

■ A macroeconomic analysis of house prices in Sweden

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House prices in Sweden have risen considerably since the mid-1990s. How can this development be explained? What role does monetary policy play for house prices? What would happen if house prices fell sharply? Are houses overvalued? This article attempts to shed light on these questions with three models for the housing market. The models are estimated on and adapted to Swedish data.

The results indicate that higher incomes, lower real interest rates and a greater preference for housing consumption are important factors behind the rise in house prices since the mid-1990s. Monetary policy affects real interest rates and incomes, it has therefore been important for the rise in house prices. However, according to the models, it would be difficult to slow down the rise in house prices by monetary policy without negative effects on the real economy.

The models indicate that a fall in house prices could have a relatively limited effect on the real economy. But, this is under the assumption that the relationships in the models are stable and that the effects on demand of lower house prices can be counteracted by a more expansive monetary policy, which cannot be taken for granted. There are many indications that house prices are currently above the long-term trend. According to the models this can be explained by such factors as higher incomes and lower real interest rates. However, it is difficult to judge whether house prices are overvalued and the conclusion will depend on the definition, method and period of time considered.

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1. Introduction

House prices in Sweden have risen considerably since the mid-1990s. In real terms, prices of one- and two-dwelling buildings rose by over 130 per cent between 1996 and 2010. This means an average rate of increase of over 6 per cent a year. A number of questions arise in light of this:

- How can this rise in house prices be explained?
- What role does monetary policy play for house prices?
- What happens if house prices fall sharply?
- Are houses overvalued?

In this article we attempt to answer these questions with three different models for the housing market. The first model is a simple econometric model based on theoretical relations for the housing market. Great importance has been ascribed to adapting the model to the data. The second model is a pure statistical model with no economic theory, a so-called Bayesian VAR model. Hence, the most importance has been ascribed to adapting the model to the data. The third model is a dynamic stochastic general equilibrium model. In models of this kind the greatest importance is ascribed to ensuring that the model agrees with economic theory. All three models build on Swedish data.

According to the econometric model, the recent rapid rise in house prices can mostly be explained by higher household income and lower real interest rates. The general equilibrium model emphasises increased preferences for housing consumption, i.e. an increased demand for housing compared to other consumption, as an important explanation.

Real interest rates and incomes are affected by monetary policy. This means that monetary policy is also important for the development of house prices. However, according to the models, any attempt to slow down a rise in house prices using monetary policy could have large-scale negative repercussions for real economic growth. In the models, monetary policy has relatively little effect on house prices and large interest rate increases are therefore required to reduce the rate at which house prices are increasing. Such an increase would have an adverse effect on households' consumption and firms' investments, which would lead to a fall in GDP.

The models indicate that a fall in house prices could have a relatively limited effect on the real economy. But, this is under the assumption that the relationships in the models are stable and that the effects on demand of lower house prices can be counteracted by a more expansive monetary policy, something which cannot be taken for granted.

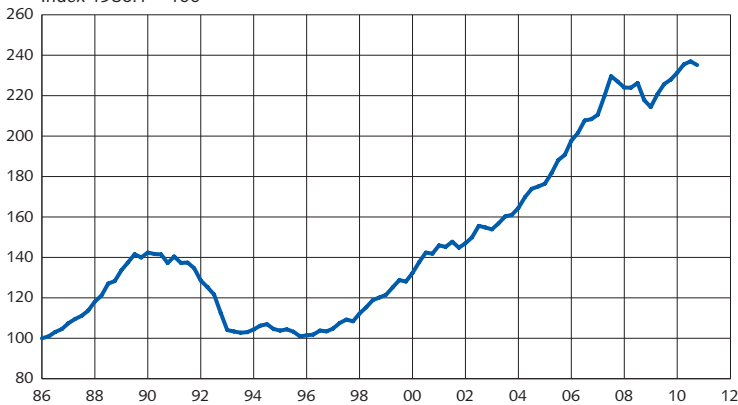
There are many indications that house prices are currently above the long-term trend. According to the general equilibrium model, house prices are currently

around 20 per cent higher than the trend. Even simple estimates of the historical average from the 1950s may indicate that house prices are above the trend. According to the models, the high house prices can be explained by such factors as higher incomes and low real interest rates. Forecasts using the BVAR model and the econometric model do not provide any evidence that house prices would fall in the future. However, it is difficult to judge whether houses are overvalued, and the conclusions will depend on the definition, method and period of time considered.

2. How can the house price development be explained?

Chart 2.1 shows the development of real prices for one- and two-dwelling buildings (“house prices” in the following) for the period 1986–2010. As we can see the prices have varied extensively. Prices rose considerably after the deregulation of the credit market at the beginning of the 1980s. Prices then fell again starting in 1990. A new period of rising prices emerged in 1996, which lasted until the financial crisis in 2007. Prices began to rise again in 2009. If we look at the period from the first quarter of 1996 to the third quarter of 2010, real prices have risen by 134 per cent.

Chart 2.1. Real prices for one- and two-dwelling buildings
Index 1986:1 = 100



Sources: Statistics Sweden and the Riksbank.

LOW INTEREST REAL RATES, HIGHER INCOMES AND HIGHER FINANCIAL WEALTH EXPLAIN MUCH OF THE RECENT INCREASE

Econometric models for the housing market are often used to analyse house-price developments. These models are estimated on historical data and explain house-price developments by a number of variables. The variables are, for example, mortgage rates, household income and wealth, monetary policy expectations and

variables measuring construction costs. Other variables such as unemployment, demographics and credit growth are also relatively common.¹

We have estimated a simple econometric model for the Swedish housing market. When estimating the model we tested for a large number of variables. However, most of these did not work well. For example, unemployment, demographic variables, monetary policy expectations and housing investments had the wrong sign or were statistically insignificant. Even construction costs worked poorly. If construction cost (excluding the cost of land) is included in the model, the house price development is explained almost entirely by this variable. We therefore suspect that construction costs are determined along with and by the same factors as house prices and not that construction costs explain house prices to such a great extent. Different statistical tests also indicate that house prices determine construction costs. An explanation for this can be weak competition in the construction sector. Studies by Konkurrensverket (2009) and BKN (2010b) suggest that competition may be weak in the construction sector.

Several studies on Swedish data use household debt as an explanatory variable, see e.g. Hort (1998) and Barot and Yang (2002). These studies include periods when the credit market was regulated. If household credit is rationed, the growth of household debt can be an important explanatory variable. However, in a deregulated credit market, the growth of credit is determined by the same factors as house prices. The Swedish credit market was deregulated in the mid-1980s and our data begins in 1986. We have therefore chosen not to use household debt as an explanatory variable in the model.

The final model includes three explanatory variables: household real disposable income, an average after tax real mortgage rate (“the real mortgage rate”) and household real financial wealth. We assume that these variables are determined outside the model, which is a normal assumption for this type of models. The model, the data and the estimations are documented and discussed in Claussen (2011). See the appendix for a short overview.²

The econometric model fits the actual development very well, as shown in chart 2.2. House prices rose by 29 per cent from the first quarter of 1987 to the first quarter of 1990. This is illustrated by the height of the first column in the chart.

1 See, for example, Hort (1998), Barot and Yang (2002), Adam and Fuss (2010), Franke (2010) and BKN (2010a).

2 The model is an error-correction model. With such a model we can distinguish between a long-run equilibrium price, the ‘fundamental price’, and a short-term equilibrium price. The model is called an ‘error-correction model’ as it has a built in mechanism that gradually corrects the difference between the fundamental price and the short-term price – the error – over time. A possible theoretical justification for the model is the fact that it takes time to build new houses, and the fact that the number of new houses that is added to the housing stock each year is very small compared to the existing stock. Thus, in the short run the supply of houses is very price inelastic, and a sudden increase in housing demand will lead to temporary increase in house prices. Over time the stock grows as new houses flow into the housing market.

According to the model, prices should have risen by 26 per cent.³ Thus, only 3 percentage points are not explained by the model, which is indicated by the light grey field in the column. Similarly, the total height of the other two columns shows the total change in house prices over two other periods and the light grey portion of each column shows the unexplained part of the change in prices throughout the period.⁴ As we see, the unexplained part is very small for all periods.

As far as the contribution of the explanatory variables is concerned, higher income has contributed to higher house prices in all the periods (the dark grey portion of the column). The contribution is particularly large in the last upturn, where higher real disposable income explains just over half of the rise in house prices. During this period, households' real disposable income rose by a full 2.3 per cent on average per year. In the first and second periods, the annual increases were 1.0 and 2.0 per cent, respectively. Chart 2.3 shows the development of households' real disposable income since 1986.

Changes in household financial wealth help to explain the rise in house prices in the last upturn period, but played no part in the previous two periods (blue portion of the column). Chart 2.4 shows the development of household real financial wealth since 1986.

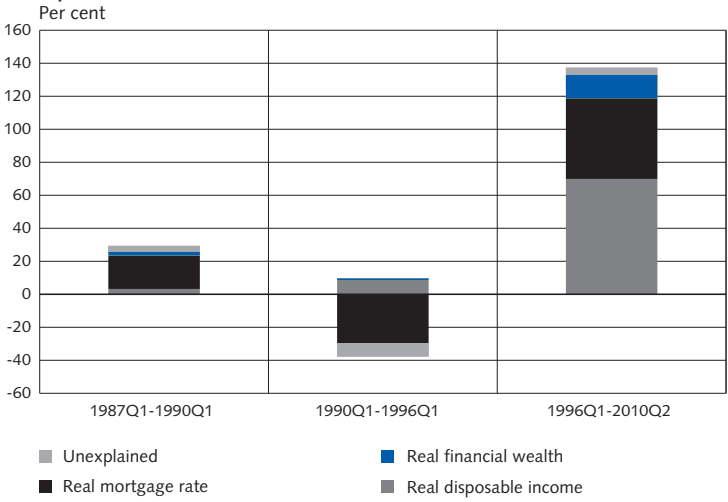
The most important explanation for the variations in house prices is variations in the real mortgage rate (the black portion of the column). 80 per cent of the rise in house prices in the latter part of the 1980s is explained by lower real mortgage rates. Similarly, falling house prices from 1990 to 1996 can to a large extent be explained by a considerable rise in real mortgage rates. Just over 35 per cent of the rise in house prices from 1996 to 2010 is explained by a reduction in real mortgage rates. Chart 2.5 shows the development of real mortgage rates.

A conclusion from the econometric model is that the growth of house prices, including the considerable rise after 1996, is well explained by the development in household real disposable income, real mortgage rates and household financial wealth.

3 We use the long-term relationship when we calculate how much the change between two moments in time should have been according to the model. Actual house prices and the price according to the long-term relationship should therefore be the same at these moments in time. In 1986, there was a large deviation between the actual price and the price according to the long-term relationship. In the first quarter of 1987, the actual price was approximately the same as the price according to the long-term relationship.

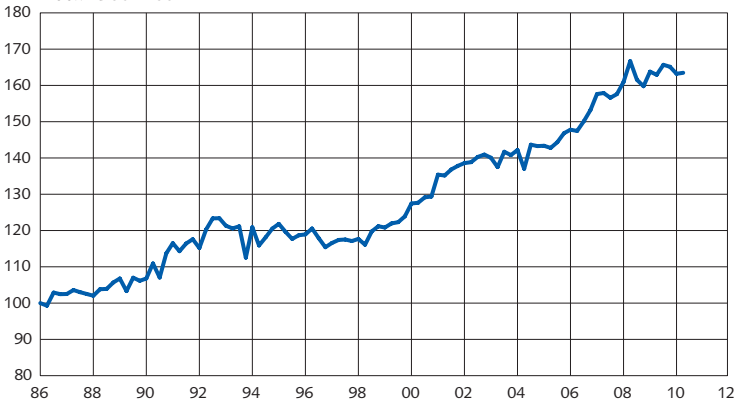
4 The long-term relationship in the model does not capture the downturn in house prices from 2008 to 2009 and we therefore regard the period from 1996 to 2010 as a single period.

Chart 2.2. House price changes in three periods and (econometric) model explanations



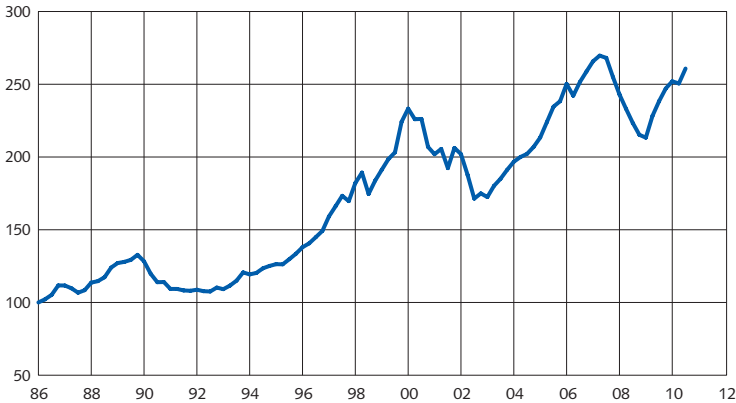
Source: Claussen (2011).

Chart 2.3. Household real disposable income
Index 1986=100



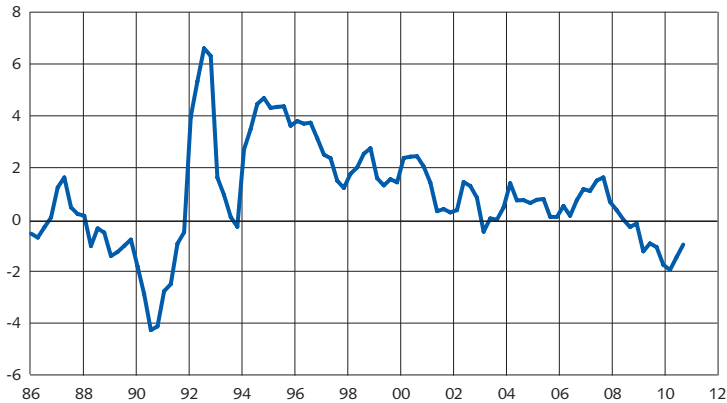
Sources: Statistics Sweden and the Riksbank.

Chart 2.4. Household real financial wealth
Index 1986=100



Sources: Statistics Sweden and the Riksbank.

Chart 2.5. Real after tax mortgage rates
Per cent



Sources: Statistics Sweden and the Riksbank.

CHANGES IN PREFERENCES ARE ALSO AN IMPORTANT EXPLANATION ACCORDING TO THE GENERAL EQUILIBRIUM MODEL

A fundamental principle in general equilibrium models is the division between endogenous and exogenous variables.⁵ Endogenous variables are explained within the model whereas exogenous variables are explained outside the model. Fluctuations in the exogenous variables drive variations in the endogenous variables.

⁵ The general equilibrium model for house prices was developed by Iacoviello and Neri (2010). It has since been modified and estimated on Swedish data by Walentin and Sellin (2010). They provide a detailed description of the model with focus on Swedish conditions. The appendix of the current article provides an informal description of the most important assumptions and mechanisms in the model.

We normally say that the economy is exposed to “shocks” when the exogenous variables vary. If, for example, technological development, which is an exogenous variable, were to change, it would cause changes in households’ and firms’ decisions on consumption, investment, labour supply, etc.

The model contains nine different exogenous variables, or shocks. There are three different shocks to households’ preferences and three different shocks to technological development.⁶ There is also a cost shock which has a direct effect on inflation, a monetary policy shock which primarily affects the interest rate, and an inflation target shock which affects the central bank’s inflation targets. In order to explain historical fluctuations in house prices, it is possible to break down the fluctuations into these shocks.

The nine shocks in the model explain together 100 per cent of the fluctuations around the trend-growth in house prices. However, only a few of these shocks explain most of the fluctuations. Historically, the most important shock has been changes in preferences for housing relative to other consumption, both with regard to upward and downward fluctuations. On average, changes in preferences have explained approximately 70 per cent of the fluctuations. Monetary policy has been less important even though in the short term these shocks have explained approximately 20 per cent.⁷ The other seven shocks together explain the remaining 10 per cent.

At present, house prices are around 20 per cent above the trend according to the model. The most important explanation for this is greater preference for housing relative to other consumption. But monetary policy has also been important. Monetary policy has been more expansive than normal according to the model and monetary policy shocks have therefore driven up house prices in recent years. But, the contribution from monetary policy is significantly less than the contribution from changes in preferences. A third explanation is that productivity growth in the housing sector has been slower than normal. This has driven up prices since 1995. Although the contribution from productivity growth has declined somewhat in recent years, it has nevertheless been important for the upturn in recent years. For a more detailed discussion of the factors explaining fluctuations in house prices see Walentin and Sellin (2010).

6 In formal terms, there is a preference shock to households’ utility from consuming today relative to consuming in the future, a preference shock in the consumption of leisure relative to other consumption, a preference shock in the consumption of housing services relative to other consumption, a technology shock in the goods sector, a technology shock in the housing sector and an investment-specific technology shock in the goods sector.

7 In the model, monetary policy follows a so-called “Taylor rule”. This means that it normally reacts to changes in inflation and GDP. However, central banks also react to other factors, which are reflected in the monetary policy shock. The monetary policy shock can be understood as a residual that captures changes in the interest rate over and above the changes caused by changes in inflation and GDP.

The largest proportion of the rise in house prices in recent years is explained by an increase in households' preferences for housing relative to other consumption. The model is unable to explain why this has taken place because it is a question of exogenous changes that, by definition, are not explained in the model. It is difficult to estimate preferences because they are not directly observable. However, we may wonder how these changes are to be interpreted and whether it is possible to understand why preferences for housing consumption have increased.

In certain contexts, fluctuations in house prices have been explained by changes in demand that cannot be related directly to factors such as income and interest rates. One sometimes hears statements like "a greater need for privacy", "changes in taste", and "a belief in the purchase of a property as an investment", see Iacoviello (2011). These explanations appear, at least at first sight, to be related to changes in preferences for housing.

Overall, the results from the two models indicate that high house prices are explained by higher incomes, low real interest rates and greater preferences for housing consumption relative to other consumption.

3. What role does monetary policy play for house prices?

This section illustrates how monetary policy affects house prices. The illustration is based on numerical examples of the effects of a change in the interest rate in the models. According to the models, it is costly in terms of inflation and GDP to use monetary policy to dampen increases in house prices.

SMALL EFFECT OF MONETARY POLICY ON HOUSE PRICES ACCORDING TO THE MODELS

According to the econometric model, a change in the real mortgage rate of 1 percentage point results in a change of 6 per cent in real house prices. To calculate how house prices are affected by *the repo rate*, we have estimated the real mortgage rate as a function of the repo rate. According to this estimation, a change of 1 percentage point in the repo rate leads to approximately half a percentage point change in the real mortgage rate. Thus, a change of 1 percentage point in *the repo rate* results in around a 3 per cent change in house prices.

The econometric model is based on the assumption that the explanatory variables are determined outside the model and that a change in a specific explanatory variable does not affect the other explanatory variables. However, in reality, a change in the real interest rate also affects households' income, for example, which in turn affects house prices. These indirect effects are better reflected in the BVAR model and the general equilibrium model.⁸

⁸ The BVAR model is described in more detail in the appendix. Note that in both the general equilibrium and the BVAR model we use the 3 month rate as a proxy for the repo rate.

According to the BVAR model, an increase in the interest rate of one percentage point leads to almost 1 per cent lower house prices during the first year, see table 3.1. House prices continue to fall in subsequent years. During the second year, they are almost 2 per cent below trend and in the third year almost 3 per cent below trend. In the long run, the higher interest rate therefore leads to approximately 5 per cent lower house prices. Higher interest rates also lead to lower house prices in the general equilibrium model. An increase of 1 percentage point in the interest rate results in almost 2 per cent lower housing prices in the first year.

Table 3.1. Effects from an increase in the interest rate of 1 percentage point
Annual change in per cent unless otherwise specified

BVAR	YEAR 1	YEAR 2	YEAR 3
Repo rate, per cent	1.0	0.8	0.7
Real house prices, per cent deviation from trend	-0.8	-1.9	-2.9
CPIF	0.2	0.3	0.2
GDP	-0.2	-0.3	-0.3
GDP, per cent deviation from trend	-0.2	-0.5	-0.7
GENERAL EQUILIBRIUM MODEL			
Repo rate, per cent	1.0	0.0	-0.1
Real house prices, per cent deviation from trend	-1.6	-1.1	-1.0
CPIF	-0.7	-0.3	-0.1
GDP	-1.0	0.2	0.2
GDP, per cent deviation from trend	-1.0	-0.8	-0.6

Sources: Statistics Sweden and the Riksbank.

In other words, monetary policy offers limited possibilities for affecting house prices in all three models. Overall, the results from the models indicate that a rise in the interest rate of 1 percentage point leads to a fall in house prices of between 2 and 5 per cent. This fall is somewhat smaller than in several other studies, but still in line with Hort (1998), see table 3.2.

Table 3.2. Effects of an increase in the real interest rate by one percentage point on house prices in several studies

	COUNTRY	ESTIMATED EFFECT ON HOUSE PRICES (PERCENTAGE CHANGE)
Hort (1998)	Sweden	-3
IMF (2005a)	United Kingdom	-6
IMF (2005b)	Netherlands	-9
Oikarinen (2005)	Finland	-2 to -8
Adams and Füss (2010)	Sweden	-8

SLOWING DOWN FAST-RISING HOUSE PRICES USING MONETARY POLICY IS COSTLY IN TERMS OF LOWER GDP AND INFLATION

According to the general equilibrium model, a higher interest rate means that households will consume less and firms will become more restrained in their investments. Lower demand leads to lower production and a lower GDP. The effect

on GDP growth from an increase in the interest rate by 1 percentage point is shown in table 3.1. GDP growth is around 1 percentage point lower.⁹ In terms of deviation from its long-term trend, GDP falls by around 1 per cent during the first year and continues to be lower for several years. When production falls, demand for capital and labour also fall. This gives rise to lower salary increases, which reduce firm expenses and leads to lower prices. Inflation measured by CPIF falls by just under 1 percentage point.

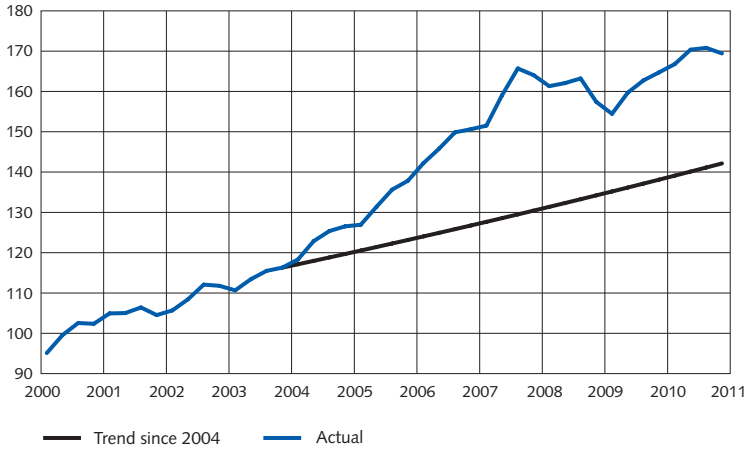
The costs of restraining rising house prices are somewhat lower in the BVAR model than in the general equilibrium model during the first year. A one percentage point increase in the interest rate results in GDP growth that is around 0.2 percentage points lower and inflation that is around 0.2 percentage points higher, see table 3.1. Inflation rises because it is positively correlated with interest in our data.¹⁰ However, after three years, GDP deviates from its trend by about the same amount as in the two models, i.e. it is approximately 0.7 per cent lower.

