means of examples and model-based calculations.

We have also concluded that the combination of high indebtedness and a major share of variable-rate mortgages raises the households' sensitivity to interest-rate movements, which could heighten the risks to the macro economy. However, this could also enhance the potential to use monetary policy to counteract the macroeconomic consequences of a fall in housing prices, depending on the degree to which the repo rate can be cut. But since a fall in housing prices could also lead to more costly funding for the banks and higher mortgage rates, high indebtedness and a sizable share of variable mortgage rates increase households' exposure to this type of risk.

One factor that distinguishes Sweden from a number of other countries that have experienced problems due to the development in the housing market is the households' savings and residential construction. International studies have shown that current account deficits exacerbate the risk of financial crises and a fall in housing prices due to low household savings and rising housing investments. High household savings could mitigate the risks in Sweden by reducing the households' requirement to add further to savings in the event of a decline in housing prices. In historical and international perspectives, housing investments are low in Sweden – a factor that has probably reduced the risks; however, there are studies indicating that low residential construction could also entail risks.

■ In addition to high indebtedness in the household sector possibly having major effects on growth in the real economy, high indebtedness could also increase the risk of financial instability. This is due to structural weaknesses in the Swedish banking system and to the through which various disturbances can impact on these weaknesses.

The Swedish financial system encompasses a banking system that is relatively large vis-à-vis the Swedish economy. Moreover, concentration in the banking system is considerable, with close linkage among the major Swedish banks. Because lending to households for housing purchases accounts for a substantial share of the banks' assets, problems in the household sector or in the housing market could have a considerable impact on financial stability.

Moreover, not only is the Swedish banking system relatively large and mortgage lending a significant share of bank business, there are also direct links between the banks' funding and developments in the housing market due to the banks' funding via covered bonds. The banks are also highly dependent on international capital markets to fund their mortgage lending. This means that confidence in the Swedish banking system is crucial to financial stability.

Various channels could expose the Swedish banking system's structural weaknesses to disturbances. The links that could reveal weaknesses act through a reduction in the credit quality of mortgage lending, loan losses on corporate lending and confidence in the Swedish banking system.

The combination of structural weaknesses in the banking system and links that could expose these vulnerabilities entail that excessively high indebtedness in the household sector could threaten not only the real economy but financial stability, too.

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