These numbers indicate that it can be relatively costly to use monetary policy to restrain rising house prices. Another way to illustrate this is to first calculate the interest rate increases that would have been required if house prices were to follow their long-term trend from 2004 onward, and then calculate the changes to inflation and GDP that are associated with these interest rate increases. According to the general equilibrium model, the long-term growth, or trend, in house prices is 2.9 per cent per year. House prices were in line with this trend around 2004. The blue line in chart 3.1 shows house prices since 2000. The black line shows what house prices would have been had they followed the trend from 2004 onwards. A tighter monetary policy would have been required to bring about this trajectory. The interest rate is therefore raised in the model by more than 2 percentage points in 2004, see table 3.3. It is continually raised during subsequent years, and in 2006 and 2007 it is raised by 5 percentage points. The rate of increase is then lowered somewhat and in 2009 the interest rate is lowered by 0.6 percentage points.

⁹ The monetary policy transmission from interest to GDP and inflation in this example is calculated using Ramses, the Riksbank's general equilibrium model.

¹⁰ The Fisher equation may shed light on the positive relationship between the interest rate and inflation: nominal interest rate = real interest rate + expected rate of inflation. If the real interest rate is constant over time, the variations in the nominal interest rate will be explained by the variations in the expected rate of inflation, i.e. there is a positive correlation between the nominal interest rate and inflation.

Chart 3.1. Real house prices. Actual and according to the trend in the general equilibrium model
Index for 2000=100



Sources: Statistics Sweden and the Riksbank.

Table 3.3. House prices according to the trend from 2004 onward
Annual change in per cent unless otherwise specified

	2004	2005	2006	2007	2008	2009	2010
Real house prices, per cent deviation from trend	-5.6	-11.2	-17.2	-22.9	-15.9	-17.6	-19.1
Repo rate, per cent	2.2	3.4	5.0	5.0	0.8	-0.6	1.2
CPIF	-1.4	-2.9	-4.9	-5.8	-3.8	-1.4	-1.8
GDP	-2.2	-3.0	-4.2	-3.9	0.6	1.3	-0.9

Sources: Statistics Sweden and the Riksbank

The higher interest rate leads to significantly lower inflation. Inflation measured by CPIF is on average around 3 percentage points lower each year. GDP growth is also lower; on average almost 2 percentage points lower with the tighter monetary policy.

4. What would happen if there were to be a drastic fall in house prices?

An important question for monetary policy is how changes in house prices affect inflation and GDP. This section presents several examples that illustrate the consequences of a fall in house prices for inflation and GDP and, in turn, the consequences for monetary policy. We assume that house prices fall 20 per cent in real terms. This is less than the fall at the beginning of the 1990s when prices fell almost 30 per cent, but more than the fall in 2008.

A FALL IN HOUSE PRICES HAS RELATIVELY SMALL EFFECTS ON THE MACRO ECONOMY IN THE GENERAL EQUILIBRIUM MODEL

According to the general equilibrium model, the largest share of the historical fluctuations in house prices has been caused by shocks to preferences for housing relative to other consumption. We therefore allow the fall in house prices to be explained by a lower demand for housing. If some other shock cause the fall in prices, the effects can be different.

The fall in house price primarily affects households that use housing as collateral. When the collateral falls in value, they are forced to increase mortgage repayments. As a consequence, they reduce other consumption which therefore brings about a fall in demand in the economy, which results in a fall in GDP.

The fall in house prices holds back GDP growth primarily during the first year, during which it is around 1 percentage point lower than otherwise, see table 4.1. However, GDP's deviation from its long-term trend is about 1 per cent for a long time into the future. During the next three years, it is on average 1 per cent lower than without the fall in house prices. Lower demand presses prices downward. The effect on inflation, though, is very small; inflation falls by only 0.1 percentage points. The absence of larger effects on inflation is in part due to the definition of inflation in the model. Only prices of consumer goods are included in the measurement. The fall in house prices therefore has no direct effect on inflation.

In the model, monetary policy is intended to stabilise inflation around an inflation target and GDP growth around a long-term growth target. Lower GDP growth and somewhat lower inflation opens for more expansive monetary policy and the interest rate is therefore lowered by 0.5 percentage points. Expansive monetary policy is another reason why a fall in house prices only has a small effect on inflation. However, monetary policy does not completely offset the fall in GDP.

Thus, the effects of a fall in house prices on GDP growth are relatively small. However, the model disregards frictions in the financial sector and borrowers in the model always repay their debts. The downturn in house prices therefore only affects borrowers negatively. Lenders are not affected by fluctuations in house prices.

The absence of frictions in the banking sector is a gross simplification. If house prices were to fall sharply, the financial sector would probably be important for how the effects would spread to the rest of the economy, as demonstrated in particular by the developments in the USA since 2007. There, the fall in house prices had such a large impact as it affected the banks' balance sheets. Repayments from borrowers fell, which in turn meant a reduction in the banks' net capital. If the banks can absorb such losses with new capital, the fall in repayments only corresponds to a redistribution, which should not lead to large aggregate effects. However, if the banks' have limited access to financing and, for example, must fulfil a capital requirement, this can lead to a credit squeeze and consequences for consumption

and investments. The fact that the model does not have credit market frictions may lead to underestimation of the effects on GDP. On the other hand, the Swedish banks have – for example at the beginning of the 1990s when house prices fell dramatically – been spared from loan losses from households.

Table 4.1. Effects of a 20 per cent fall in house prices in 1 year

Annual change in per cent unless otherwise specified

GENERAL EQUILIBRIUM MODEL	YEAR 1	YEAR 2	YEAR 3
Real house prices, per cent deviation from trend	-20.0	-17.9	-15.9
CPIF	-0.1	-0.1	-0.1
GDP	-1.1	0.2	0.2
GDP, per cent deviation from trend	-1.1	-1.0	-0.8
Repo rate, per cent	-0.5	-0.5	-0.2
BVAR, SHOCK TO HOUSE PRICES			
Real house prices, per cent deviation from trend	-20.0	-20.3	-19.5
CPIF	-0.4	-0.2	-0.2
GDP	-2.0	-0.2	0.1
GDP, per cent deviation from trend	-2.0	-2.2	-2.1
Repo rate, per cent	-0.5	-0.8	-0.7
BVAR, ALL SHOCKS			
Real house prices, per cent deviation from trend	-20.0	-22.9	-22.0
CPIF	-0.5	-0.4	-0.4
GDP	-2.3	-1.3	0.2
GDP, per cent deviation from trend	-2.3	-3.5	-3.3
Repo rate, per cent	-0.3	-1.1	-1.1

Sources: Statistics Sweden and the Riksbank.

THE EFFECTS ARE SLIGHTLY LARGER IN THE BVAR MODEL

To analyse the effects of the house-price fall in the BVAR-model we first assume that the fall in house prices is caused by a “housing shock”, i.e. the residual in the equation for house prices. An interpretation of this can be that there is a collapse of confidence on the housing market. The numerical example is carried out in the form of a conditional forecast in which real house prices fall by approximately 20 per cent over one year. The effects on GDP are approximately twice as large in the BVAR model compared to the general equilibrium model. GDP growth falls by around 2 percentage points compared to 1 percentage point in the general equilibrium model, see table 4.1. The interest rate is lowered by around 0.5 percentage points, which tends to counteract the negative effects of the fall in house prices.

The effects of a fall in house prices are to a large extent dependent on why they fall. In the two examples presented thus far, the cause of the fall is a separate shock to the housing market. In that case effects for the rest of the economy are small.

However, if the cause of the fall in prices is a general downturn in the economy, the effects can be more extensive, which can be illustrated using the BVAR model. Formally, we now allow the shocks that, according to the model, are the

most probable to explain the fall in prices. In this case GDP growth is around 2.5 percentage points lower during the first year, see table 4.1. GDP falls below its trend by more than 3 per cent during the second and third year. Even the interest rate goes down, which partly offsets the negative effects of both the fall in house prices and the general downturn in the economy.

In practice it can be sometimes be difficult to lower the interest rate to the extent suggested by the model since the interest rate cannot become negative. In situations where a reduction in the interest rate cannot be fully utilised to counteract the downturn in the economy, the outcome can be even worse than in these examples. A fall in house prices associated with a general downturn in the economy can lead to subdued macroeconomic growth for several years and low interest rates as a result.

5. Are houses overvalued?

The considerable rise in house prices since the mid-1990s has initiated a debate on whether houses are overvalued. However, answering this question is not straight forward, partly because different definitions exist. Three definitions that are applicable in some of our models are the following.

Houses are overvalued if

- i. house prices are above their long-term trend,
- ii. house prices cannot be explained by fundamental factors,
- iii. predictions by the models indicate falling house prices.

MUCH INDICATE THAT HOUSE PRICES ARE ABOVE THEIR LONG-TERM TREND

According to the general equilibrium model, the long-term trend growth for real house prices has been around 3 per cent a year. Since house prices have grown much faster than this during the last 25 years – around 4 per cent per year – prices are currently well above their long-term trend. According to the model, they are about 20 per cent above trend. Neither the econometric model nor the BVAR model defines an explicit trend growth rate. These models therefore cannot provide information about the degree to which house prices currently lie above the long-term trend.

An important factor when calculating the trend is the time period that serves as its basis. The general equilibrium model is estimated on a relatively short period of time. If the trend were calculated using a longer period, the results could have been different. Chart 5.1 shows the development of real house prices for the period 1952 to 2010. It is worth noting that real house prices in 1996 were at the same level as in 1952. The average rate of increase per year is around 1.5 per cent for the entire

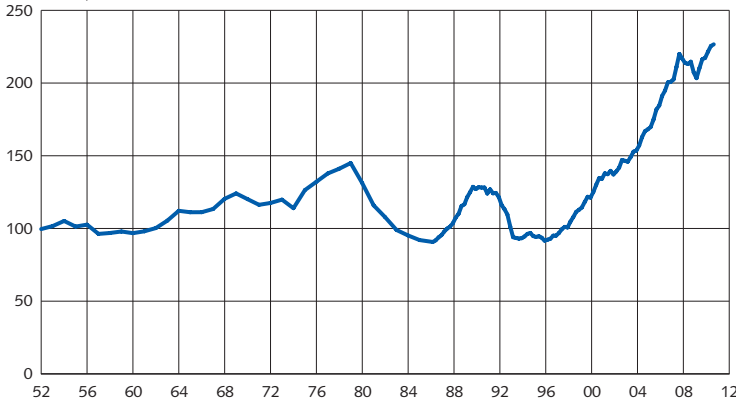
period, which can be compared to the 6 per cent rate of growth seen in the past 15 years. In this light, the strong growth of house prices since 1996 appears to be exceptional.

The trend of rapidly rising house prices over the past 15-20 years is also evident in a number of other countries. In the USA, real house prices in 1996 were at the same level as 100 years earlier. House prices began to rise significantly in the mid-1990s. Time series exist for Amsterdam going back to 1650. These show that real house prices in 1996 were largely at the same level as 300 years earlier. In Norway, house prices in 1990 were largely at the same level as 100 years earlier, but since the mid-1990s they have risen sharply.

In the public debate regarding the increase in house prices over the last 20 years a number of arguments are put forth. One argument is that it has become easier for households to obtain a mortgage. The credit market has been deregulated, competition has increased, and this has made it possible for more people to obtain a mortgage. Another argument is that the number of people living in major cities has increased.

There are many indications that house prices are above the long-term trend and that they therefore can be considered overvalued according to the first definition. However, this does not necessarily mean that house prices will fall in the future. According to the models, the most probable development is rather a slower rate of increase (see below).

Chart 5.1. Real house prices in Sweden 1952-2010
Index, 1952=100



Sources: Statistics Sweden and the Riksbank.

HOUSE PRICES CAN BE EXPLAINED IN THE MODELS

According to the econometric model, house prices have risen because household income and financial wealth have increased, and because real mortgage rates have

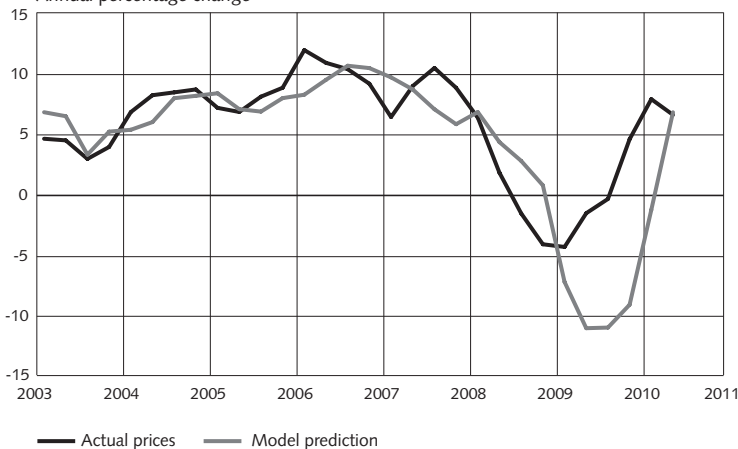
become unusually low. This means that, according to the econometric model, rising house prices can be explained by fundamental factors. Thus, according to this model and the second definition, houses are not overvalued.

The BVAR-model estimated with data up until 2002 provides an additional illustration. Chart 5.2 shows this model's predicted house prices from 2003 onward given the realised values of the input variables.¹¹ The model's predictions are in line with actual prices for most of the period. The exception is 2009 when actual increases are higher than according to the model. But, the model predictions and actual increases are the same by the end of the period. The house price developments can therefore be 'explained' by the model.

There are, however, possible objections to this analysis. One is that much emphasis was placed on adapting the models to the data. But models are always simplifications. For example, if an important variable is missing from the model, i.e. the model is incorrectly specified, the conclusions could be different.

In the general equilibrium model, house prices are by definition explained by the various shocks. House prices are therefore by construction neither overvalued nor undervalued, but are always fundamentally explained in the model.

Chart 5.2. Real house prices 2003-2010. Actual prices and conditional forecasts from the BVAR model
Annual percentage change



Sources: Statistics Sweden and the Riksbank.

¹¹ The analysis follows the set-up from a speech, "Monetary Policy and the Housing Bubble", given by Bernanke (2010). The speech bases large parts of the analysis on Dokko et al (2009) and discusses monetary policy's role in the growth of house prices in the USA with a focus on the period 2002 onward. Many believe this period is characterised by the "bubble element", see e.g. Shiller (2007). One conclusion from the speech was that the US house prices could not be explained by the outcome of other variables. However, the key interest rate could be explained by the outcome of other variables.

FORECASTS USING MODELS DO NOT INDICATE THAT HOUSE PRICES WILL FALL

Forecasts from the econometric model indicate relatively stable house prices in the future. In order to forecast a sharp fall in house prices, an unrealistically high interest rate combined with very low income growth is necessary.¹²

Forecasts with the BVAR model can be created in a number of different ways. A common method is to let the model forecast all variables in the model. This is usually called an *unconditional forecast*. Another method is to condition the forecast on a given development of one or more of the variables in the model. This is called a *conditional forecast*. In the conditional forecasts we have used the Riksbank forecasts for GDP, inflation and interest rates. Neither the unconditional nor the conditional forecasts from the BVAR model indicate that house prices will fall in the next three years. However, the rate of growth will gradually abate.

In summary, the forecasts from the two models indicate that house prices in Sweden will not fall sharply in the future. Housing is therefore reasonably valued according to the third definition.

HOUSE PRICES ACCORDING TO OTHER MEASUREMENTS

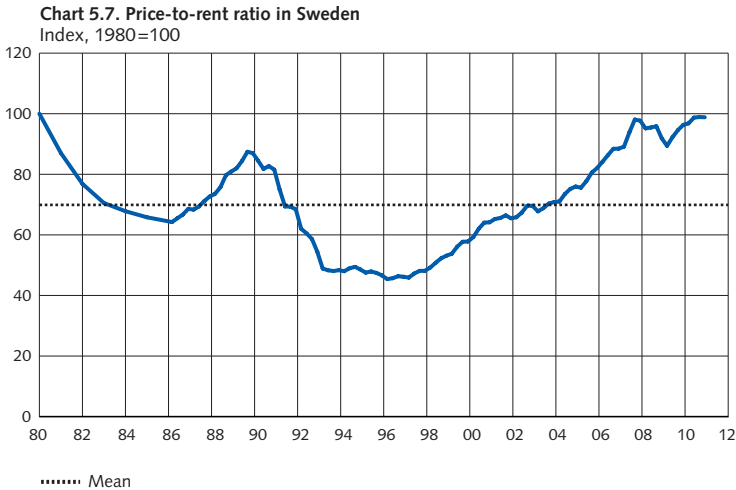
In the debate on possible overvaluation a whole range of measurements and definitions are used. Many of these cannot be directly applied to our models or to Swedish data. Two such measurements are prices in relation to rents and house prices in relation to income.

Prices in relation to rents

Housing can be purchased or rented. In market equilibrium, the price of the same housing service should be the same regardless whether it is purchased or rented. If that is not the case, households can make a profit by changing from one form of housing to another. For that reason, so-called price-to-rent ratios are often used to analyse house prices. Price-to-rent ratios for Sweden are used by IMF (2009), the National Mortgage Loan Board (BKN, 2009) and The Economist (2010), among others. All of these studies indicate that Swedish houses are much overvalued.

Chart 5.7 shows the house price index in relation to rents in Sweden. The rent component in the consumer price index, CPI, has been used to measure rent levels. The average price-to-rent ratio over the period from 1980 is well below today's level. According to the BKN's calculations, house prices can therefore fall by approximately 20-25 per cent in the coming years.

¹² See Claussen (2011).



Note. The rent component in the consumer price index, CPI, has been used to measure rents.

Sources: Statistics Sweden and the Riksbank.

However, there are a number of objections to using the price-to-rent ratios as an indicator for potential overvaluation of Swedish houses. The most important objection is that Sweden does not have market rents in the same way as in the USA, for example, which is a prerequisite in order for any analysis to be meaningful. Added to this is the more general problem of comparing rental properties, which consist of both apartments and one- and two-dwelling buildings. A comparison between rented apartments and tenant-owned apartments would be more relevant. One added difficulty is that the analysis assumes that it is easy to change between rented housing and home ownership if prices deviate from what is reasonable.

House prices in relation to income

The basic idea behind this valuation method is that if house prices are higher than normal in relation to income, housing is overvalued. In this context, income is most commonly measured in terms of disposable income per capita or GDP per capita. IMF's World Economic Outlook from October 2009 shows that house prices in relation to income are well above their normal levels in many countries. For example, in Sweden house prices in relation to disposable income were around 15 per cent above the average, which would indicate that the housing market is overvalued.

According to this valuation method, house prices should increase no more than disposable income or GDP in order to for houses not be overvalued. However, it can be completely reasonable for real house prices to rise faster than real income during certain periods. One example is if there are temporary shifts in demand for

housing services relative to other consumption, which is one of the explanations for the rapidly rising house prices in recent years according to the general equilibrium model.

In the long run, it is often reasonable to assume that consumption is a constant share of income or GDP. Housing consumption should then also grow at the same rate as the GDP in the long run. Shiller (2006) shows that the average housing area per capita in the USA has tripled since the 1940s. This is one way of reflecting increased consumption of housing. GDP per capita in the USA is currently around 3.8 times higher than in 1948. Thus, according to these calculations, consumption of housing has risen at approximately the same rate as GDP per capita.¹³

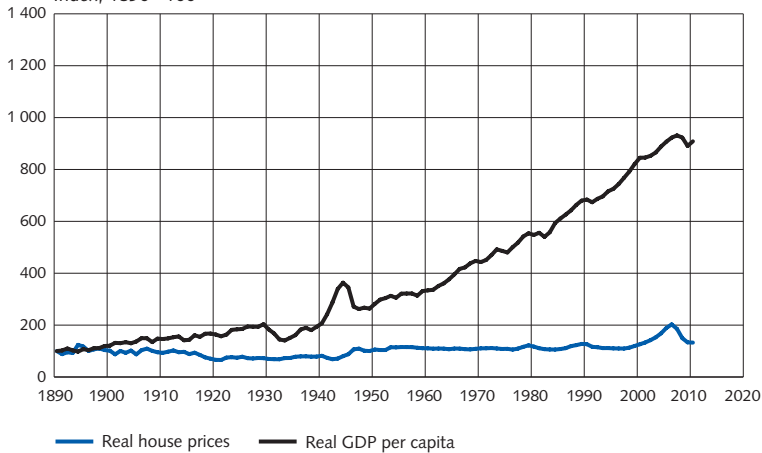
The development of real house prices is in the long run driven by the difference in productivity growth between GDP and the housing sector. If productivity growth is the same in the housing sector as in the rest of the economy, real house prices will be constant. If real house prices are to grow at the same rate as or faster than the GDP, productivity must be zero or negative in the housing sector, given that productivity growth is positive in the rest of the economy.

Chart 5.8 shows that, up until the mid-1990s, real house prices in the USA have been relatively constant while GDP rose steeply. This suggests that there is no major difference between productivity growth in the housing sector and the rest of the economy in the long run. Chart 5.9 shows a similar development for Sweden from 1952 onward.

It also seems reasonable from both a theoretical and empirical point of view for real income and GDP to grow faster than real house prices in the long run, but during certain shorter periods it can also be reasonable for real house prices to grow just as fast as or even faster than GDP.

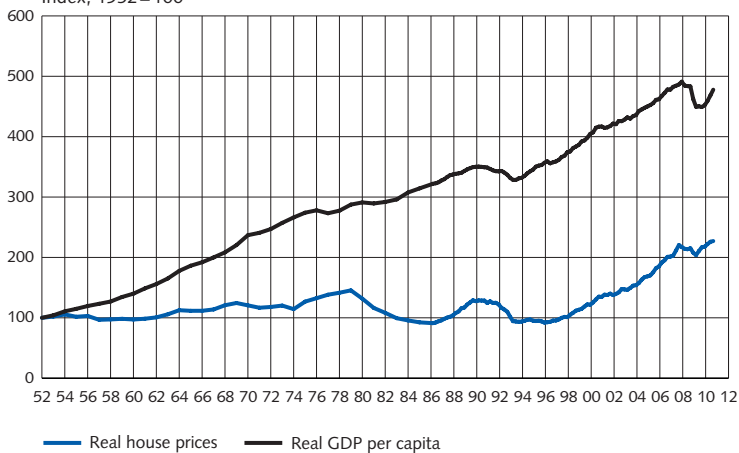
13 In addition, the quality of housing has risen since the 1940s.

Chart 5.8. Real house prices and real GDP per capita in the USA in the 1890-2010 period
Index, 1890=100



Sources: Robert J. Shiller and Historia.se.

Chart 5.9. Real house prices and real GDP per capita in Sweden in the period 1952-2010
Index, 1952=100



Sources: Statistics Sweden and the Riksbank.

6. Concluding remarks

There are many indications that house prices are currently above their long-term trend levels. According to our models, this can be explained by higher incomes, low real interest rates and an increased preference for consumption of housing. The results from the models also indicate that the costs of using monetary policy to restrain rising house prices can be high since this leads to lower real economic

growth. Finally, we find that a fall in house prices may have a relatively limited impact on the real economy and inflation. However, this is under the assumption that the fall is not due to a general downturn in the economy.

Results from models are always surrounded by uncertainty. There are several reasons for this. First, models are always based on a series of simplifying assumptions. They are linearized, and therefore abstract from non-linear effects. For example, a considerable fall in house prices can result in contagion effects for the banking sector that are difficult to capture in a linear model. Second, there is statistical uncertainty because, among other things, the period of time being studied might not be representative. Third, the results from the models assume that the model relationships are stable over time.

There are several important issues that this study has not been able to illustrate in full. For example, house prices are determined in a market influenced by both supply and demand. The supply of housing, i.e. housing construction, has been very low since the beginning of the 1990s even though prices have risen sharply. Understanding how the supply of housing is determined and how it affects house prices is important and should be central for future work.

Appendix

THE ECONOMETRIC MODEL

The econometric model explains the growth of prices for one- and two-dwelling buildings by the growth of three variables: household real disposable income, household financial wealth and real after tax mortgage rates. The model is an “error correction model”. There is a long tradition of using error correction models to analyse the housing market, see for example Girouard et. al. (2006) and Borowiecki (2009). For studies on Swedish data, see Hort (1998), Barot and Yang (2002) and Adams and Füss (2010).

The four variables included in the model are explained in table A:1. The model is estimated on data from the first quarter of 1986 up to and including the third quarter of 2010. Other studies on Swedish data have used other variables, such as unemployment, demographic variables, variables measuring expectations of monetary policy, credit growth and construction costs.¹⁴ There is no quarterly data for several of the demographic variables. In the deregulated Swedish credit market, credit growth is a poor indicator of access to credit. For that reason we have not used these variables. Our statistical estimates show that construction costs (excluding the costs of land) are determined together with house prices and can therefore not be used as an explanatory variable for house prices. The fact that construction costs rise when house prices rise can be due to weak competition in the building sector (See Konkurrensverket (2009) and BKN (2010b)). We tested for a series of other variables, none of which work in our model.¹⁵ See Claussen (2011) for a more detailed discussion.

In the estimated model, the long-term equilibrium price (p^*) is determined by the level of household real disposable income (di), household financial wealth (df), and by real after tax mortgage rates (rr) in the equation

$$p^*_t = -16,4 + 1,23 di_{t-1} - 0,06 rr_{t-1} + 0,15 df_{t-1}, \quad (1)$$

(0,00) (0,00) (0,00) (0,08)

where t is the period and the figures in parentheses are p -values. We tested for co-integration and find evidence of co-integration (see Claussen 2011 for details). Equation (1) means that the long-term level of the house price index in quarter t (e.g. the first quarter of 2010) is determined by the level of the three explanatory variables one quarter earlier. The reason for this specification is that Statistics Sweden’s statistics on house prices are reported by the date on the bill of sale,

¹⁴ Hort (1998), Barot and Yang (2002), BKN (2010a) and Adams and Füss (2010).

¹⁵ The coefficients are assigned the wrong sign or are not significant. Unemployment and the variable measuring monetary policy expectations are stationary variables and we have not tested these in a long-term relation.

in other words the date when the purchaser is the new formal owner of the property. The delay between drafting the contract and the bill of sale is normally approximately two months.

Table A.1. Variables in the econometric model.

	SYMBOL	EXPLANATION	SOURCE
House prices	<i>p</i>	Statistics Sweden's house price index deflated by the CPIF. The house price index estimates the price of the existing stock of one- and two-dwelling buildings. CPIF is the consumer price index with a fixed mortgage rate.	Statistics Sweden
Disposable income	<i>di</i>	Households' gross income minus direct taxes, deflated with by CPIF.	Statistics Sweden
Financial assets	<i>df</i>	Households' stocks, bonds, bank accounts, insurance policies and other items, deflated with the CPIF.	Statistics Sweden
Real after tax mortgage rate	<i>rr</i>	$rr = r(1 - \tau) - \pi$, where τ is the proportion of interest payments that households can deduct from their tax, π is CPIF inflation measured as annual percentage change and r is the average nominal mortgage rate. This average is a weighted average of a 3-month government certificate rate, a 3-year government bond rate and a 5-year government bond rate. The three weights are, respectively, the share of variable rate mortgages, the share of mortgages with a fixed interest period between 3 months and 5 years, and the share of mortgages with a fixed interest period exceeding 5 years.	Statistics Sweden, the Riksbank

All variables except for real interest rates after tax are in logs. For variables in logs , the estimated coefficients give the percentage change in the long-term equilibrium price following a percentage change in a given variable. Model (1) therefore means that a one percentage point rise in the real mortgage rate leads to a full 6 per cent fall in the long term equilibrium price. Similarly, the model means that if the real mortgage rate falls by 1 percentage point, house prices will rise by 6 percentage points. Several international studies contain similarly high coefficients, see table 3.2. The coefficient for real disposable income means that a 1 per cent increase in real disposable income leads to a 1.2 per cent rise in house prices. The coefficient for household financial wealth means that a 1 per cent rise in wealth leads to a 0.15 per cent rise in the long term equilibrium price.

The short-term dynamic in the model is given by

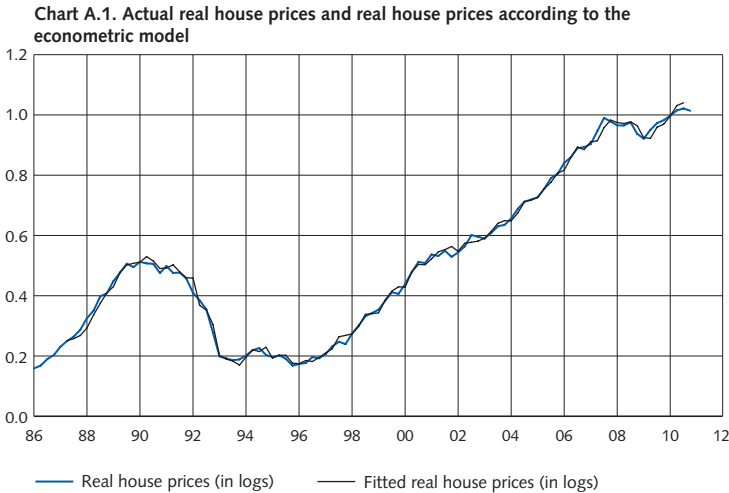
$$p_t = 0,002 - 0,10(p_{t-1} - p_{t-1}^*) + 0,6\Delta p_{t-3} - 0,005(\Delta rr_t + \Delta rr_{t-1} + \Delta rr_{t-3}) + 0,21\Delta df_{t-1}, \quad (2)$$

(0,28)
(0,00)
(0,00)
(0,01)
(0,00)

where $\Delta p_t = p_t - p_{t-1}$, $\Delta p_{t-1} = p_{t-1} - p_{t-2}$, $\Delta rr_t = rr_t - rr_{t-1}$, $\Delta rr_{t-1} = rr_{t-1} - rr_{t-2}$, etc. Figures in parentheses are the *p*-values. The coefficient before $(p_{t-1} - p_{t-1}^*)$ measures how fast a deviation between the actual housing price and the long-term equilibrium price is corrected (error correction). The coefficient of 0.1 means that 10 per cent of

this deviation is corrected each quarter. This means that about 30 per cent of the deviation disappears within one year.

If we move p_{t-1} over to the right-hand side of (2), we obtain an expression for the current house price. Chart A.1 shows actual house prices together with the short-term equilibrium price according to the model. As we may observe, the model reflects actual house prices very well.



Source: Claussen (2011).

THE BVAR MODEL

A Bayesian VAR model is a VAR model with assessments, so-called priors, of, for example, means and variances.¹⁶ An important criterion when selecting priors is that they should be independent of the data that used in the estimation. These prior perceptions are then weighed alongside the information in the data.

The BVAR model in this study includes the following variables: the house price index from Statistics Sweden, the seasonally-adjusted CPIF, the seasonally-adjusted GDP and three-month government bond rates; see also Iacoviello (2005). Log-first-differences of all variables are used, with the exception of short-term interest rates, which are included in levels. The model is estimated on data from the first quarter of 1986 to the second quarter of 2010. After analysis using different lag criteria, the model has been estimated with one lag. This means that the variables are modelled as functions of the outcomes for the variables during the immediately preceding quarter. A dummy variable which reflects the transition to current monetary policy from the 1993 regime is also included. As mentioned, the estimation is

¹⁶ VAR is an abbreviation for “vector autoregression”.

supplemented with assessments, i.e. priors. We have placed priors on the means of the variables. As a test of robustness, an alternative specification with two further variables, open unemployment 15-74 years and a five-year government bond rate, have been estimated, but the results were not substantially different.

THE GENERAL EQUILIBRIUM MODEL

A detailed formal description of the general equilibrium model is found in Iacoviello and Neri (2010) and Walentin and Sellin (2010). The model has up to now primarily been used in monetary policy analysis at the Riksbank to generate scenarios in which house prices have played an important part, see for example the monetary policy report in July 2010. The model is also relatively widely spread among other central banks and institutions, for example the ECB (Lombardo and McAdam, 2008).

There are three kinds of agents in the model: households, firms and a central bank. Firms are active in the housing sector, where they produce housing, and in the goods sector, where they produce consumer goods, investment goods and input goods. Goods are produced with labour and capital, but land and input goods are required for producing new houses, in addition to labour and capital. The construction of housing requires land and for that reason the assumption that only capital and labour are used in production is too restrictive.

One important observation in the data is that, historically, house prices have risen faster than prices of other goods. In order to reflect this, it is necessary to explicitly model the production of housing. One explanation for the rapid increase in house prices, according to the model, is relatively slow technological progress in the housing sector.

There are two types of households: "patient" and "impatient". Impatient households prefer to consume their incomes relatively quickly, whereas patient households are more inclined to save and prefer to postpone consumption. Therefore, patient households are lenders and impatient households are borrowers. The impatient households are assumed to have difficulty receiving a loan. They are therefore unable to finance their housing completely with loans, but rather must pay a certain portion in cash. Fluctuations in house prices affect these households' lending and consumption possibilities, which means that the effects of fluctuating house prices can spread from the housing market to consumption and the aggregate economy.

Patient households work and consume consumer goods and housing services. They provide loans for firms' investments and impatient households' purchases of housing. Impatient households work and consume both consumer goods and housing services in exactly the same way as patient households, but they accumulate only the capital required to finance collateral on their mortgage loan.

The central bank is assumed to follow a so-called Taylor rule. This means that the interest rate reacts to the actual deviation of inflation from the inflation target and to GDP's deviation from its long-term growth level. In order to avoid excessively large variations in the interest rate, it is assumed that, it also depends on the interest rate level in the previous quarter. If inflation is at the same level as the inflation target and growth has zero deviation from its long-term level, the interest rate is constant. If inflation deviates from the target and/or GDP differs from long-term growth, the interest rate rises or falls depending on the size and direction of the deviation.

There are several reasons why the Taylor rule has become popular. It appears that monetary policy in many countries can be described relatively well using this rule. Monetary policy reacts systematically and predictably in the case of the various shocks to which the economy is continuously exposed. It normally means that monetary policy is well adjusted, i.e. from a normative perspective it is normally close to optimal, see Plosser (2008).

References

- Adams, Z. and R. Füss (2010), "Macroeconomic Determinants of International Housing Markets," *Journal of Housing Economics*, 19(1), pp. 38-50.
- Barot, B. and Z. Yang (2002), "House Prices and Housing Investment in Sweden and the United Kingdom. Econometric Analysis for the Period 1970-1998", *Review of Urban and Regional Development Studies* 14(2), pp. 189-216.
- Bernanke, B. (2010), "Monetary Policy and the Housing Bubble," Speech, Published 3 January 2010.
- BKN (2009), "Vad bestämmer priset på bostäder?" Market Report, October, The National Housing Credit Guarantee Board.
- BKN (2010 a), "En bostadsbubbla kostar," Market Report, February, The National Housing Credit Guarantee Board.
- BKN (2010 b), "Vad kostar det att bygga bort bostadsbristen?" Market Report, October, The National Housing Credit Guarantee Board.
- Borowiecki, K. J. (2009), "The Determinants of House Prices and Construction: An Empirical Investigation of the Swiss Housing Economy," *International Real Estate Review* 12(3), pp. 193-220.
- Claussen, C. A. (2011), "An Error-Correction Model of Swedish House Prices," mimeo, Sveriges Riksbank.
- Dokko, J., B. Doyle, M. T. Kiley, J. Kim, S. Sherlund, J. Sim, and S. van den Heuvel (2009), "Monetary Policy and the Housing Bubble," Federal Reserve Finance and Economics Discussion Series 2009-49.
- Economist (2010), "You can't keep 'em Down. Houses Remain Overvalued in Many Countries where Prices are Now Rising," *The Economist*, 15 April 2010.
- Francke, M. K. (2010), "How Bloated is the Dutch Housing Market?" *Real Estate Research Quarterly* 9(1), pp. 48-54.
- Girouard, N., M. Kennedy, P. van den Noord and C. André (2006), "Recent House Price Developments: The Role of Fundamentals," OECD Economics Department Working Papers 475.
- Hort, K. (1998), "The Determinants of Urban House Price Fluctuations in Sweden 1968-1994," *Journal of Housing Economics* 7(2), pp. 93-120.
- Iacoviello, M. (2005), "House Prices, Borrowing Constraints and Monetary Policy in the Business Cycle," *American Economic Review* 95(3), pp. 739-764.
- Iacoviello, M. (2011), "Housing in DSGE Models: Findings and New Directions," mimeo.
- Iacoviello, M. and S. Neri (2010), "Housing Market Spillovers: Evidence From an Estimated DSGE Model," *American Economic Journal* 2(2), pp. 125-64.
- IMF (2005a), "United Kingdom: Selected Issues," IMF Country Report 05/81, International Monetary Fund.
- IMF (2005b), "Kingdom of the Netherlands: Selected Issues," IMF Country Report 05/225, International Monetary Fund.

- IMF (2009), "World Economic Outlook", October, International Monetary Fund.
- Konkurrensverket (2009), "Åtgärder för bättre konkurrens – konkurrensen i Sverige," Swedish Competition Authority, report 2009:4.
- Lombardo, G. and P. McAdam (2008), "Adding Financial Market Frictions to the NAWM," European Central Bank, Working paper.
- Oikarinen, E. (2005), "Is Housing Overvalued in the Helsinki Metropolitan Area?", The Research Institute of the Finnish Economy, Discussion Papers 992.
- Plosser, C. (2008), "The Benefits of Systematic Monetary Policy," Speech for the National Association for Business Economics, Washington Economic Policy Conference.
- Shiller, R. J. (2006), "Long-Term Perspectives on the Current Boom in Home Prices," *Economist's Voice*, March 2006.
- Shiller, R. J. (2007), "Understanding Recent Trends in House Prices and Homeownership," *Housing, Housing Finance, and Monetary Policy*, Federal Reserve Bank of Kansas City Jackson Hole Symposium.
- Walentin K. and P. Sellin P. (2010), "Housing Collateral and the Monetary Transmission Mechanism," Sveriges Riksbank Working Paper No. 239.

■ Larger share of variable mortgages – how does this affect the impact of monetary policy?

JESPER JOHANSSON, BJÖRN LAGERWALL AND HENRIK LUNDEVALL*

In recent years, a growing share of households has switched to mortgages with variable interest rates. Today, approximately 55 per cent of the outstanding loans of mortgage institutions are variable loans, a figure that was barely 10 per cent in 1996. At the same time, households' total debt is growing in relation to their disposable income. Does this mean that household consumption has become more sensitive to changes in the key interest rate? This article discusses how the trend toward an increasing number of variable rate mortgages affects the impact of monetary policy on private consumption, and thereby on inflation and the utilisation of resources. It begins with a simple example that demonstrates how the key interest rate is traditionally assumed to impact household consumption. A discussion is then held about new economic research that shows how households' choice of fixed or variable interest rates affects the impact of monetary policy.

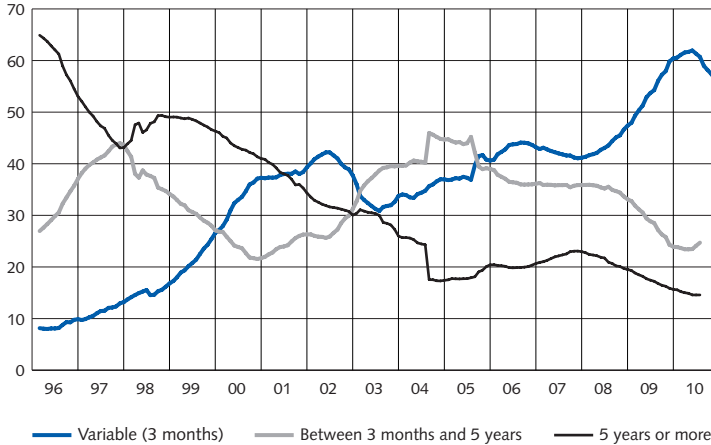
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GROWING SHARE OF VARIABLE RATE LOANS – STATISTICS AND POSSIBLE CAUSES

Chart 1 shows the distribution of original fixed-interest periods in mortgage institutions' outstanding stock for the period 1996-2010.¹ Chart 1 clearly shows that the trend toward shorter fixed-interest periods has been ongoing for quite some time, and that the changes that occurred since 1996 are extensive, even if the statistics refer to the loan's original fixed interest period and must therefore be interpreted with a certain degree of caution. In March 1996, loans with original fixed interest periods of 5 years or more represented approximately 65 per cent of mortgage institutions' outstanding stock, while at the end of 2010 they represented around 15 per cent of the total borrowed amount.

During the financial crisis, the share of variable rate loans increased significantly. Given the information presented in chart 1, this increase appears to be an accentuation of a trend that has persisted for some time.

Chart 1. Breakdown of Swedish mortgage institutions' outstanding stock by original fixed interest periods (per cent)



Note. Due to a change in the way the statistics are reported, data up to August 2010 uses the categories "Between 3 months and 5 years" and "5 years or more". This distribution of categories is not available after August 2010, at which time the statistics of outstanding loans only show "variable rate" and "fixed rate".

Sources: The Riksbank and Statistics Sweden.

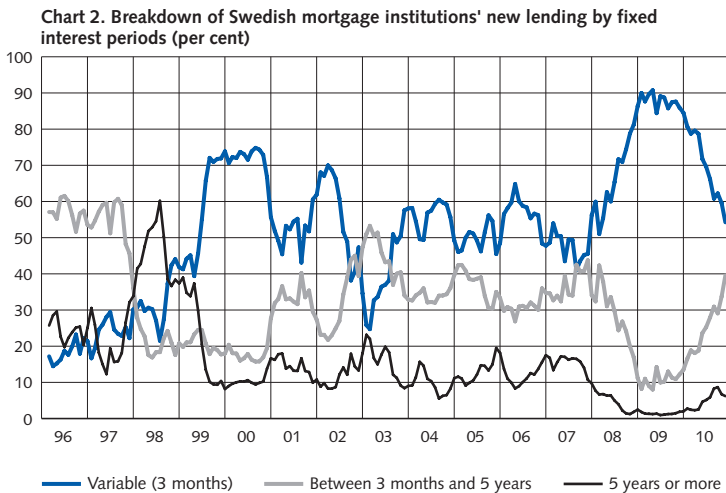
At the same time as the average fixed interest period on household mortgages falls, total indebtedness of households is increasing. In 1996, the total debt of Swedish households was just under 90 per cent of their disposable income. In January 2011,

1 An alternative to the statistics about mortgage institutions' lending is Financial Markets Statistics, which contains statistics about lending by all Swedish credit institutions' for housing purposes. This series has only been available for the past six years. Due to space restrictions, these statistics are not reported here. However, it is worth noting that during the six-year period for which both series are available, both show the same general trend toward shorter fixed interest periods.

total household debt was valued at approximately 170 per cent of the households' annual disposable income. Together, these two trends present a picture of a household sector whose economy should be more markedly affected by a change in the key interest rate of a certain size.

NEW LENDING SHOWS HOUSEHOLDS' CURRENT CHOICE OF FIXED INTEREST PERIODS

Chart 2 shows the breakdown of mortgage institutions' new lending by fixed interest periods.² We see relatively strong fluctuations over time in the share of loans with different fixed interest periods, but we also see that the ranking among the different categories has been relatively stable from the end of the 1990s onward. Loans with variable rates have been most popular, followed by fixed interest periods between 3 months and 5 years. Least popular are loans with long fixed interest periods. However, during the period 1996-1998 most households preferred a fixed rate of between 3 months and 5 years. From the start of 2008 until the start of 2009, the share of new lending at variable rates increased from 40 to 90 per cent. During 2010, the share of variable rate loans fell again and at the end of the year was approximately 55 per cent of new lending.



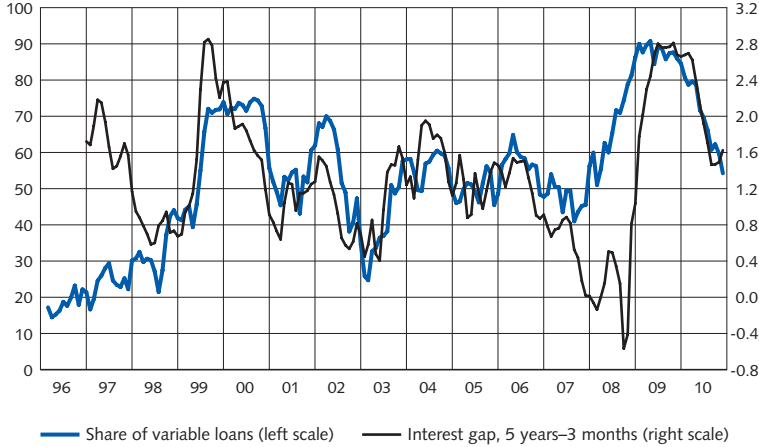
Sources: The Riksbank and Statistics Sweden.

One question that can be raised is why the share of variable rate loans has fluctuated so sharply in recent years. There is a clear co-variance in the data between the share of variable rate loans and the gap between the interest rates for

² If primary interest is in the factors that affect the choice of fixed interest periods, new lending is the most relevant. If the question is instead what kind of effect monetary policy has, the breakdown between different maturities in the total stock of loans is most interesting.

fixed and variable loans. This is illustrated in chart 3, which shows the share of new lending that is taken up at variable rates and the gap between the five-year and three-month mortgage rate.

Chart 3. Share of new lending at variable rates and the gap between 5-year and 3-month mortgage rates (per cent)



Sources: The Riksbank, SBAB and Statistics Sweden.

Conventional economic theory does not provide a satisfactory explanation for this co-variance. According to the expectation hypothesis for the yield curve, long-term rates should be the same as the average of the expected value of future short-term rates during the relevant maturities. For example, the 5-year interest rate is approximately the same as the expected value of the 3-month rate over the next 5 years. According to this hypothesis, a large gap between long-term and short-term rates indicate quite simply the expectation that short-term rates will increase sharply. If the expectation hypothesis is correct, the household does not gain anything by choosing a variable rate, even if the variable rate is significantly lower than the interest rate of a fixed rate loan.

One possible explanation, of course, is that some households do not give any consideration to how the interest rate levels are expected to change in the future but instead base their decisions solely on today's interest rate levels. However, there are strong arguments that undermine this explanation: for many households their mortgage is by far their largest financial commitment. Short-term or otherwise rash behaviour could lead to the household taking on unnecessarily large expenses.

A research study from 2009 introduced another possible explanation for the co-variance between the share of variable rate loans and the gap between the interest on loans with different maturities. Kojien, Hemert and van Nieuwerburgh (2009) study the development of the U.S. mortgage market and say that differences in

interest rate costs between loans with different maturities can be the result of premiums on loans with fixed interest rates. The basic idea, in other words, is that the expectation hypothesis is not complete and that large differences between interest rates with different fixed-interest periods can partly be explained by premiums; when premiums are high it is relatively expensive to choose fixed rates and when they are low it is relatively inexpensive.³

The purpose of this article is not to investigate the causes behind the households' choice between mortgages with variable or fixed interest rates. We are merely stating that the households' choice between different fixed-interest periods varies over time and that there are a number of conceivable explanations for this variation.⁴ These circumstances can be important to keep in mind during the following discussion, where the choice of the households' fixed-interest period is taken as given.

Consumption, interest rates and income – a simple theoretical background.

What effect can the increased share of mortgages at variable rates have on the impact of monetary policy? To start with, it is worth considering the “traditional” effects interest rate changes have on household demand.

IMPACT OF THE INTEREST RATE ON CONSUMPTION – THE “TRADITIONAL” CHANNEL

According to classic consumption theory, consumption's rate of increase is decided by the real interest rate and the households' general willingness to abstain from consumption today in order to consume at a future point in time. Under certain greatly simplifying conditions, the following relationship applies:⁵

$$\textit{Growth in consumption} \approx \textit{real interest rate} - \textit{time preference}$$

Here, the term ‘time preference’ captures specifically the households' relative valuation of consumption today and consumption in the future. A high rate of time preference is usually interpreted as households being impatient to consume, while a low time preference is interpreted as households being relatively patient. A positive real interest rate means that a person can consume more in later periods by abstaining from consumption today. In other words, the real interest rate can be

3 An additional explanation can be that some households have credit limits, which means that the choice is controlled more by the current interest rate levels than the expected levels. When variable mortgage rates are low, costs for variable mortgages are typically lower in the beginning of the lending period. If income is low and expected to increase, the variable rate can therefore be an attractive alternative, even if the variable interest rates are expected to rise in the future.

4 See also Campbell and Cocco (2003) and Moench, Vickery and Aragon (2010).

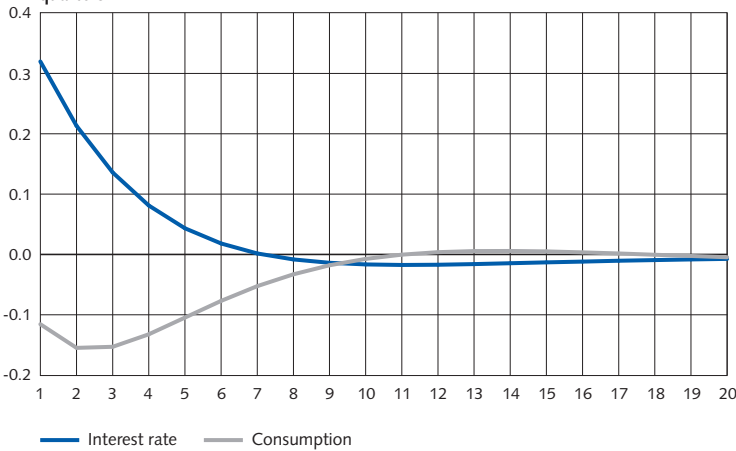
5 This relationship ignores uncertainty and assumes a logarithmic utility function.

seen as the return on saving. If a person cares as much about consumption today as in the future (and the time preference is zero) growth in consumption will be as high as the real interest rate. Conversely, consumption growth is zero if the time preference is equal to the real interest rate.

A higher interest rate leads to a faster rate of consumption growth, which redistributes consumption from today to tomorrow. It is more profitable to save. Consumption therefore tends to fall today if the interest rate rises. Higher impatience (higher time preference) has the opposite effect: a person wants to consume more today and consumption growth declines.

In so-called New Keynesian models, to which the Riksbank’s Ramses model belongs, this is one channel through which the interest rate affects aggregate consumption: the interest rate is a deciding factor for a household’s choice between consuming and saving. Chart 4 shows the effect of a hike in interest rates on consumption in the Riksbank’s Ramses model.⁶

Chart 4. The effect on consumption of an increase to the key interest rate in Ramses. The chart shows the interest rate and consumption over a period of 20 quarters.



Note. The chart shows the effects of an exogenous monetary policy shock.

IMPACT OF INCOME ON CONSUMPTION

According to classic consumption theory, somewhat simplified, *the level of consumption for a certain time period is decided as follows:*

$$\text{Current consumption level} \approx \text{average of all future discounted income}$$

⁶ The experiment in Ramses was carried out as an unexpected monetary policy shock that raises the interest rate by more than 0.3 percentage points in the first period. This means that consumption at most is 0.15 per cent lower than before the monetary policy shock. For a description of the model, see Christiano, Trabandt and Walentin (2007).

where "discounted" means that they are "calculated back to today" using the interest rate.⁷ The above expression means that consumption is smoothed over time.⁸ The relationship between current income and consumption is weak.⁹ Assume that there are 10 periods with an income of 1 in each period.¹⁰ The average is 1, which is also the consumption level for each period. If income falls to zero in period 1 but remains unchanged in the other periods, consumption is 0.9 (9/10), i.e. it only falls by 10 per cent. Consumption is decreased by 10 per cent in all periods and the household solves this problem by borrowing money in order to allow today's consumption to exceed today's income. Note that if income had decreased by 10 per cent in all periods, the effect on the consumption level would have been the same.

EFFECTS OF VARIABLE RATE LOANS: DISPOSABLE INCOME IS AFFECTED BY CHANGES TO THE KEY INTEREST RATE

Based on classical consumption theory, let us now approach the question of variable and fixed rate mortgages and consumption's sensitivity to key interest rate changes. In the general public debate, the difference is often described as follows: if households have variable rate mortgages, monetary policy has more of a direct impact on their disposable income, which is not affected at all in the case of fixed mortgage rates. Therefore, consumption should be more sensitive to changes to the key interest rate with variable mortgages rates. However, according to the "classical" analysis above, a fall in current disposable income only has a limited effect on consumption. The difference between consumption's sensitivity to interest rate changes between households with variable interest rates and fixed interest rates is thus small.

Some save and others borrow – what is the total effect?

In total, it is reasonable to assume that some households borrow while others save an equal amount. Assume now that we went from a scenario where everyone borrows at a fixed rate to a scenario where everyone borrows at a variable rate. What is the effect of an increase to the key interest rate? Classical theory has

7 A higher interest rate consequently results in a lower discounted value. Thus, the consumption level decreases.

8 If the time preference is the same as the real interest rate, consumption is exactly the same in all periods. See also the previous page.

9 The permanent income hypothesis (PIH) according to Friedman (1957) suggests that individuals consider their expected total future income when deciding how much to consume, instead of considering only their current income. The life-cycle hypothesis presented by Modigliani and Brumberg (1954) shows that an individual smooths consumption over a life cycle. Income follows a curve that peaks at middle age and bottoms out in childhood and following retirement. Typically, income is higher than consumption at middle age while the opposite applies for the young and following retirement.

10 This means that, in discounted terms, income is 1 in all periods.

shown that it is reasonable to expect a change in income to have a small effect on consumption. On the other hand, if total lending and borrowing activities total zero – some save and lend to others – the interest income of “the savers” will increase as much as the interest expenses of “the borrowers” increase. The extra effect on consumption from a variable interest rate is thus zero.

So what have we learned from this basic theoretical overview? The normal channel for an increase in the interest rate alters the balance between consumption and saving, and consumption normally decreases following a rise in interest rates.

A larger share of variable loans increases the effect of an interest rate increase on mortgage costs and disposable income. If a household can smooth this effect, the gap between variable and fixed loans does not matter. Furthermore, if total borrowing is zero – some households’ borrowing is funded by others’ saving – the aggregate effect of a larger share of variable loans should be zero.

One conclusion can be drawn from classical macroeconomic theory: for the economy as a whole, this “mortgage channel” is of limited or non-existent significance. It is reasonable that a change to the key interest rate via this channel would only result in a redistribution of resources between different types of households and not have an effect on the aggregate behaviour of households. Instead, the “normal” channels for the interest rate apply, as described above.

One important assumption behind the “classical analysis” described above is that savers and borrowers act similarly, i.e. they are assumed to have the same marginal propensity to consume given changes to income. If this is not the case, the results can be different, as has been the focus of current research.

The difference between fixed and variable loans – what does the research say?

In the analysis above, we used a very simple model to show under what assumptions the difference between variable and fixed rates can be relatively unimportant for the effects of monetary policy.

In order for a redistribution of resources between households to be of macro-economic significance, the savers and borrowers must make different choices about consumption and saving. That the behaviour of lending and borrowing households differ in this manner is an important assumption of two recently published research projects. One was published by the European Central Bank (Calza, Monacelli and Stracca, 2009, hereafter CMS) and the other by the Bank of Spain (Rubio, 2009). The two studies are very similar to one another in their problem identification and model assumptions. They use a variation of the New Keynesian standard model, which has become a common tool in the research literature to analyse the

relationship between the mortgage market and macroeconomic developments.¹¹ Households are different in this type of model. Some are “impatient” while others can be described as “patient” and have a higher tendency to save today in order to be able to consume more in the future. As we saw in the simple model, these differences result in the “impatient” households wanting to “consume today” and borrowing from the banks and the other type of household saves in banks. We will hereafter refer to these two types of households as borrowing and saving households, respectively.

Another important assumption is that there is an upper limit for how much an individual household is allowed to borrow. The bank can demand collateral in the household’s property to grant a loan, which means that the value of the property establishes the upper limit for how much the household is allowed to borrow.

If the household has borrowed to such an extent that no one is willing to grant any additional loans, the household’s ability to smooth its consumption over time is limited. In such a situation, even a rational, forward-looking household is forced to live hand-to-mouth; income decreases must be met by a corresponding fall in consumption. One conclusion that has been known for a long time is that credit limits can increase the relationship between current income and consumption.¹²

If the difference between the households’ basic thriftiness is sufficiently large, and if the households meet an upper limit for how much they are allowed to borrow, the households that are less likely to save always face a binding borrowing limit. The borrowing households, in other words, will always find themselves in situations where they want to borrow more in order to increase consumption. This is due to the lower tendency of the borrowing households to save. One reasonable interpretation of this is that a certain share of households in an economy always face limitations on what they can borrow.¹³

The basic assumptions that were just discussed entail that the consumption of borrowing households in the model always are more sensitive to income changes than the saving households. One consequence of this is that each change that causes a redistribution of resources between the two groups of households also affects aggregate consumption. This means that monetary policy in these models works via more channels than what is the case in the standard model.

In cases where all households have fixed rate loans, the central bank’s decisions do not have a major impact on the borrowing households’ nominal interest rate cost. This means that the extra channel for monetary policy described above is not

¹¹ See, for example, Iacoviello (2005).

¹² See, for example, Zeldes (1989).

¹³ In reality, there can be many different reasons for why a household finds itself in this situation. For example, young households often have rather small financial assets, at the same time as expected lifetime income is relatively high. In this kind of situation, there can be reasons for taking on a larger loan, perhaps to buy a home.

meaningful. Conversely, if all households have variable rates, direct distribution effects would arise when the central bank raises or lowers the interest rate, which tends to reinforce the effects of the changed interest rate on aggregate consumption. Both CMS (2009) and Rubio (2009) investigate the size of these effects using standard assumptions in the model. The results show that the effects are greater the higher the loan-to-value ratio, i.e. the larger the loans the borrowing households are allowed to take on for a given value of the property.

CMS (2009) find for a loan-to-value ratio of 70 per cent that the fixed interest period only has a minimal impact on the size of the effects of a given change in interest rates on aggregate consumption. However, if the loan-to-value ratio is 95 per cent, the effects of a change in interest rate on consumption are approximately twice as large if the interest rate is variable compared to if all households have fixed rates.

CMS (2009) show that the fixed interest period on households' loans under certain circumstances can be a deciding factor for how large the effect of a given change to the key interest rate is on aggregate consumption, and consequently on resource utilisation and inflation. The authors use a model that to the greatest extent possible is similar to the New Keynesian models that have become standard tools for monetary policy analysis both at universities and at central banks throughout the world.

CMS (2009) also show that there are patterns in the data that appear to support the results from the models. The authors estimate a VAR model for 19 developed countries for the period 1970-2008.¹⁴ The estimate makes it possible to study how a given change in the interest rate affects the variables in the model, and private consumption in particular. The results show that among the countries where variable rates are most common, an interest rate increase of a certain size on average results in a statistically significant decrease in private consumption and where the maximum effect occurs after approximately a two-year lag. In countries where most households choose a fixed rate, the average effect on consumption is not significantly different from zero during the same period.

It is important to remember that this type of empirical analysis does not identify a causal relationship between the fixed interest period of household loans and the size of the effects resulting from a change in interest rates. However, the results from the estimate demonstrate that patterns found in the data largely correspond to the theoretical results.¹⁵

14 The empirical model contains the following variables for each of the 19 countries: private consumption, investments in housing, CPI, a real house price index, a 3-month inter-bank rate and the real, effective foreign exchange rate.

15 An additional reason to interpret the results with caution is that the division of countries is based on the share of variable rate loans in *the flow of new lending*, not on the share of variable rate loans in the outstanding stock. Moreover, CMS allows Sweden to belong to the group of countries where fixed rate loans are most common.

There are also arguments that indicate that the results should be interpreted with a certain degree of caution. Perhaps the most important is that there is very little research on the relationship between fixed interest periods and the monetary policy transmission mechanism. The analysis in the studies does not state why more households are choosing variable rates.

Conclusions: how does the trend toward variable rates affect the impact of monetary policy in Sweden?

The studies that have been discussed in the previous sections show that a larger share of variable rate mortgages tends to reinforce the impact of monetary policy. Since the share of variable rate mortgages has grown relatively quickly in recent years, it is also reasonable to assume that the key interest rate's impact on inflation and resource utilisation has gradually been strengthened during the financial crisis.

On the one hand, this means that household consumption will be affected more markedly when the Riksbank raises the interest rate: the more households that borrow at variable rates, the stronger the restraining effect of a given interest rate increase. This suggests that a given contractionary effect could be achieved by relatively small increases in the interest rate.

On the other hand, the impact of the already implemented interest rate decreases has tended to be increasingly stronger as the share of variable rate loans increased: the more households with a variable rate, the stronger the expansive effects of the low interest rate level.

Recently the share of new lending at variable rates has decreased. It is easier to switch from variable rates to fixed rates than the reverse, and it is therefore not improbable that the share of variable rate loans could decrease sharply in the future. In such a scenario, the effects of changes to the interest rate on consumption would decrease.

References

- Calza, A., Monacelli, T. and Stracca, L. (2009), "Housing finance and monetary policy", ECB Working Paper 1069.
- Campbell, J.Y. and Cocco, J.F. (2003), "Household risk management and optimal mortgage choice", *Quarterly Journal of Economics* 118(4), 1449-1494.
- Christiano, L., Trabandt, M. and Walentin, K. (2007), "Introducing financial frictions and unemployment into a small open economy model", Working Paper no. 214, Sveriges Riksbank.
- Friedman, M. (1957), "A Theory of the Consumption Function", Princeton University Press.
- Iacoviello, M. (2005), "House Prices, Borrowing Constraints and Monetary Policy in the Business Cycle", *American Economic Review* 95(3), 739-764.
- Kojen, R.S.J., Van Hemert, O. and Van Nieuwerburgh, S. (2009): "Mortgage timing", *Journal of Financial Economics* 93, 292-324.
- Modigliani, F. and Brumberg, R. (1954), "Utility analysis and the consumption function: An interpretation of cross-section data", i: Kurihara, K., red., *Post-Keynesian Economics*, 388-436.
- Moench, E., Vickery, J. and Aragon, D. (2010), "Why Is the Market Share of Adjustable Mortgage Rates So Low?", *Current Issues in Economics and Finance* 16(8), Federal Reserve Bank of New York.
- Rubio, M. (2009), "Fixed and variable-rate mortgages, business cycles and monetary policy", Banco de Espana Working Paper 0903.
- Zeldes, S.P. (1989), "Consumption and Liquidity Constraints: An Empirical Investigation" *Journal of Political Economy* 97, 305-346.

■ Household indebtedness, house prices and the macroeconomy: a review of the literature

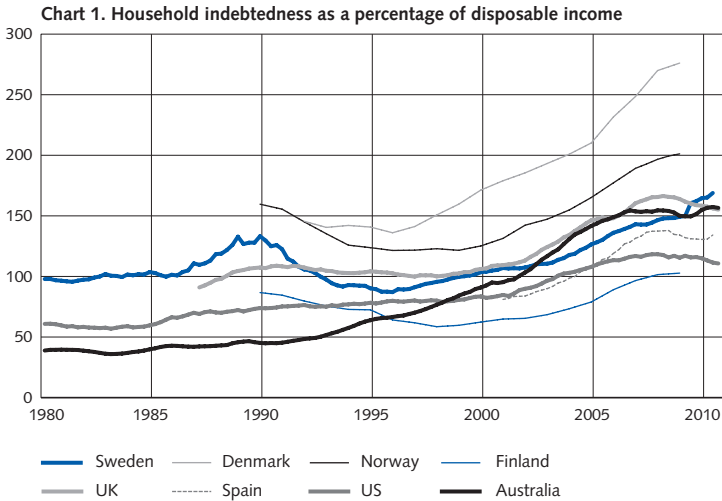
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In the last 15 years, household indebtedness has increased substantially in Sweden. Since the mid-90s, debt-to-income ratios have nearly doubled. Since mortgages represent about 80% of household debt, the substantial increase in indebtedness, coupled with a rally in house prices, has raised concerns about the possibility of an unsustainable credit growth. In light of these developments, this article reviews the existing economic literature on the potential explanations for, as well as the macroeconomic consequences of, the observed substantial increase in the households' leverage. Given the strong connection between real estate markets and the households' borrowing choices, the article also discusses the driving forces behind house price developments. We conclude by discussing to what extent the results of international research on this topic can be used to shed light on the current situation in Sweden.

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Introduction

Over the past 15 years, credit growth in Sweden has vastly exceeded the growth in the households' disposable income. As a result, Swedish households' indebtedness has increased substantially. Following the sharp decline in household debt after the banking crisis in 1992-1993, household indebtedness increased from 90% of disposable income in the mid-1990s to around 170% in 2010, see Chart 1. Other countries have experienced similar trends in the household debt-to-income ratio, some of which are shown in Chart 1.¹

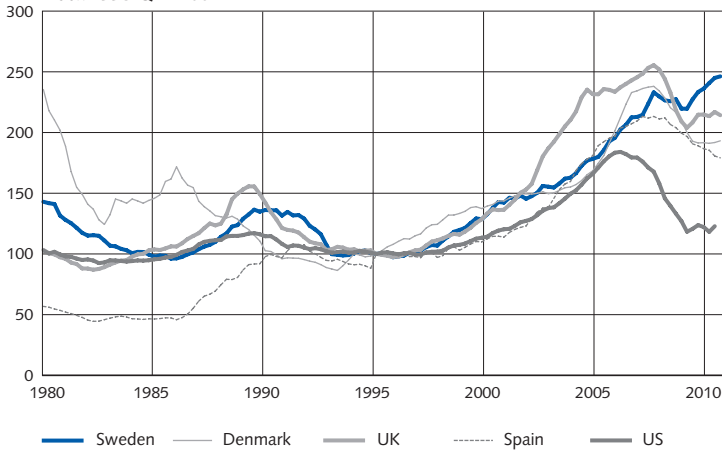


Sources: The BIS, national central banks, Reuters EcoWin and the Riksbank.

Housing credit growth is the main factor in rising household indebtedness. For most households, real estate makes up the bulk of their assets, while mortgages constitute the largest liability. House prices have been increasing in Sweden since the mid-90s. At the onset of the financial crisis, real house prices in Sweden stopped rising and even fell by about 5% in 2008-2009. Since then, real house prices in Sweden have started to increase again. Chart 2 shows the development of house prices in Sweden and some other countries.

¹ The household debt/GDP ratio shows a similar pattern in Sweden (see Hansson, 2010).

Chart 2. Real house prices
Index 1995 Q1 = 100

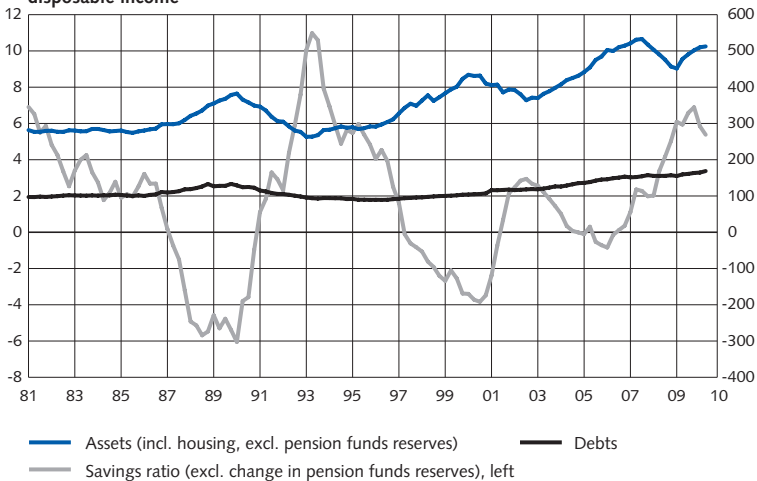


Note. Data for the US until 2010Q2

Sources: Reuters Ecowin and Statistics Sweden.

The recent prolonged increase in house prices in Sweden and in many other advanced countries has boosted the asset side of the households' balance sheets, and in many cases, households' net wealth has increased. Chart 3 shows the development of Swedish household debt, assets and savings. In the mid-1990s, the Swedish households held assets worth about three times their debt. In 2000, this ratio had increased to four, but 10 years later it is now back to three again.

Chart 3. Swedish household gross debt, assets and savings as a percentage of disposable income



Sources: Statistics Sweden and the Riksbank.

Although house prices in Sweden have continued to rise, they declined in several industrialized countries in the wake of the 2008-2009 financial crisis (Chart 2), illustrating that the asset side of the households' balance sheets can be substantially affected by fluctuations in house prices and interest rates.

Prior to financial deregulation in the mid-1980s, Swedish household debt was relatively stable at 100 per cent of disposable income. Following deregulation, household debt increased rapidly to around 140 per cent before declining during the 1992-1993 financial crisis. Since that crisis, household debt has again trended up. This raises the question of what constitutes a sustainable level of household debt.

A wave of recent theoretical and empirical research has focused on illustrating the basic mechanisms of household indebtedness against the backdrop of falling house prices in many countries. In this context, this article reviews:

- How do fundamental factors like expected income, interest rates, preferences and demographics affect household saving behaviour?
- What is the importance of credit market frictions and financial innovations in explaining the evolution of household debt?
- What is the interaction between household indebtedness and the development of house prices?
- To what extent can the rapid rise in household indebtedness be explained by an increase in credit supply?
- What data would be useful to analyse these issues? Aggregate data might obscure risks that stem from the fact that households differ in resources, constraints and preferences.
- What factors are relevant when evaluating the indebtedness of the Swedish households and possible risks to financial and macroeconomic stability? What policy conclusions can we draw for Sweden?

What is driving household debt? Some theory

The permanent income/life-cycle model is a useful starting point for considering household debt from an economic theory point of view.² Households save or borrow based on their expected lifetime resources, real interest rates and demographic factors. In this setting, with well-functioning financial markets, households aim to smooth out consumption even though incomes from wages and assets vary over the life cycle. This standard theory identifies a number of variables that influence the households' choice of consumption and level of borrowing:

² See Ando and Modigliani (1963) and Friedman (1957). See also Debelle (2004) for a survey of household borrowing in the life-cycle framework and macroeconomic implications.

- **Real interest rates.** Changes in real interest rates affect consumption through different channels with opposite signs. On the one hand, a decline in the real interest rate can boost borrowing because it cuts the cost of servicing the debt and decrease savings because it increases the present discounted value of future income. On the other hand, a lower return on savings also implies lower consumption in the future given the present value of lifetime resources. This last effect can boost savings. So the net effect of real interest rates on consumption and savings is ambiguous.
- **Future income.** An increase in future income expectations drives consumption up, boosting borrowing.
- **Demographics.** Individual income profiles vary substantially with age. Demographic shifts in the age composition of the population can help explain changes in household debt.
- **Uncertainty.** The households' attitude towards risk (e.g. income uncertainty and time-varying interest rates) is also an important factor in the life-cycle consumption and borrowing decisions. With uncertainty, households choose to build up precautionary savings/wealth. If uncertainty is reduced, the households' rational response is to reduce precautionary saving.

With this framework in mind, historically low real and nominal interest rates, a substantial decrease in macroeconomic volatility, changes in taxation, or the ageing of the baby boom generation,³ have all been pointed out as potential factors behind the observed increase in indebtedness.

In this standard model, borrowing is the result of households' optimal responses to economic conditions. However, recent research has considered partial departures from this simplified paradigm to explain why households do not necessarily reach their efficient consumption or borrowing levels. Imperfections in credit markets or irrational behaviour on the part of borrowers (and/or lenders) are just some examples of the numerous factors cited in the literature to potentially explain household over-indebtedness. Below we discuss the most important factors and describe how these alter the conclusions one would draw from the standard life-cycle/permanent income model.

Financial market imperfections and borrowing decisions

Financial markets are not perfect. The simple model sketched above abstracts from credit market imperfections, an important determinant in households' borrowing decisions. Liquidity-constrained households borrow *less* than they would optimally

³ Dynan and Kohn (2007) explore the effects of the ageing of the baby boom generation on the evolution of US household debt since 1983.

choose to do. As a result, financial deregulation and the potentially implied easier access to credit markets can boost borrowing among those households who initially were financially constrained. This last channel works not only for households who were excluded from financial markets, but also for those households who were borrowing less than they would have liked to because of binding borrowing constraints. In this sense, in a life-cycle/permanent income model augmented with a borrowing constraint, relaxing this constraint allows households to better smooth out their consumption and enhances welfare. Against this background, aggregate household debt would rise as previously constrained households reach their new optimal borrowing level.

Financial frictions and over-borrowing. Imperfection in credit markets can also induce excessive borrowing (see e.g., Lorenzoni, 2008, and Bianchi and Mendoza, 2011). Financial constraints are usually tied to collateral values and can amplify the effects of a downturn on the economy via their feedback effects on asset prices. When making borrowing decisions, private agents might not take into account that, during a slump, fire-sales of assets will further reduce asset prices. This will shrink their ability to borrow and exacerbate the recession. As a result, they will over-borrow during a boom and their behaviour will increase macroeconomic volatility. In this environment, by taking into consideration this amplification mechanism, the government can reduce aggregate borrowing in a boom and dampen asset sales in a slump. This channel provides a justification for a macroprudential approach in financial supervision. This mechanism and the resulting interaction between asset prices and financial distress could have been at work in the recent financial crisis.

Behavioural approaches: irrationality and over-indebtedness

Behavioural factors can also generate excessive borrowing. “Self-control” problems, “overconfidence” or a lack of “financial literacy” are some of the examples cited in the literature. All these factors can potentially generate unrealistic expectations about asset prices that can further increase borrowing above rational or optimal levels and create vicious circles.

Self-control problems. In economics, a self-control problem describes a situation where there is a conflict between short-term and long-term preferences. Households who think they should save more for retirement, but still prefer not to cut their consumption today, suffer from self-control problems. Clearly, such behaviour could importantly influence saving choices and lead to under-saving (or excess borrowing).⁴

Financial literacy, overconfidence and financial mistakes. Households might take on more debt than is rationally appropriate because they lack the knowledge

4 See Laibson (1997) and Angeletos et al. (2001).

required to make the right investment decisions, so-called “financial literacy”. Agents may also hold insufficient precautionary savings or too much debt because they are overconfident and underestimate the variance of future shocks.⁵ In this context, households could interpret historically low real interest rates as reflecting a permanent change in real interest rates and base their borrowing decisions on this misperception. This channel can be further strengthened if banks also change their risk attitude, for example in extended periods of low interest rates, and soften their lending standards for new loans.⁶ In theory, such a permanent change in real interest rates would be justified by a permanent decrease in growth rates, in discount factors, i.e. household preferences, or a permanent cut in capital income tax rates.⁷ Over time, financial markets have evolved and new, more complex, financial products have been created requiring a higher level of sophistication among investors. At the same time, economic policies that indirectly stimulate homeownership, such as interest rate deductions, or that increase the degree of individual responsibility in managing pension savings have been implemented.⁸ Thus, individual financial decisions have become more relevant at a macroeconomic level. If household over-borrowing is the result of poor financial literacy, policies such as financial education and saving programmes could be a tailor-made solution to the problem.

Credit frictions and behavioural factors. A combination of credit frictions and behavioural factors can explain excessive borrowing and credit-induced asset price fluctuations. Most of the literature on credit market inefficiencies takes leverage⁹ as a given variable and focuses on the equilibrium determination of interest rates. In Geanakoplos’s (2010) theory of “leverage cycles”, the interaction between “natural buyers”, i.e., people who value an asset more or have more optimistic beliefs, and “natural sellers” determines both asset prices and leverage in equilibrium. Natural buyers are willing to pay more and, most importantly, be more leveraged to be able to hold the asset.¹⁰ If, following bad news for the asset, they lose their ability to borrow then they will invest less in the asset. As a consequence, natural sellers will now hold the asset. Asset prices and leverage will go down and the initial bad shock to asset prices is amplified. This simple mechanism will create a “leverage

5 See Kahneman, Slovic and Tversky (1982).

6 Ioannidou et al. (2007) find evidence of a link between short-term interest rates and banks’ risk taking.

7 See Jonsson (2002).

8 In the United States, the shift from defined benefit to defined contribution pension plans has increased individuals’ discretion in choosing how to allocate their retirement savings. The reform of the Swedish pension system approved in 1998 goes in the same direction. In the actual system, a share of individual contributions is deposited in capital funds chosen by the pension-saver.

9 More specifically, leverage is defined as the ratio between the asset value and the equity used to purchase it.

10 A “natural buyer” is someone who is willing to pay more than the rest of the public for a specific asset. This can reflect a higher risk tolerance, different, more optimistic beliefs or simply the fact that she/he values the asset more. Furthermore, some investors may be more expert than others at evaluating an asset because they possess more information.

cycle": leverage will be too high in booms and too low in bad times. Geanakoplos (2010b) argues that behind the recent financial crisis in the United States there are two leverage cycles reinforcing each other: in financial and in housing markets. According to his theory, the upsurge in house prices observed in the United States just before the crisis relied mainly on a credit expansion. New, more leveraged, households entered into housing markets, thus pushing up housing prices even further. Slowly, lenders started to become more alert and house prices sharply declined following the increase in the delinquency rate. The massive fall in house prices induced by the crisis has made it more difficult for households to get new loans and to refinance old loans. This has created problems for these loans as well as for the securities they back, i.e. new securitizations have also become more difficult to underwrite. The author's main conclusion is that central banks should actively monitor leverage levels in the economy.

Housing and household debt

Housing plays a key role in household indebtedness. Specifically, it is important to take into account housing-finance motives to understand household borrowing behaviour. Real estate serves two important functions: houses are investment assets but also durable goods that provide direct services for households. At a certain point in their lives, all households will need to face important decisions on whether to rent or buy, or on which kind of mortgage to subscribe. As a result, a major share of the households' wealth is held in this form and this makes the whole economy vulnerable to house price movements. Importantly, housing can also be used as collateral and variations in house prices can facilitate or impede access to credit markets. This last mechanism is emphasized in Ortalo-Magne and Rady (2006), where the "capital gains channel", i.e. the ability to move up the housing ladder when house prices are increasing, is a determinant of housing and borrowing demand for credit constrained homeowners. This can further boost house prices since more households will be able to afford more expensive homes using their capital gains.¹¹ Higher house prices may also require a larger amount to be borrowed.¹² In addition, tax incentives, such as mortgage interest cost deductibility, could also boost borrowing via an induced portfolio rebalancing, i.e. encouraging households to invest more in housing.

Wealth effects of increasing house prices? An increase in house prices could boost consumption and reduce savings via a housing wealth effect. This channel holds for households who are planning to downsize in the future. It works in the

11 Collateral constraints on housing play a crucial role also in Iacoviello (2005) where house price booms can amplify business cycle fluctuations by relaxing household collateral constraints.

12 In the literature, this is called the "front loading effect". The strength of this mechanism of course depends on an individual's asset position.

opposite direction for households planning to buy a bigger house. In a representative agent model these two effects cancel out, i.e. on average there are no housing wealth effects (see Buiter (2010)). In reality, the aggregate outcome of housing wealth effects depends on the demographic structure of society. Moreover, housing wealth may affect spending indirectly, via its effect on consumers' access to credit.¹³

Renting versus owning real estate. Most of the housing literature focuses on the riskiness of housing investment. Renting, however, is also a risky activity since rents are subject to fluctuations. Sinai and Souleles (2005) explicitly take into account the fact that when deciding whether to buy a house or not, households trade off these two risky activities. The rent risk is particularly high for households that expect to stay in their houses for an extended period of time. A greater spatial correlation in house prices across different markets and a high persistency in house prices over time are both factors that reduce house price risk, i.e. both factors are likely to close the gap between sale and purchase prices when a household moves. According to Sinai and Souleles, the demand for homeownership should reflect the trade-off between rent and house price risk, a prediction that is consistent with U.S. data. Most importantly, they show that expected future rents and rent variance have an important effect on house prices. Clearly, a high degree of regulation in the rental market will alter this trade-off. If renting is not a real option, households will be forced to make risky housing investments even if their expected length of stay in their house is short. Therefore, rental regulation will expose households to more house price risk.

Bubbles in housing markets. Bubbles in housing markets arise when the observed price deviates from some notion of fundamental value.¹⁴ Many researchers have stressed the observed high volatility in house prices and have suggested that housing markets seem intrinsically prone to bubbles. An increase in household debt fuelled by investors' naively optimistic expectations regarding house prices could potentially constitute a serious threat to financial stability. Akerlof and Shiller (2008) argue that unmotivated confidence in housing investments, "money illusion" and more generally what they label as "animal spirits" historically have all been significant factors behind housing cycles.¹⁵ Households that do not understand the difference between nominal or real quantities suffer from "money illusion". Disagreement about real interest rates between smart and illusionary investors can stimulate borrowing and lending and drive up the price of collateral (see Piazzesi and Schneider, 2007). This channel works during periods of both high and low inflation. In a low inflation environment, illusionary investors will confuse low nominal rates with low real rates and invest more in housing. During times of

¹³ This last effect is not considered in Buiter (2010), since he abstracts from borrowing constraints.

¹⁴ See Dillén and Sellin (2003) for a review of the literature on financial price bubbles.

¹⁵ See chapter III.1 for a review of the literature on real estate bubbles that arise from asymmetric information and agency problems.

high inflation, they will be replaced in housing markets by smart investors. Smart investors correctly understand that real rates are low and want to invest in housing. Thus, the model can potentially account for the housing boom in the high-inflation 1970s as well as in the low-inflation 2000s observed in many countries.

Why has household debt increased? Empirical results

A number of empirical studies have tried to explain the observed increase in household indebtedness and disentangle the contribution of the different potential explanatory factors identified in the theoretical literature. This has proven to be a difficult task as it is not always possible to discern between causality and mere correlation. In addition, some of the potential factors behind indebtedness, such as credit, are not easily measurable or have evolved only gradually over time, such as financial innovation. Moreover, trying to explain household indebtedness by looking at aggregate data can be misleading. In this respect, it is useful to look at household level data and analyse their portfolio composition to assess the risks connected to high indebtedness. A disaggregated analysis of house-price data, both at a regional or even at a neighbourhood level, could also be fruitful. For example, an inspection of Swedish regional data reveals that the sizable upsurge in house prices is mainly a big-city phenomenon (see chapter I.1). The sharp increase in property prices in low-income neighbourhoods observed just before the subprime crisis in the United States has been interpreted by many commentators as the result of lax credit standards. A similar analysis would also be relevant for Sweden.

Can we explain increasing household debt using “traditional channels”?

There are several papers that use traditional channels, such as interest rates, future income or demography, to explain the rise in household debt. Barnes and Young (2005) use a simple calibrated model in which housing is both a consumption good and an investment good to show that changes in interest rates, future income growth and demographic effects can explain the rise in the debts of the US households during the 1990s. However, these factors cannot account for rising indebtedness during the 1980s, a period characterized by high interest rates and lower income growth. Finocchiaro and Queijo von Heideken (2007) use a similar approach on Swedish data. They find that a combination of low real interest rates and lower LTV requirements can account for most of the increase in Swedish household debt since the 1990s. These studies do not consider the effect of house prices on indebtedness. Dynan and Kohn (2007) explain the rise in US household indebtedness since the early 1980s by analysing the following factors:

- **Household preferences.** There is only limited evidence of a decrease in patience or increase in risk appetite among responders of the Survey of Consumer Finances (SCF) between 1983 and 2004.
- **Interest rates.** According to the econometric models used by the Federal Reserve Board, low interest rates had a very limited effect on the saving rate between 1990 and 2000.
- **Demographic shifts.** The shift of the baby-boom generation, from the youngest to the middle age group, has partially boosted aggregate debt. However, according to their data, increasing debt is an increasing trend among all age groups, hinting at the contributions of other explanatory factors.
- **House prices and financial innovation.** Dynan and Kohn estimate that rising house prices can justify one fifth of the total increase in household debt. Their study also reports some suggestive evidence on the importance of financial innovation for the uptrend in debt. On the one hand, they downplay the role of the “democratization of credit,” i.e. easier access to credit markets for previously constrained households, as this would explain only one seventh of the observed increase in household debt between 1983 and 2004. On the other hand, they stress the importance of mortgage securitization on interest rates and the interplay between house prices and financial innovations as being particularly important from a quantitative point of view.

Dynan and Kohn’s main conclusion is that changes in interest rates, income growth or in preferences can only partially explain the run-up of debt, while rising house prices and financial innovation were crucial.

The role of financial deregulation

Financial innovation has increased access to credit. The last thirty years have been characterized by considerable changes in financial markets. Gradually, banks have started granting housing loans with more generous loan-to-value ratios and longer amortization periods than in the past. Changes in the capital requirement introduced by Basel II¹⁶ and an increase in competition have further squeezed the margins on mortgage institution lending rates. Last but not least, the development of secondary markets for mortgages and the emergence of mortgage-backed securities have also played an important role and drastically changed credit markets.

Credit rationing has been reduced. The effects of financial deregulation on household debt have been widely explored in the empirical literature. Gerardi

¹⁶ Capital requirements were calculated on the basis of risk weighted assets, which implied lower risk weights for collateralized lending. More recently, the reforms included in Basel III have moved in the opposite direction.

et al. (2010) provide evidence that the deregulation of the mortgage market in the United States in the early 1980s was followed by an increase in borrowing among households with higher expected future incomes. Thus, their analysis suggests that financial deregulation has improved market efficiency. On the other hand, Mian and Sufi (2009) argue that the substantial mortgage credit expansion observed between 2002 and 2005 in subprime neighbourhoods in the United States can mainly be explained by an upsurge in credit supply. They also show that such an increase is not motivated by improvements in the creditworthiness of subprime borrowers, while it is correlated with an expansion in the rate of securitization. Interestingly, those subprime neighbourhoods have also experienced the highest number of defaults during the crisis.

Financial literacy — Do households make investment mistakes?

Household financial literacy is lagging behind. Another branch of the literature has focused on testing the ability of households to make the right financial decisions. The empirical results in Brunnermeier and Julliard (2006) support the idea that when people decide whether to buy or rent an apartment they confuse real and nominal rates, i.e. they suffer from money illusion. Their mistakes make them underestimate the real cost of future mortgage payments and cause an increase in house prices when inflation is low. Using US data, Lusardi and Tufano (2009) find that a lack of debt literacy, i.e. the ability to make simple decisions regarding debt contracts, is widespread and correlated to over-indebtedness. In their sample, individuals with lower debt literacy tend to judge their level of indebtedness as excessive. Gerardi et al. (2010b) attribute part of the massive defaults and foreclosures observed in the US mortgage market to limited financial literacy among borrowers. Their results suggest that financial mistakes can have considerable macroeconomic consequences. Based on a representative survey of 1,300 Swedish adults, Almenberg and Widmark (2011) find that both basic and advanced financial literacy substantially vary across different demographic groups and that they are an important determinant behind stock market participation or homeownership choices. In their sample, the oldest (age > 65) and youngest (age 18-29) respondents show a particularly low level of financial literacy. Among those individuals with a low level of financial literacy, one out of seven do not know what share of their mortgages are at an adjustable rate. Reassuringly, individuals with adjustable-rate mortgages also have a higher level of financial literacy. Their main policy conclusion is that many Swedish adults are not well equipped to make complex financial decisions.

The links between house prices, consumption and household debt

Housing wealth effects remain uncertain. There are contrasting results regarding the influence of house prices on household debt and the strength of the so-called “housing wealth effect”. Mian and Sufi (2010a) show that, between 2002 and 2006, US homeowners responded to the upsurge in house prices by increasing their debt. More specifically, they find that the average household in their sample would increase its borrowing by 25 cents for every dollar gain in home equity. The extracted cash would then be used primarily for consumption or home improvement.¹⁷ A recent survey study by Chakrabarti et al. (2011) reports that in 2006, on average, US homeowners increased their mortgage debt by 1% for each 1% increase in home prices. Using UK micro data, Campbell and Cocco (2005) find a large degree of heterogeneity in the house price elasticity of consumption across young and old cohorts of the population. According to their estimates, old homeowners change their consumption much more strongly in response to house prices. Thus, their results suggest that the aggregate effects of house prices on consumption should be stronger as the population ages. In contrast, Calomiris et al. (2009) argue that many of the empirical studies that find large wealth effects do not take into account the possible correlation between house prices and households’ long-term income expectations, i.e. their “permanent income”. Using state-level US data, they correct for the bias that this correlation could create and find that housing wealth does not have a significant effect on US consumption. Attanasio et al. (2009) reach similar conclusions for British households. However, even though the effects of house prices on consumption generate some disagreement, there is consensus on the increasingly prominent role of housing in explaining business cycle fluctuations (see for example IMF, 2008). In this respect, Leamer (2007) observes that since World War II, eight out of ten recessions in the US were preceded by changes in residential investment.

Macroeconomic implications of rising household debt

High household indebtedness can have large macroeconomic implications for two different reasons. First, as shown by the recent financial crisis, over-indebtedness can lead to financial distress and exacerbate the effects of a crisis. In this respect different policies¹⁸ could have a preventive role in the build-up of the crisis. Second, high household indebtedness can also have important consequences in normal times by increasing households’ exposure to macroeconomic fluctuations.

¹⁷ Since the illustrated link between house prices and consumption implies the existence of credit constraints, technically this is not a pure “housing wealth” effect.

¹⁸ We are not strictly referring to monetary policy, but to a broad range of policies that include financial regulations or fiscal policy that could have an impact on household debt.

Debt and financial distress

High household indebtedness impacts economic downturns. The recent financial crisis led to the most severe recession since the Great Depression. A striking similarity between the two crises is that both were preceded by a dramatic increase in household leverage: household debt exceeded 100% of GDP only twice in the last century of American history: in 1929 and in 2006.¹⁹ Fisher's (1933) debt deflation theory highlights the active role of deteriorating credit market conditions during an economic downturn. In a nutshell, his theory implies that an interaction between high household leverage and negative supply or demand shocks can exacerbate a downturn.²⁰ Glick and Lansing (2010) argue there are three common patterns, observed across different countries between 1997 and 2007, that enable us to understand the role of debt in the build-up of the crisis and the subsequent economic recovery.

- First, household debt increased considerably and at a faster rate than disposable income in many countries before 2007.
- Second, there is a positive correlation between the rapid increase in household debt and house prices.
- Third, countries experiencing the largest increase in debt have also experienced the most severe depressions.

Glick and Lansing conjecture that in many countries household deleveraging will bring more defaults or considerable cuts in spending. Recent survey-based evidence shows that indeed US households responded to their deteriorated financial situation by cutting spending. More precisely, in 2009 they increased their savings by paying down part of their mortgage debt rather than increasing their contributions to retirement or savings accounts (see Chakrabarti et al., 2011).

Are highly indebted households more vulnerable to shocks?

High household debt and volatility. Higher debt can also have large macroeconomic consequences by increasing households' vulnerability to shocks, including income, interest and asset price risk:²¹

- **Income risk.** Unemployment is probably the biggest negative income shock that a household could face. To become unemployed and have a mortgage could have adverse consequences, even though unemployment insurance

¹⁹ See Mian and Sufi (2010b).

²⁰ Interestingly, King (1994) draws a similar parallel between the 1930s and the crisis experienced by many industrialized countries in the 1990s. He stresses how the countries experiencing the most severe recessions were also those where private debt burdens were highest prior to the downturn.

²¹ See also Debelle (2004) and Dynan and Kohn (2007) on the macroeconomic consequences of high household debt.

may temporarily limit the drop in income.²² The big fall in income will make it difficult to maintain the mortgage payments and a large debt and negative equity could considerably reduce households' mobility in search of a new job.²³ This negative effect can be mitigated by the fact that homeowners can better absorb a negative shock by extracting equity from their houses. In this respect, British renters are more likely than homeowners to cite "unemployment" or "higher than expected interest rates" as a reason to experience debt-repayment difficulties.²⁴ Using US data, Hurst and Stafford (2004) show that households with little liquid wealth are more prone to extract equity from their homes in response to a negative income shock. Moreover, there is a vast literature stressing the role of financial deregulations on macroeconomic stabilization. For example, Dynan et al. (2006) argue that developments in credit markets that have enhanced households' and firms' ability to borrow played a crucial role in the stabilization of economic activity in the mid-1980s. Campbell and Hercovitz (2006) reach similar conclusions.

- **Interest rate risk.** Increases in interest rates have a direct impact on households' ability to service their debts. The immediate impact of interest increases will depend on the number of households that have floating-rate compared to fixed-rate mortgages. This channel is particularly strong in countries where adjustable-rate mortgage (ARM) contracts are more common, like Sweden, but less so in countries with predominantly fixed-rate mortgages like France, Germany and the United States (see Debelle, 2004).
- **House price risk.** Finally, changes in house prices will have an impact on highly-indebted homeowners changing the value of the asset side on their balance sheet. In principle, households planning to move in the future are more exposed to this risk (see Sinai and Souleles, 2005). A substantial fall in house prices could shrink home equity down to a level such that the mortgage debt on a property exceeds its market value. In the United States, survey-based evidence shows that in response to the recent decline in house prices the "effective homeownership rate", i.e. the proportion of individuals with a positive amount of home equity, has fallen by more than 7 percentage points since 2007 (see Chakrabarti et al., 2011).

22 This is especially true in a country with a well-developed welfare system like Sweden.

23 For this last channel, see Sterk (2010). Empirically, both Ferreira, Gyourko and Tracy (2010) and Chan (2001) find that homeowners with negative equity are less mobile. In theory, there could be also forces that increase mobility among people with negative equity (see Schulhofer-Wohl, 2010). For example, if the loan is nonrecourse a homeowner's best choice could be to default and move. Moreover, homeowners could choose to move if they could rent out their house. However, this might be less relevant for Sweden, a country with highly regulated rental markets and full-recourse loans.

24 See Waldron and Young (2007).

To assess the relevance of these three channels is important to look at the distribution of debt across households, quantify to what extent society as a whole is exposed to the risks of high indebtedness and take into account country-specific institutional differences that may alter these mechanisms.

What is special about Sweden?

In addition to fundamental factors, local housing demand and supply characteristics are important. Using standard fundamental explanatory factors such as growth in disposable income, the age of the working population, interest rates and rent-to-price ratios, Swedish real estate markets have frequently been identified as being out of line with fundamentals (IMF, 2004, 2008, 2009; Economist, 2010). However, treating credit and housing markets as homogenous across countries could be misleading. In this respect, there are some important features of the Swedish economy such as (i) a highly regulated housing market; (ii) limited buy-to-let market; (iii) credit market structure and equity withdrawal; and (iv) debt distribution.

A highly regulated housing market

A striking feature of the Swedish housing market is the high level of regulation. Rent regulations were first introduced in 1940 and, despite some reforms in the 1970s and in the 2000s, the rental sector is still highly regulated today.²⁵ The largest proportion of the rental market is public and rents are set according to a cost approach. Rents in the public housing sector in practice set a cap on those in the private sector. Therefore, rents in Sweden generally do not reflect the market value of an apartment, especially in metropolitan areas. Regulations are also present in the owning segment of the housing market. The most common alternative to renting is to be member of a cooperative housing association (*bostadsrättsförening*). In practice, the most significant difference between being a member of a cooperative housing association and owning an apartment is that the former limits a homeowner's right to sublet the flat. These regulations create a number of distortions that need to be taken into account when evaluating households' borrowing decisions and the development of house prices in Sweden:

- First, rent regulations partially invalidate the use of the price-to-rent ratio to evaluate possible deviations of house prices from their fundamental values. In the empirical literature, large departures of house prices from rental prices are interpreted as a warning signal for the possible upsurge of a bubble. However, if rental prices are kept artificially low by regulations, the link between

²⁵ See OECD Economic Survey: Sweden (2007) and chapter I.1 of this report for more details.

rents and prices breaks down and the rent-to-price ratio may not reflect fundamental values. As pointed out in chapter I.1, in Sweden, deviations of house prices from rents might simply reflect an increasing gap between market and regulated rents. Frisell and Yatsi (2010) criticize the use of the price-to-rent approach in Sweden and argue that behind the remarkable increase in house prices there are mainly fundamental reasons such as lower real interest rates and higher labour income. Changes in housing demand, caused for example by changes in taxation, and variation over time in the maximum LTV ratio are important factors that explain house price fluctuations in Sweden according to Walentin and Sellin (2010).²⁶

- Second, as a result of the high level of regulation in housing markets, a buy-to-let market has never fully developed in Sweden. This has reduced the scope for speculation in the housing market.²⁷
- Third, the main effect of rent control in metropolitan areas is to create a mismatch between demand and supply; as a result, queues for a rental apartment in central Stockholm can be as long as 10 years. This may force young households to buy a house earlier in life than they would have otherwise preferred and therefore to be more leveraged. Referring to Sinai and Souleles' (2010) research, in practice there is no real trade-off for Swedish households between renting and owning.²⁸ The lack of a well-developed rental market can force household to buy even if their investment time horizon is short and in this sense they are more exposed to house-price fluctuations.
- Fourth, housing regulation and a high cost of construction have contributed to a low level of new housing construction compared to other European countries (see OECD, 2007).

To summarize, the high level of regulation in housing markets may increase household exposure to house price fluctuations and distort household borrowing decisions and this calls for extra caution when evaluating the level of overheating in housing markets. On the upside, the resulting underdevelopment of a buy-to-let market may discourage potential speculation in housing markets.

Some important differences in credit markets

Most real estate contracts in Sweden are at floating interest rates and all mortgage debt is "full recourse". Adjustable-rate mortgage contracts are predominant in Sweden and account for about 2/3 of all mortgage contracts.²⁹

²⁶ See also chapter II.1 of this report.

²⁷ In this sense, a house in Sweden is more of a consumption good than an investment good.

²⁸ Here we mainly refer to big metropolitan areas.

²⁹ Chapter II.2 of this report also shows that this share has been increasing over time.

Mortgage debt in Sweden is full recourse, which implies that the borrower is personally liable for the full amount of the loan, regardless of the market value of the underlying housing collateral. These factors could increase highly-indebted households' sensitivity to house price risks:

- Adjustable-rate mortgages can increase households' sensitivity to interest movements, as well as the sensitivity of house prices to interest rate movements, since in this case the change in interest rates will affect not only new borrowers but also a large share of outstanding loans.³⁰ This last prediction is confirmed by Assenmacher-Wesche and Gerlach (2010), who study how different housing markets affect the impact of monetary policy on property prices in different countries, including Sweden. Indeed, using a VAR analysis, they estimate a higher degree of sensitivity of house prices to monetary policy shocks in countries where ARM contracts are more common.
- Full-recourse loans may mitigate the effects of excessive borrowing on financial stability. As they are personally liable for their debts, people may be more cautious in their borrowing decisions. Moreover, in this case the issuer's/lender's recovery is not limited to the collateral. On the other hand, it implies that the cost of not being able to repay debt is particularly high for Swedish households.³¹ For example, in periods of high interest rates and declining house prices, Swedish households may have a higher propensity to cut their consumption to be able to service their debts. In this respect it would be useful to use international data on countries with a similar legal framework as Sweden to quantify this effect.

Savings and home equity withdrawal

Home equity withdrawals appear limited in Sweden. Rising debt and decreasing savings have been a constant pattern in the United States for the last 20 years. Negative savings and rising debt can reflect home equity withdrawals. The situation looks quite different in Sweden. In recent years, savings have been positive and increasing most of the time. Looking at the Swedish savings rate, one could conclude at first glance that Swedish households do not refinance their mortgages for consumption purposes. However, the ratio between secured housing credit and dwelling investments shows a different picture. On average, home equity withdrawal amounted to about 4% of disposable income at the end of 2009 (see Sveriges Riksbank, 2010). However, aggregate data give only a very rough measure of this phenomenon. For policy purposes it would be more useful to undertake a

³⁰ In theory, households should take into account interest rate risks when making their optimal choice between ARM and FRM contracts. However, Campbell (2006) shows that households' mortgage contract decisions are sometime difficult to rationalize.

³¹ See also chapter II.6.

micro data study, as in Mian and Sufi (2010a), and have more precise estimates in this respect.

Debt distribution

Debt distribution matters for debt sustainability. To properly assess the risks connected with high debt, it is important to look at debt distribution in society as a whole rather than at the average. In previous Financial Stability Reports, it has been argued that the current debt level in Sweden does not represent a serious threat to financial stability. However, even if the majority of Swedish households appear to have good margins in terms of their ability to service debt (see Johansson and Persson, 2006, and Sveriges Riksbank, 2009), new borrowers seem to be more exposed to unemployment and interest rate risks (see chapter II .4). Almost 60% of total debt belongs to households at the highest end of the income distribution; these are less likely to default on their mortgage payments in the event of a downturn, but also less likely to actually be hit by an unemployment shock. Nevertheless, comparing debt levels of households in different income categories does not give the full picture. This is especially true in a high-tax country like Sweden. In practice, contrary to the situation in the United States, income distribution in Sweden is basically flat. However, wealth distribution provides a different picture in that it is much more skewed.³² In this sense, the debt-to-asset ratio could be more informative when evaluating debt sustainability. Aggregate data show that this ratio has been stable over time. A potential drawback of using this approach is that housing wealth constitutes the largest share of household wealth. Thus, in this sense households have also become more exposed to house-price fluctuations. Moreover, disaggregated data show that a significant fraction of Swedish households has little wealth.³³ In this regard, it would be useful to use both debt-to-income and debt-to-asset ratios in Sweden to estimate the probability of missing debt payments. In the United States, the second measure has a better predictive power according to Dynan and Kohn (2007).

CONCLUDING THOUGHTS

What explains the observed rise in household debt over the past two decades? Economic theory offers a rich set of potential explanatory factors such as increased expected future income, low real interest rates, diminished uncertainty, changes in demographics and financial innovation. However, empirically discerning the contribution of each of these factors has proven to be a difficult task. Many of these variables are highly endogenous or hard to measure and this has made it difficult

³² See Domeij and Floden (2010).

³³ See Domeij and Floden (2010) and Domeij and Klein (2002).

to discern causality from mere correlation. In the United States, the easing of credit constraints and rising house prices have been pointed out as two important causes of increasing debt. A growing empirical literature suggests that there is also a link between a lack of financial literacy and over-indebtedness. In Sweden, there is some evidence to show that a combination of low real interest rates and more generous LTV ratios can explain most of the observed increase in debt.³⁴ However, we are not aware of any comprehensive study that uses micro-data to also assess the impact of increasing house prices, credit supply or changes in disposable income on household indebtedness in Sweden. Some recent survey-based evidence has documented a lack of financial literacy among Swedish households that could probably lead to an excessive build-up of debt. Moreover, even “financially educated” people could make financial mistakes and take on too much debt by judging current low levels of interest rates as permanent and the current appreciation rate in house prices as everlasting. A long period of low interest rates and increasing house prices could create and reinforce this misperception. Understanding the evolution of real-time beliefs about house price appreciation or interest rates is therefore central to understanding housing markets and household debt decisions. Collecting more data on these issues would be useful for policy purposes. Moreover, economic policies that aim to increase transparency about financial conditions, such as the decision to publish the Riksbank’s projected interest rate path,³⁵ could also help in this respect.

Judging whether the current level of household indebtedness is sustainable or whether house prices in Sweden are driven by a bubble is an even more demanding task. There is some evidence to show that house price fluctuations could mainly be explained by fundamental factors, such as real interest rates and disposable income. Nevertheless, we believe that some caution is needed in this respect. Predicting house price bubbles has proven to be very difficult and in the last US house-price cycle economic theory provided little guidance in judging what should be a reasonable level of house prices (see Foote et al., 2010). Both debt-to-income and debt-to-asset ratios are informative measures when assessing household debt sustainability. We think that it would be useful to use both ratios, at a disaggregated level, to estimate the probability of missing debt payments in Sweden and to evaluate which of the two measures have a better predictive power.

Nonetheless, irrespective of whether or not we believe that households are over-borrowing and housing markets are overheated, there are indeed some special institutional settings in Sweden, such as the high degree of regulation in housing markets or the widespread use of ARM contracts, that may potentially increase indebted households’ exposure to house-price and interest rate fluctuations. That said, whether monetary policy is the right instrument to constrain household debt

34 See Finocchiaro and Queijo von Heideken (2007).

35 Since January 2007, the Riksbank publishes its own forecast on future developments of the repo rate.

and limit the associated risks is still an open question. An increase in the policy rate would have an impact on both households and firms. The actual borrowing cost faced by indebted households is also influenced by fiscal factors, e.g. interest rate deductibility, that are disconnected from monetary policy. Increasing interest costs by gradually reducing the degree of deductibility is another example of a tailor-made solution to dampen the increasing trend in indebtedness. Moreover, a change in interest rates will affect not only new borrowers but also a large share of outstanding loans and higher interest rates may induce borrowers to amortize their loans less. On the other hand, a cap on LTV ratios, like the one mandated by Finansinspektionen since October 2010, could potentially induce people to borrow less and thus slow down the rate of increase in indebtedness. Economic policies that create incentives for people to amortize could have a dampening effect on existing debt levels. Finally, heavily regulated rental markets and high construction costs have also contributed to a shortage of housing in metropolitan areas. Limited supply may have played an important role in the development of house prices and indebtedness.

Going forward, to properly assess the risks stemming from household balance sheets and housing, regulators will need to continue developing micro data on household borrowing and assets. The assessment of micro data on the households will also need to be better integrated into aggregate models for policy simulation and analysis.

Such steps could improve our understanding of household indebtedness and the risks it poses to macroeconomic and financial stability. The Riksbank's inquiry into the risks in the Swedish housing market is a first attempt in this direction.³⁶

³⁶ See chapter IV.1 for a description of some of the new data that will be used by the Riksbank to study housing markets.

References

- Andersson, Tom and Sofia Lindh (2011), "Insolvent mortgage borrowers – a comparison between the USA and Sweden", chapter II.6.
- Ando, Albert and Franco Modigliani (1963), "The Life-Cycle hypothesis of saving: aggregate implications and tests", *American Economic Review*, vol. 53, pp. 55-84.
- Akerlof, George, A and Robert J. Shiller (2009), "Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism" Princeton University Press.
- Allen, Franklin and Douglas Gale (2000), "Bubbles and Crises," *Economic Journal*, vol. 110, pp. 236-255.
- Allen, Franklin and Kenneth Rogoff (2011), "Asset Prices, Financial Stability and Monetary Policy", chapter III.1.
- Almenberg, Johan and Olof Widmark (2010), "Numeracy, financial literacy and asset market participation", *Mimeo*.
- Angeletos, G. M., D. Laibson, J. Tobacman, A. Repetto and S. Weinberg (2001), "The Hyperbolic Consumption Model: Calibration, Simulation, and Empirical Evaluation", *Journal of Economic Perspectives*, vol. 15, no. 3, pp 47-68.
- Assenmacher-Wesche Katrin and Stefan Gerlach (2008), "Ensuring financial stability: financial structure and the impact of monetary policy on asset prices," *IEW – Working Paper* no. 361.
- Attanasio, O., L. Blow, R. Hamilton and A. Leicester (2009), "Booms and Busts: Consumption, House Prices and Expectations", *Economica*, vol. 76, pp. 20-50.
- Barnes, Sebastian and Guy Young (2003), "The rise in US household debt: assessing its causes and sustainability", *Bank of England Working Paper* no. 206.
- Bernanke, Ben S., Mark Gertler and Simon Gilchrist (1999), "The financial accelerator in a quantitative business cycle framework", in: J. B. Taylor & M. Woodford (ed.), *Handbook of Macroeconomics*, edition 1, vol. 1, chapter 21, pp. 1341-1393, Elsevier.
- Bianchi, Javier and Enrique Mendoza (2011), "Overborrowing, Financial Crises and 'Macroprudential' Policy," *IMF Working Paper* WP/11/24.
- Brunnermeier, Markus K. and Christian Julliard, (2008), "Money Illusion and Housing Frenzies", *The Review of Financial Studies*, vol. 21, issue 1, pp. 135-180, 2008.
- Buiter, Willem (2010), "Housing Wealth Isn't Wealth", *Economics: The open-access, open-assessment E-journal*, vol. 4, 2010-22, www.economics-ejournal.org.
- Calomiris, Charles W., Stanley D. Longhofer and William Miles (2009), "The (Mythical?) Housing Wealth Effect". *NBER Working Paper* no. 15075.
- Campbell, John Y. (2006), "Household Finance," *NBER Working Paper* no. 12149.
- Campbell, Jeffrey R. and Zvi Hercowitz (2006), "The role of collateralized household debt in macroeconomic stabilization", *Working paper*.

- Campbell, John, Y. and Joao F. Cocco (2007), "How do house prices affect consumption? Evidence from micro data", *Journal of Monetary Economics*, vol. 54(3), pp. 591-621, April.
- Chan, Sewin (2001), "Spatial Lock-in: Do falling Prices Constrain Residential Mobility?," *Journal of Urban Economics* vol.49(3), pp. 567-586.
- Chakrabarti, R., D. Lee, W. Van der Klaauw and B. Zafar (2011), "Household Debt and Saving during the 2007 Recession," *FRB of New York Staff Report No. 482*.
- Claussen, Carl Andreas, Magnus Jonsson and Björn Lagerwall (2011), "A macroeconomic analysis of house prices in Sweden", chapter II.1.
- Debelle, Guy (2004), "Macroeconomic implications of rising household debt", *BIS working paper* no. 153.
- Dillén, Hans and Peter Sellin (2003), "Financial bubbles and monetary policy," *Sveriges Riksbank Economic Review* 2003:3.
- Domeij, David and Martin Flodén (2010), "Inequality Trends in Sweden 1978-2004," *Review of Economic Dynamics*, 13(1), pp. 179-208.
- Domeij, David and Paul Klein (2002), "Public pensions: To What Extent Do They Account for Swedish Wealth Inequality?," *Review of Economic Dynamics*, 5(3), pp. 503-534.
- Dynan, Karen and Donald L. Kohn (2007), "The Rise in U.S. Household indebtedness: Causes and Consequences" *Finance and Economics Discussion Series* 2007-37. Washington: Board of Governors of the Federal Reserve System.
- Englund, Peter (2011), "Swedish house prices in an international perspective", chapter I.1.
- Favara, Giovanni and Zheng Michael Song "House Price Dynamics with Dispersed Information", *Mimeo*.
- Ferreira, Fernando, Joseph Gyourko and Joseph Tracy (2010), "Housing Busts and Household Mobility," *Journal of Urban Economics* vol 68(1), pp. 34-45.
- Finocchiaro, Daria and Virginia Queijo von Heideken (2007), "Household Debt and the Macroeconomy: the Swedish Case", *Mimeo*.
- Fisher, Irving (1933), "The debt-deflation theory of great depressions," *Econometrica*, vol.1, issue 4, pp. 337-357.
- Foote, Chris, Chris Gerardi and Paul Willen (2010), "Reasonable people did disagree: Optimism and pessimism about the U.S. housing market before the crash," forthcoming in *Reinventing the American Mortgage System: Rethink, Recover, Rebuild*, coedited by Marvin Smith and Susan M. Wachter.
- Friedman, Milton (1957), "A theory of the consumption function," *Princeton, NJ, Princeton University Press*.
- Frisell, Lars and Masih Yatsi (2010), "The price development in the Swedish housing market – a fundamental analysis," *Sveriges Riksbank Economic Review* 2010:3.
- Geanakoplos, John (2010), "The leverage cycle", *Cowles Foundation Discussion Paper* no. 1715R.

- Geanakoplos, John (2010b), "Solving the Present Crisis and Managing the Leverage Cycle", *FRBNY Economic Policy Review / August 2010*
- Gerardi, Kristopher, Harvey S. Rosen and Paul Willen (2010), "The impact of deregulation and financial innovation on consumers: the case of mortgage markets", *Journal of Finance*, vol. 65, issue 1, pp. 333-360, February.
- Gerardi, Kristopher, Lorenz Goette and Stephan Meier (2010b), "Financial Literacy and Subprime Mortgage Delinquency: Evidence from a Survey Matched to Administrative Data", *Federal Reserve Bank of Atlanta Working Paper 2010-10*
- Glick, Reuven and Kevin Lansing (2010), "Global Household Leverage, House Prices, and Consumption", *FRBSF Economic Letter*, January.
- Hansson, Bengt (2010), "En bostadsbubbla kostar", *Statens Bostadskreditnämnd Marknadsrapport*, February.
- Hurst, Erik and Frank Stafford (2004), "Home is where equity is: mortgage refinancing and household consumption", *Journal of Money, Credit, and Banking*, vol. 36, no. 6, pp. 985-1014.
- Iacoviello, Matteo (2005), "House Prices, Borrowing Constraints, and Monetary Policy in the Business Cycle," *American Economic Review*, American Economic Association, vol. 95(3), pp. 739-764, June.
- International Monetary Fund (2004), "*World Economic Outlook*", September.
- International Monetary Fund (2008), "*World Economic Outlook*", October.
- International Monetary Fund (2009), "*World Economic Outlook*", October.
- Ioannidou, Vasso P., Steven Ongena, and José L. Peydró (2007), "Monetary Policy and Subprime Lending: A Tall Tale of Low Federal Funds Rates, Hazardous Loans, and Reduced Loan Spreads", *Mimeo*.
- Johansson, Jesper, Björn Lagerwall and Henrik Lundwall (2011), "Larger share of variable mortgages – how does this affect the impact of monetary policy", chapter II.2.
- Johansson, Martin W. and Mattias Persson (2006), "Swedish Households' indebtedness and ability to pay – a household level study", *Sveriges Riksbank Economic Review*, 2006:3.
- Jonsson, Magnus (2002), "The real interest rate and monetary policy", *Sveriges Riksbank Economic Review*, 2002:1.
- Karen, Dynan, Douglas W. Elmendorf and Daniel E. Sichel (2006), "Can Financial Innovation Help to Explain the Reduced Volatility of Economic Activity?", *Journal of Monetary Economics*, vol. 53, pp. 123-50.
- King, Mervyn (1994), "Debt deflation: Theory and evidence", *European Economic Review*, vol. 38, pp. 419-455.
- Kiyotaki, Nobuhiro and John H. Moore (1997), 'Credit Cycles', *Journal of Political Economy* 105, pp. 211-248.
- Laibson, David (1996), "Hyperbolic discounting, undersaving and saving policy", *NBER Working Paper no. 5635*.

- Leamer, Edward (2007), "Housing is the business cycle", *Proceedings, Federal Reserve Bank of Kansas City*, pp. 149-233.
- Lorenzoni, Guido (2008), "Inefficient Credit Booms", *Review of Economic Studies* vol. 75, pp. 809-833.
- Lusardi, Annamaria and Peter Tufano (2009), "Debt literacy, financial experience and overindebtedness", *NBER Working Paper* no. 1408.
- Lustig, Hanno, N, and Stijn, G. Van, Nieuwerburgh (2005), "Housing Collateral, Consumption Insurance, and Risk Premia: An Empirical Perspective", *Journal of Finance*, vol. 60, issue 3, pp. 1167-1219.
- Mian, Atif R. and Amir Sufi (2009), "House prices, home equity-based borrowing and the U.S. Household leverage crisis", *American Economic Review*, forthcoming.
- Mian, Atif R. and Amir Sufi (2010a), "House Prices, Home Equity-Based Borrowing, and the US Household Leverage Crisis", *NBER Working Paper* no. 15283.
- Mian, Atif R. and Amir Sufi (2010b), "Household debt and macroeconomic fluctuations", *Vox*, <http://www.voeu.org/index.php?q=node/4954>
- Nordberg, Anders and Albina Soultanaeva (2011), "The Riksbank's monitoring of the Swedish mortgage market – expanded statistics base", chapter IV.1.
- OECD (2007), *Economic Survey of Sweden*.
- Ortalo-Magné, François and Sven Rady (2006), "Housing Market Dynamics: On the Contribution of Income Shocks and Credit Constraints", *Review of Economic Studies* vol. 73, issue 2, pp. 459-485.
- Piazzesi, Monica and Martin Schneider (2008), "Inflation Illusion, Credit, and asset pricing", forthcoming in John Y. Campbell (ed.) *Asset Pricing and Monetary Policy*, Chicago, IL: Chicago University Press, pp. 147-181.
- Schulhofer-Wohl, Sam (2011), "Negative Equity Does Not Reduce Homeowners Mobility", *NBER Working paper* no. 16701.
- Sinai, Todd and Nicholas S. Souleles (2005), "Owner-Occupied Housing as a Hedge Against Rent Risk," *The Quarterly Journal of Economics* vol. 120(2), pp. 763-789.
- Sterk, Vincent (2010), "Home equity, Mobility and Macroeconomic Fluctuations", *Mimeo*.
- Sveriges Riksbank (2009), "Financial Stability Report 2009:1", www.riksbank.se
- Sveriges Riksbank (2010), "Financial Stability Report 2010:1", www.riksbank.se
- Walentin, Karl and Peter Sellin (2010), "Housing Collateral and the Monetary Transmission Mechanism", *Sveriges Riksbank Working Paper* no. 239.
- Waldron, Matt and Gary Young (2007), "Household debt and spending: results from the 2007 NGM Research survey" *Bank of England Quarterly Bulletin* 2007:Q4.

■ Household indebtedness – consequences for the banks' credit losses and financial stability

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This report analyses the effect that higher indebtedness among Swedish households can have on financial stability through credit losses in the banks' lending to Swedish households and companies. We used data from a mortgage survey carried out by Finansinspektionen and apply this microdata to carry out stress tests of household finances and to study the extent to which their ability to pay is affected by various shocks. Most households are expected to be able to meet their debt obligations even in extremely stressful scenarios that entail higher interest rate expenditure or lower income. However, major losses can occur during extremely stressful scenarios since the banks' exposures to households are very large. Although this kind of development is considered to be less probable, the possibility still exists. A larger risk could be that the households decrease their other consumption expenditure, which can lead to lower demand and credit losses in the banks' corporate lending. This effect is heavily influenced by the debt level of households, which means that continued credit growth has large implications for how the economy is affected by various economic shocks. However, the overall conclusion is that the credit losses in a stressful scenario are not considered to constitute a direct threat to financial stability through capital adequacy in the major Swedish banks. However, the economy could still suffer negative effects if the debt-related expenses of households were to increase or if their income were to fall.

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1. Introduction

One lesson that was learned from many economic crises is that steep falls in property prices have played a significant role and that in many cases the crises were preceded by a credit expansion that caused indebtedness to rise sharply.¹ Once the credit expansion collapsed, the fall in asset prices was followed by more bankruptcies and a lower ability to pay among borrowers, which in turn led to an increase in credit losses in the banking sector. Assessors have long been worried about unsustainable development on the housing markets of many countries, where household indebtedness is increasing rapidly. High indebtedness could lead to situations where fluctuations in the interest rate level, given the household's other expenses and income, make it difficult for the household to handle both interest and amortisation payments. However, during the Swedish banking crisis in the 1990s, the household sector only accounted for 10 per cent of the banking sector's overall credit losses, despite the fall in housing prices and the fact that the halt to economic growth resulted in a rise in unemployment and borrowers finding it more difficult to pay their debts. Instead most of the banks' credit losses were from the commercial real estate sector. Despite these past experiences, it is not necessarily the case that the banks' credit losses would develop in the same way today if a disadvantageous economic development were to take place.

At the moment, total household debts in relation to disposable income amount to approximately 170 per cent (see chart 1), which is much higher than the highest levels recorded at the beginning of the 1990s. Today, slightly more households are in debt and the proportion of households with a very high debt ratio has increased. In recent years it has become much more common for households to take out a greater proportion of their loans at a variable interest rate, making the household sector more exposed to interest rate risk. Highly-indebted households can therefore be hit harder if they suffer a loss of income for any reason at the same time as their debt-related expenses rise.

There are also a number of key differences between the conditions that prevailed on the mortgage market in the 1990s and the conditions that prevail at the moment. One major difference is that regulations for actors on the mortgage market have changed, which has led to credit institutions allowing higher loan-to-value ratios for a long time. Combined with this is the increase in competition on the mortgage market, which has resulted in credit institutions not requiring households to amortise to the same extent as before. Today, first mortgage loans have much longer amortisation times, which was not the case in the 1990s. Another important difference is that inflation is considerably lower today than it was in the 1990s. This means that the real value of household debts does not fall (is not inflated

1 See Reinhart & Rogoff (2009).

down) to the same extent as before. Lower inflation also means that interest rates are lower, so households can bear more debt, while paying the same loan costs. Intensive reform work is currently being carried out to prevent future crises, which means that new banking rules will be introduced, increasing the costs for credit institutions when interest rates go up. Compared with the 1990s, mortgages now make up a greater share of the banks' balance sheets and there is a risk that a higher proportion of households will have problems in the future if the credit losses in the banking sector were to be higher than in the 1990s. In view of this it is relevant from a financial stability perspective to further analyse whether the current development in household indebtedness could be seen as a threat to financial stability.

From the end of 1995 to 2008 real house prices increased by more than 125 per cent. This increase coincided with a substantial increase in household debts, which went up by 175 per cent. But during the same period the disposable income of households only rose by 67 per cent. This means that household debts in relation to disposable income also increased significantly. At the same time, the interest rates for households fell and, even with a substantial rise in debts, interest expenses as a proportion of the households' disposable income did not change significantly.

When the financial crisis broke out at the end of 2008, interest rates fell heavily around the world, including in Sweden. Interest rate reductions were carried out as part of emergency crisis management and to counteract the halt in the real economy, which led to inflation forecasts being adjusted down heavily in the wake of the financial crisis. Interest rate reductions led to lower interest expenses for Swedish households in 2008-2009. Apart from a temporary dip in 2008 house prices have continued to rise and household indebtedness has continued to increase throughout this turbulent period, which can partially be explained by lower interest rates. This means that household interest expenses will increase significantly when interest rates return to their normal levels again, unless indebtedness falls. The debt burden for households has therefore increased, both in relation to disposable income and for interest expenses as a proportion of disposable income.

This report analyses the possible consequences that household indebtedness could have on financial stability through credit losses in the banks' lending. We use microdata of the financial situation of Swedish households and analyse how the households are affected by economic shocks, such as interest rate hikes and a fall in income. We will look at how these factors affect the ability of households to pay their own debts, and how the change in consumption behaviour of households can affect the ability of companies to pay and how this can lead to credit losses in the banks.

The rest of this report is organised as follows. Section 2 describes what happened to the Swedish economy during the crisis in the 1990s and relates this to the

banks' credit losses from household lending during this period. Section 3 contains a detailed description of the survey that was conducted and the data that has been used. Section 4 presents the calculations that have been carried out to study how financial stability is affected by various changes to the financial situation of households and might prevent them from meeting their obligations on the loans they have taken out. Section 4 also investigates what happens to credit losses from commercial lending if households change their consumption expenses to meet their loan obligations in various stress scenarios. Section 5 summarises the conclusions from this report.

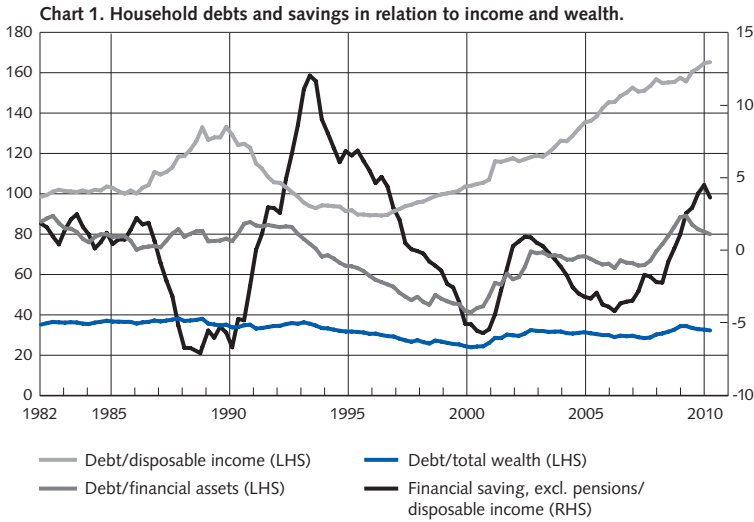
2. Development in the real economy and credit losses in the 1990s

This section looks at the economic development in Sweden at the beginning of the 1990s in order to put this report into a historic context. The focus is on the development of the real economy and the development of credit losses from household lending in this period.

Following many years of regulation, the credit markets in Sweden were deregulated in the second half of the 1980s. In the years up to 1989 companies and households borrowed even more. Debts as a proportion of disposable income rose from 101 per cent to 133 per cent between 1985 and 1989 (see chart 1). As a large proportion of this lending was for investments in real assets, debts in relation to net household wealth did not change to any significant extent. What actually happened was that the balance sheets of households increased considerably.² The interest rates that households were paying over these years were greatly affected by taxes, interest deductions and high inflation, which meant that the real interest rates were negative for several years, making it advantageous to borrow money.³ Another reason why households borrowed so much was that inflation eroded debt and made it easier for households to bear it. In this same period, i.e. the second half of the 1980s, the financial savings of households fell, falling to very negative levels in the final years of the 1980s. There has therefore been high indebtedness and low savings since the end of the 1980s.

² See Barr and Gustavsson (1993).

³ See e.g. Englund (1999).



During the Swedish banking crisis from 1991-1993, Sweden's GDP fell while unemployment rose significantly. Household interest expenses increased rapidly in 1990-1993, amounting to an average of ten per cent of disposable income, which was much higher than during any previous period. However, debts were not eroded by inflation to the same extent as before because inflation fell heavily. Real house prices fell by a maximum of around 30 per cent between 1990 and 1995. The corresponding fall in the net real wealth of households was 20 per cent for the same period.

Although households faced a tough debt situation at the end of the 1980s and despite the economic development at the beginning of 1990s, the strain on household finances did not lead to banks suffering from particularly high credit losses from their lending to Swedish households. The average credit loss level for Swedish mortgage credits at Stadshypotek AB was calculated as being no more than around 0.25 per cent of lending per year between 1990 and 1995.⁴ The credit losses which the banks incurred actually came from commercial real estate companies and finance companies, which were often heavily leveraged and were hit hard by the higher interest rates. Although a large proportion of the credit losses were from outside the household sector, the high debt ratio of households at the beginning of the crisis may have played a role in the extent of credit losses in other parts of the banks' credit portfolios. For example, the consumption behaviour of households during the crisis could have been affected by the fact that they had to meet their debt obligations and therefore reduced other consumption expenses as

⁴ Source: Stadshypotek AB.

the proportion of income for interest expenses increased. This had repercussions on non-financial companies as a result of a drop in demand.

The experiences from the economic crisis in the 1990s would suggest that credit losses from household lending should not constitute a major direct risk to financial stability. Despite strong credit growth and the subsequent economic decline, an overwhelming majority of households were able to pay their mortgages. However, it is not possible to rule out that the households' indebtedness affected other parts of the economy through different channels (see section 4.2). Some factors also indicate that the risk for credit losses could be larger today. The level of indebtedness that households have now is much higher than it was in the 1990s (see chart 1). However, household debts in relation to wealth is relatively unchanged, which is mainly due to rising real and financial assets. One interesting observation is that the over-lending in the 1980s was not mirrored in the ratio between debts and assets. This is because asset prices were also affected by credit growth, which gave a misleading image of the households' financial position. This ratio remains virtually unchanged, while credit growth has been very high; this indicates a similar level of over-lending as was seen at the end of the 1980s. Debts in relation to financial assets also remain mostly unchanged. It is therefore important to analyse how well households could manage a fall in income or an increase in expenses and if this could lead to credit losses in the banking sector. Central factors for the extent to which households can handle unexpected economic events include their indebtedness, how they are affected by higher interest rates and how they can influence their debt situation. The rest of this report looks at the extent to which current mortgage lending to households can contribute to credit losses in the banking sector.

3. Analysis of household indebtedness

This report analyses how different assumptions about household income and expenses affect the banks' credit losses in order to see the extent to which household indebtedness, the proportion of loans at a variable rate and small amortisations can affect financial stability. In these calculations the financial conditions of a number of households are changed and the consequences for these households are studied. The stress that household finances are subjected to is linked to the interest rate on their debt and to household income. A link between household finances and the banks' credit losses from household credits is shown later.

The central factors for the sensitivity of household finances in the various stress scenarios are household indebtedness, the proportion of loans at a variable interest rate and the buffer that households have before their other consumption has to change to ensure that their income can cover their expenses. High debts mean that

household expenses are affected more by changes to interest rates than would be the case at lower debt levels. A higher proportion of loans at a variable rate means that changes to interest rates would affect household finances more quickly than would be the case if loans were taken out at a fixed rate. Variable rate loans also mean that households do not have the same amount of time to change their debt situation to balance out changes to their expenses when there is a change to interest rates. Finally, low amortisations mean that households take longer to adapt their debt situation when conditions change; it also means that, in any calculations that are based on the assumption of low or no amortisations, there is less scope to cover unexpected economic events that households could otherwise have dealt with by changing their amortisation rate.

Household finances are studied at an individual level to calculate the effects that high loans, low amortisations and a large proportion of variable loans have on financial stability. The financial situations of individual households are studied using the data collected during the mortgage study carried out by Finansinspektionen in 2009.⁵ Based on this data, it is possible to use information about household income and debts to calculate how much money a household has after interest payments and once standard expenses for households have been deducted. The following sub-section presents the data, the calculation methods and the scenarios that have been used.

3.1 DESCRIPTION OF DATA

The sample collected by Finansinspektionen contains data for households that received loans from seven different Swedish banks during the period 28-30 September 2009.⁶ This sample contains a total of 6 863 loans. The information in the data includes household composition (e.g. the number of co-applicants and the number of children living at home) and the households' financial situation (e.g. household income and total debt). The margins for different households are calculated using this information. When households have a positive margin, it means that they have money left over after standard expenses have been paid and interest expenses have been deducted. When households have a negative margin, their income does not cover standard expenses and interest payments. If households have a negative margin over a long period of time, they risk running into problems making payments and the banks risk making credit losses from the household credits.

One important difference between the data used in this survey and the data used previously in Financial Stability 2009:1 to stress test the households' ability to

⁵ See Finansinspektionen (2010).

⁶ The banks included in the study are Länsförsäkringar bank, Nordea, SBAB, SEB, Handelsbanken, Skandiabanken and Swedbank.

pay is that the data collected by Finansinspektionen is for loans that were recently paid out, while the data previously used to stress test households was based on a random sample survey of Swedish households. The latter therefore includes households that have no debt, households that took out loans a long time ago and households that have recently taken out loans. This data therefore gives a reasonably good image of the debt situation in the household sector as a whole. However, it is probably not the case that households that take out new loans are representative of the average indebted household in Sweden. For example the households' loan-to-value ratios are higher in Finansinspektionen's data than for indebted households as a whole. Subsequently, an analysis of the debt situation in the broader random sample of Swedish households provides a view of the risks to stability that is not representative of the risks that may occur in the future, if the households that take out new loans are not similar to the households that already have loans. In this context Finansinspektionen's data would provide a better view of how the debt situation of Swedish households may look in the future, as households in this data represent a new inflow of indebted households.⁷ However, Finansinspektionen's data may not be representative of the development in the banks' mortgage lending. For example, seasonal variations could mean that the collected sample is not representative for all periods of time. The overall assessment is that Finansinspektionen's data is a better basis for an analysis than the data used in Financial Stability 2009:1 as it provides a better indication of the risks that could occur if the current development continues.

Household margins can be calculated by using data from individual households from Finansinspektionen's data and assuming standard expenses for all these households. The assumptions made in this calculation are presented in the next subsection.

3.2 CALCULATING HOUSEHOLD MARGINS

The income data in the data is used as the basis for calculating household margins. Standard expenses are then deducted from the income. The standard expenses are the same as those used by Finansinspektionen.⁸ After standard expenses have been deducted from income, household interest expenses are taken away from the rest. Interest expenses are calculated based on the household debt in Finansinspektionen's data.⁹ When calculating household interest expenses, no tax

7 Loans that are renewed in a different bank are included in Finansinspektionen's data. This means that some of the households found in the stock of indebted households will be in the data that represents the flow.

8 See Finansinspektionen (2010).

9 As the objective is to expose households to stress to see what credit losses this leads to, amortisations are not taken into consideration in this context. This is because households are expected not to pay amortisations when they are under stress.

deductions for interest paid have been made. A summary of the calculations used for household margins is set out in table 1.

Table 1. Calculating household margins.

Household's disposable income
– standard expenses for applicants (SEK 7 000)
– standard expenses for co-applicants (SEK 5 500) per co-applicant
– standard expenses for children living at home (SEK 2 500 per child)
– interest expenses (assumed interest rate x household's total debt)
– running costs for houses (SEK 4 000)
= Household margin

Table 1 above shows that the interest expenses that a household is assumed to have are not reduced by any interest deductions. There are two main reasons not to include interest deductions when calculating household margins. The first is that interest deductions are a tool that could be used to regulate debt growth in the household sector (see report III.3). As interest deductions are a possible tool to influence the lending growth rate, it is important to produce calculations under the assumption that interest deductions do not reduce interest expenses. However, one objection to this calculation method is that, for various reasons, it is unlikely that the interest deductions would be removed, which leads to the second reason for not reducing interest expenses using interest deductions, i.e. because it is important to take into consideration not only possible scenarios, but also scenarios that are improbable but possible. This ensures that the results provide an indication of the risks that household credits present for the banking sector.

Data on the number of co-applicants, the number of children staying at home and the household's total debt are needed to be able to calculate household margins in accordance with the method described in table 1. The households in the sample that have data for these variables therefore form the basis of the results presented below. A total of 6 002 households are included in the sample that is analysed in this report. Descriptive statistics for the included households are found in table 2.

Table 2. Descriptive statistics for households in the mortgage survey

	MEAN	STANDARD DEVIATION
Age	46.7	14.0
Number of co-applicants	0.64	0.49
Number of children	0.76	1.02
Total debt	1 645 703	1 539 995
Annual disposable income	443 199	445 003
Debt ratio	3.84	3.11
Number of observations	6 002	

Based on the information available for the households, the banks' credit losses for household lending are estimated given different scenarios. Descriptions of these estimates are provided in the following sections.

3.3 CALCULATING CREDIT LOSSES

In 2009 the four major Swedish banks lent a total of approximately SEK 2 000 billion to households. Credit losses on household lending are estimated to have totalled SEK 1 billion that year. This means that the level of credit losses from household lending was 0.05 per cent. Based on Finansinspektionen's data and the calculation assumptions presented above, 4 per cent of the households in the sample have a negative margin.¹⁰ In order to calculate credit losses using different assumptions on how household income and expenses change, it is assumed that a doubling of the proportion of households with a negative margin leads to a doubling of the level of credit losses. Using this assumption, credit losses can be analysed in various scenarios with lower income and higher expenses.

3.4 DIFFERENT SCENARIOS FOR THE DEVELOPMENT OF HOUSEHOLD INCOME AND EXPENSES

Three scenarios have been set up to analyse how the banks' credit losses develop using different assumptions of lower income and higher expenses for households. In the first scenario, household expenses increase, specifically the households' interest expenses. This increase in expenses is calculated based on a situation where interest rates rise from 2.5 per cent to 12.5 per cent for households. In the two other scenarios, household income falls¹¹ either by reducing household income by between 6 per cent and 18 per cent, which could happen if disposable income were to fall, or by reducing income to a level corresponding to the applicant and any co-applicants being made unemployed. In the latter scenario households receive 70 per cent of their original income, or a maximum of SEK 14,960 per applicant or co-applicant in unemployment benefit. The levels of unemployment used in the sample in the calculations are 5, 10, 15 and 20 per cent, respectively.¹² These scenarios are summarised in table 3.

¹⁰ This calculation is made under the assumption that the interest rate that households had in 2009 was 2.5 per cent.

¹¹ An interest rate level of 7.5 percent is used when income falls.

¹² When making these calculations, it is assumed that unemployment is divided randomly among households, that only people under 65 years old can be affected by unemployment and that everyone in the household is made unemployed if the household is affected by unemployment.

Table 3. Scenarios for household income and expenses

Scenario 1 (*Higher expenses due to a rise in interest rates*)

Interest on household debts: 2.5-12.5 per cent.

Scenario 2 (*Lower income as in a loss of income and an interest rate of 7.5 per cent*)

Fall in income of 6-18 per cent

Scenario 3 (*Lower income as in unemployment and an interest rate of 7.5 per cent*)

Fall in income, if 5-20 per cent of households are made unemployed

It is important to note that we are only analysing how *the households' economic resilience* is affected by higher expenses (higher interest rates) and/or lower income (for example, a fall in income due to unemployment). We are not investigating how various economic events affect the economy as a whole. It is important to note that the macro-economic consequences of the stress scenarios we have used are considerable and that these consequences are what mostly affect financial stability. However, the main aim of this study is to stress test the ability of households to make payments at the micro level to see how their ability to pay changes under different economic conditions. In a further stage, an attempt is made to link the ability of households to make payments to the banks' credit losses from household lending.

The next section presents the credit losses from household lending of the four major banks in the different scenarios for household income and development.

4. Banks' credit losses and household indebtedness

4.1 BANKS' CREDIT LOSSES FROM HOUSEHOLD LENDING

Using the calculation conditions presented in the previous section, the proportion of households with a negative margin has been calculated along with the credit losses for the major banks. The credit losses for the three scenarios are presented in table 4 below. In scenarios 2 and 3, we look at an interest rate of 7.5 per cent and the starting point in these scenarios is therefore identical with scenario 1 when the interest rate is 7.5 per cent.

Table 4. The proportion of households with a negative margin and the credit losses for the banks.

Scenario 1 (different interest rate levels)				
Interest rate (%)	2.50	7.50	9.50	12.50
Proportion of households with a negative margin (%)	4	20	30	45
Credit losses (%)	0.05	0.23	0.34	0.51
Credit losses (billion)	1.0	4.6	6.8	10.1
Scenario 2 (fall in income)				
Fall in income (%)	0	6	12	18
Proportion of households with a negative margin (%)	20	27	35	44
Credit losses (%)	0.23	0.30	0.40	0.50
Credit losses (billion)	4.6	6.1	8.0	10.0
Scenario 3 (unemployment)				
Unemployment (%)	0	5	10	20
Proportion of households with a negative margin (%)	20	22	24	29
Credit losses (%)	0.23	0.25	0.28	0.32
Credit losses (billion)	4.6	5.1	5.5	6.5

Table 3 shows that credit losses are small compared with total lending based on the conditions used in the calculations, irrespective of which of the three stress scenarios is studied. Credit losses amount to a maximum of around SEK 10 billion per year. In order to gain an understanding of this chart, these credit losses can be linked to the total capital of the four major banks.¹³ If the credit losses were to amount to SEK 20 billion (SEK 10 billion per year for two years), the aggregated capital ratio of the four major banks would fall from 10.4 to 10.0 per cent, i.e. a fall of 0.4 percentage units, according to 2009 charts.¹⁴ Based on the historic links that have been identified, financial stability would not appear to be threatened by the banks' capital ratio being too low as a result of credit losses from mortgages.

There are several reasons why the level of credit losses is low in the calculations above. A first reason is that credit losses from Swedish mortgages are so small from the outset that an increase in the proportion of houses with a negative margin only affects credit losses to a small extent, assuming that there is a linear relationship between the two. The reason why there are low credit losses on mortgage lending from the outset could be because households reduce other consumption when their overall expenses exceed their income, rather than defaulting on their mortgage. This means that households will only default on their mortgage obligations under very extreme conditions, so banks would only experience credit losses from their mortgage lending in exceptional cases. In this context the banks' procedures for granting credits and the Swedish regulations for the payment obligations of private individuals (see report II.6) play a major role in the behaviour observed among mortgage takers. The fact that borrowers change their consumption behaviour

¹³ The four major banks, Handelsbanken, Nordea, SEB and Swedbank, account for around three quarters of Swedish household lending. This is why credit losses are related to the aggregated capital of these four banks.

¹⁴ The capital adequacy ratio refers to equity in relation to risk-weighted assets.

rather than not fulfilling their loan commitments means that credit losses for lending other than household lending can arise in the banking sector. Such indirect channels are discussed in more detail in the next section.

The calculations presented in table 4 are based on the assumption that the banks' credit losses increase linearly with the proportion of households that have a negative margin. If this assumption were not to prove to be a good approximation, the banks' credit losses from mortgage lending would not be estimated correctly in the calculations above. A sensitivity analysis has been carried out, where the relationship of credit losses to the financial situation of households varies, in order to illustrate the extent to which the calculations depend on the assumptions made. A first variation is to allow the credit loss level to depend not only on the proportion of households with a negative margin, but also on the size of the negative margin for these households. More specifically, the calculations change so that the proportion of households with a negative margin doubles, while the negative margin for these households increases by a factor of three, so that the credit losses will increase by a factor of six. The size of the negative margins therefore has repercussions on the size of the credit losses. Table 5 sets out the credit losses that would occur under these conditions.

Table 5. Credit losses with a non-linear connection between the proportion of negative margins and credit losses.

Scenario 1 (different interest rate levels)				
Interest rate (%)	2.50	7.50	9.50	12.50
Credit losses (%)	0.05	0.46	0.90	1.90
Credit losses (billion)	1.0	9.2	18.0	38.0
Scenario 2 (fall in income)				
Fall in income (%)	0	6	12	18
Credit losses (%)	0.46	0.63	0.94	1.34
Credit losses (billion)	9.2	12.6	18.9	26.7
Scenario 3 (unemployment)				
Unemployment (%)	4.6	6.1	8.0	10.0
Credit losses (%)	0.46	0.56	0.67	0.87
Credit losses (billion)	9.2	11.2	13.5	17.3

The results in table 5 indicate that the credit losses would be much higher if we assumed a dependency on both the proportion of households with a negative margin and on the size of the negative margin, compared with if we only assumed a dependency on the proportion with a negative margin. However, if this were the case, the credit losses would still not be high enough to threaten financial stability in terms of capital adequacy. However, it is important to note that banks can incur other problems even if their capital adequacy is not threatened. So even if the credit losses are not high enough to threaten the banks' capital requirements, financial stability could still be affected through other channels.

A second variation of the calculations carried out above is to see to what extent household indebtedness has to fall to avoid a negative margin in the various stress scenarios. By making the assumption that household debt reduction occurs by banks writing off claims against households that have negative margins to provide these households with a margin of zero, it is possible to obtain an approximate upper limit for credit losses from mortgage lending. Calculations based on Finansinspektionen's data show that there would be credit losses of a maximum of SEK 200 billion, or 10 per cent of lending, under the conditions set out in the various stress scenarios. These kinds of credit losses would have a major impact on the capital ratios, but the probability of them occurring is extremely low.

All in all the results above indicate that there is a low risk that credit losses from mortgage lending to Swedish households would jeopardise financial stability. This conclusion is based mostly on the fact that Swedish households have historically been very good when it comes to meeting their mortgage obligations. However, if this behaviour were to change drastically, the size of mortgage lending would constitute a potential threat to financial stability.

As well as affecting the banks' credit losses from mortgage lending, the stress that households are subjected to could also affect their consumption behaviour. As mentioned earlier, these changes in behaviour may be an important explanation as to why households rarely default on their mortgage obligations. However, these changes in behaviour could have negative repercussions on demand in the economy, which would have a negative impact on company profits. This could in turn affect the probability of companies going bankrupt, which could then lead to credit losses for banks from their commercial lending. The next section studies how important this channel could be.

4.2 INDIRECT EFFECTS OF HOUSEHOLD INDEBTEDNESS

One consistent conclusion that can be drawn in the analyses of Swedish households is that the credit risk from household lending appears to be low even in a scenario where households are subjected to extreme financial stress.¹⁵ In addition to credit losses that come directly from household lending, other channels could also affect financial stability when households are subjected to stress. One such channel is household consumption expenses. If household finances are affected negatively, for example because of a disadvantageous development in household income or debt-related expenses, this could have a negative impact on household consumption expenses. This effect can be caused by households reducing their consumption expenses to be able to meet higher debt-related expenses or because they increase their savings as they want to be more cautious. Both of these reasons contribute

¹⁵ See e.g. Financial Stability 2009:1.

to a reduction in demand, which can affect company profits and therefore their creditworthiness. This section studies the extent to which this channel can contribute to financial instability.

One of the scenarios above is used to show the extent to which reductions in household consumption expenses can contribute to credit losses in the business sector.¹⁶ Unlike the analysis above, the extent to which disposable income falls is now studied in this scenario. It is then assumed that household consumption expenses fall in relation to this reduction in income.¹⁷ This reduction subsequently leads to a reduction in GDP. A model is then used that depicts the link between production and bankruptcy probability in order to link this reduction in GDP to credit losses in the business sector.¹⁸ It is important to note that this analysis is based on narrow relationships in the economy. This means that the credit loss in the business sector should be seen as an individual effect from households' altered consumption. It is also possible that other negative effects could be felt in the economy if household interest expenses were to increase or if household income were to fall. However, this will not be analysed in this report.

Chart 2 shows the extent to which a change in household consumption behaviour affects lending in the business sector.¹⁹ The calculations shown in this chart are partly based on the indebtedness in Finansinspektionen's data. However, one calculation is also made using the assumption that indebtedness in the household sector would be 30 per cent lower than is the case in the data. Debt for Swedish households has grown by around 30 per cent since 2006. The calculations at the lower debt level would therefore show how credit losses in the business sector would have developed in the scenario if no growth had taken place in the debt level since 2006.

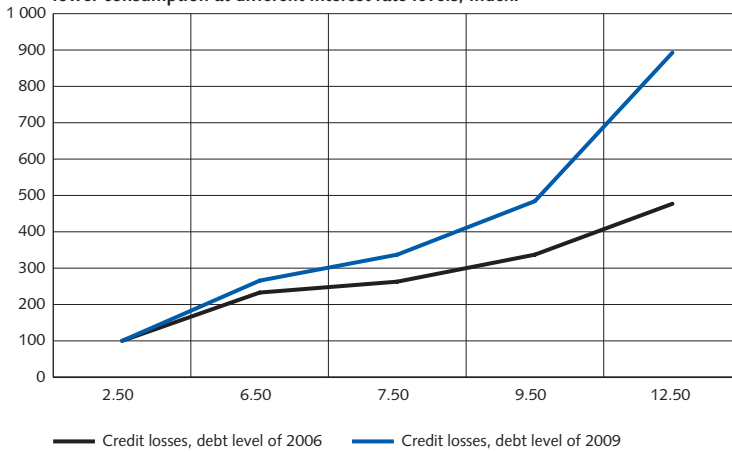
16 The scenario with different interest rates is used as this scenario led to the highest credit losses.

17 An estimated elasticity of 0.44 is used in the calculations. This means that household consumption expenses fall by 4.4 percent if household income falls by 10 percent.

18 See Åsberg Sommar and Shahnazarian (2009).

19 It is assumed that there is no change to household income in the calculations.

Chart 2. The banks' expected credit losses in the business sector were caused by lower consumption at different interest rate levels, index.



Source: The Riksbank.

The results indicate that a reduction in household consumption would lead to a substantial increase in credit losses in the business sector. The results also indicate that the credit losses would be considerably higher at the higher level of indebtedness than at the lower level. This is because households are more exposed to interest rate increases at the higher level of indebtedness. Assuming that the level of indebtedness in the entire mortgage stock is as high as in Finansinspektionen's mortgage study, credit losses could be as much as SEK 40 billion higher at the current level of indebtedness, compared with the lower debt level. The high credit growth of households could therefore have a decisive role on the negative shocks that the financial system could experience. Even though the losses are high, the indirect credit risk is not considered to be a threat to the banks' capital adequacy and therefore not to financial stability either through problems concerning the banks' solvency. Although it is possible that a situation like the one analysed above could have an impact on the banks' ability to finance lending, this is not analysed in this report.

5. Conclusions

This report analyses how a high level of indebtedness among Swedish households can affect financial stability through credit losses in the banks' lending to Swedish households and companies. Using data from a mortgage survey carried out by Finansinspektionen, we were able to use microdata to carry out a stress test of household finances and to study the extent to which the ability to pay is affected by various financial shocks. Most households are expected to be able to meet their debt obligations even when they are faced with extremely stressful scenarios with

interest rate hikes and a loss of income. However, major losses can occur during extremely stressful scenarios since the banks' exposure to households is very high. Although this kind of development is considered very improbable, the possibility still exists. This means that continued credit growth can have key implications on how the economy is affected by various economic shocks. There is also a risk that households could reduce their other consumption in stressful scenarios, leading to a fall in demand and major potential credit losses in the banks' lending to companies. Despite this, the conclusion is that the credit losses in this kind of scenario are not expected to constitute a direct threat to the financial stability through capital adequacy in the major Swedish banks. However, the economy could still suffer negative effects, for example with regard to the banks' funding, if the expenses of households were to increase sharply or if their income were to fall sharply.

References

- Barr, Daniel and Gustavsson, Kurt (1993), "Skuldsanering pågår", Penning och Valutapolitik, 1993:4.
- Englund, Peter (1999), "The Swedish Banking Crisis: Roots and Consequences", Oxford Review of Economic Policy, 15:3, pp. 80-97.
- Finansinspektionen (2010), "Den svenska bolånemarknaden och bankernas kreditgivning", in Swedish.
- Reinhart, Carmen. and Rogoff, Kenneth (2009), "This Time is Different: Eight Centuries of Financial Folly", Oxford and Princeton: Princeton University Press.
- Sveriges Riksbank (2009), "Financial Stability 2009:1", www.riksbank.se.
- Åsberg Sommar, Per, Shahnazarian, Hovick (2009), Interdependencies between Expected Default Frequency and the Macro Economy, International Journal of Central Banking, 5:3, pp. 83-110.

■ A fall in house prices – consequences for financial stability

HANNES JANZÉN, KRISTIAN JÖNSSON AND ANDERS NORDBERG*

This report studies the consequences that a fall in house prices can have on financial stability. The channels that are investigated are banks financing their lending through covered bonds and the effect on credit losses from lending to companies. The conclusion is that the creditworthiness of covered bonds should not be under threat if house prices were to fall. However, the banks' costs and access to financing can be affected despite the good credit quality of these covered bonds. The conclusion is that although the banks can suffer major credit losses, these losses are not high enough to constitute a direct threat to financial stability.

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1. How covered bonds are affected by a fall in house prices

This section looks at the consequences that a fall in house prices can have on financial stability due to banks financing their lending through covered bonds. In Sweden the banks have significantly increased lending to the public in recent years. The banks have financed most of this lending by raising capital on the financial markets, which they have mostly done by issuing covered bonds. Covered bonds currently account for almost half of the securities financing of the major Swedish banks.

When the banks issue covered bonds, they use existing mortgage credits as collateral. A covered bond is therefore linked to specially selected collateral, in what is known as the 'cover pool'. Changes to the loan-to-value ratios of mortgages affect the cover pool because it contains mortgage credits. Normally loan-to-value ratios increase when house prices fall. If the loan-to-value ratio is too high, collateral has to be removed from the cover pool, which then falls in value. This can then affect the banks' ability to issue covered bonds. It is therefore interesting to analyse if and how a fall in house prices could affect bank financing through covered bonds.

WHAT IS A COVERED BOND?

A covered bond is a kind of asset that has a very long history, particularly in Denmark and Germany. In the 1990s interest in covered bonds increased, after experiencing a lull over a long period of time. Now they are a central financing instrument for banks, particularly in Europe.

Covered bonds are different from other financial instruments as they are protected by a well-defined set of rules. In Sweden covered bonds are regulated by a specific act and by EU rules. There are also clear rules for cover pools, regulating the kind of loans that can be included, their composition and the maximum loan-to-value ratios of loans that are included as collateral. The Swedish rules also require an independent inspector, appointed by Finansinspektionen, to monitor and ensure that the assets in the cover pool adhere to the requirements.

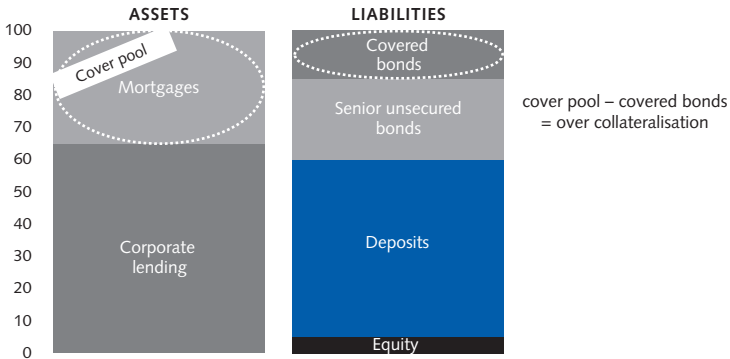
A covered bond can be described as a claim on the issuing institution. If the issuer is not able to meet its obligations, the holder of the bond has priority to specially-selected collateral that is linked to the bonds, the 'cover pool'. The cover pool contains various kind of credits, normally mortgage credits or credits for other kinds of real estate lending, but also credits for agriculture and shipping, as well as credits for governments and municipalities. However, the cover pool for the covered bonds of Swedish banks mainly contains mortgage credits.

The main difference between a covered bond and a traditional non-covered bond from a bank is therefore the rights that an investor has if the issuer goes bankrupt. For a standard bond, the holder has a non-preferential claim on the

issuer, while a covered bond gives the holder preferential rights to a specific cover pool. This means that a covered bond often has a higher credit rating than the issuer.

As mentioned earlier, Swedish mortgage institutions use existing mortgages as collateral in their cover pool and then issue covered bonds based on them. If the value of the cover pool exceeds the value of the issued bonds, it causes 'over-collateralisation' (see chart 1).

Chart 1. Illustration of a covered bond



Note. A simplified assumption has been made in the figure that all the mortgages on the assets side are included in the cover pool. This is not often the case in reality, as only loans with a certain maximum loan-to-value ratio can be included. Some banks also decide not to put all the mortgages approved in accordance with the regulations into the cover pool.

Source: The Riksbank

The loans in the cover pool remain on the banks' balance sheet. This means that the issuer still retains the credit risk in the underlying loans. The cover pool is also dynamic, so any collateral that does not qualify is removed from the cover pool and replaced with new collateral. If the credit quality of the loans falls below certain pre-determined levels, the issuer is forced to remove them and replace them with new ones. This is why an issuer of a covered bond has strong incentives to make a thorough credit assessment of the loans that are included in a covered bond. Consequently there are good reasons to consider the creditworthiness of covered bonds to be high.

Some securities also have mortgage credits as their underlying collateral, for example Residential Mortgage-Backed Securities (RMBS). Unlike covered bonds, an RMBS only has a claim on the underlying collateral and not a claim on the issuer. In addition, the cover pool for an RMBS does not have to be dynamic, which means that the issuer does not have to replace collateral whose quality has worsened. As the issuer has removed the loan from the balance sheet, a fall in the credit quality of the loan will not have an impact on the issuer. This means that the issuer does not

have as much incentive to make a well-founded credit assessment of the underlying loans. As a result the credit quality of an RMBS might not necessarily be that high. Investors are forced to rely heavily on the bond's credit rating to make sure that the underlying loans have a good credit quality. As confidence in credit ratings plummeted during the financial crisis, it was very difficult to evaluate and assess the risk of an RMBS issued by private institutions, which caused major problems on this market.

The importance of covered bonds for Swedish banks

Since the second half of 2004 Swedish banks and credit market companies have been able to apply to Finansinspektionen for permission to issue covered bonds. The first Swedish covered bonds were issued in the autumn of 2006, and in the spring of 2008 all institutions that had been approved as issuers had implemented the necessary conversion and had issued covered bonds. Seven Swedish banks and their mortgage institutions can now issue covered bonds on the Swedish market.¹

Table 1. Swedish institutions that issue covered bonds

	RATING	VOLUME, SEK BILLION	PROPORTION OF TOTAL OUTSTANDING VOLUMES, PER CENT
Swedbank	AAA	448	27
Stadshypotek	AAA	439	26
Nordea hypotek	AAA	309	18
SEB	AAA	193	12
SBAB	AAA	155	9
Länsförsäkringar hypotek	AAA	80	5
Landshypotek	AAA	53	3

Source: SCB (Statistics Sweden) and bank reports, December 2010

In December 2010 the outstanding volume of covered bonds on the Swedish market amounted to just over SEK 1 600 billion, corresponding to around half of Sweden's GDP. This means that it is much bigger than the market for Swedish government bonds and the fifth largest covered bonds market in Europe. The majority of the volume of Swedish covered bonds, just under 80 per cent, is denominated in Swedish krona, with the rest mostly in other Nordic currencies and euro.² Issues in other currencies are normally converted into Swedish krona (and other Nordic currencies) using derivative instruments.

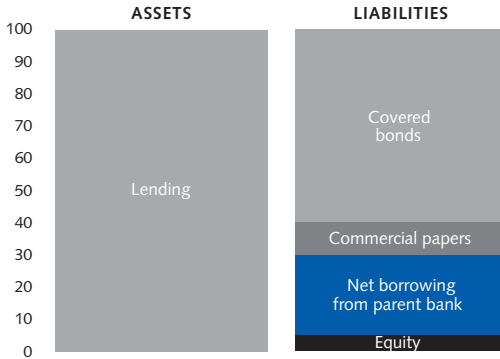
Covered bonds are currently the single most important source of financing for Swedish mortgage institutions (see chart 2 for a simplified balance sheet of a typical Swedish mortgage institution). As well as covered bonds these institutions also

1 Stadshypotek (Handelsbanken), Landshypotek, Länsförsäkringar hypotek, Nordea hypotek, SBAB, SEB, Swedbank hypotek.

2 In September 2010 Stadshypotek was the first Nordic bank to issue covered bonds in USD.

finance lending through the issuance of certificates and net borrowing from their parent bank.

Chart 2. Simplified balance sheet of a typical Swedish mortgage institution
Standard for 2010

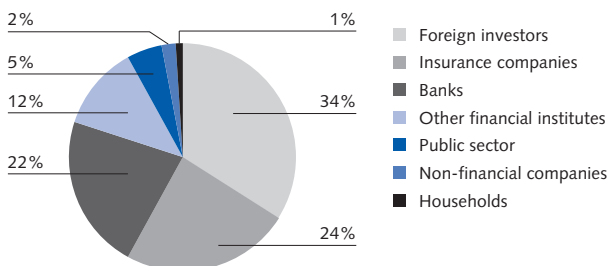


Sources: Bank reports and the Riksbank

Who buys Swedish covered bonds?

More than one third of the covered bonds issued by Swedish banks or their mortgage institutions are owned by foreign investors (see charts 3 and 4). In Sweden and other countries in the world it is mostly insurance companies, banks and other financial institutions that invest in covered bonds.

Chart 3. Investors in Swedish covered bonds
September 2010

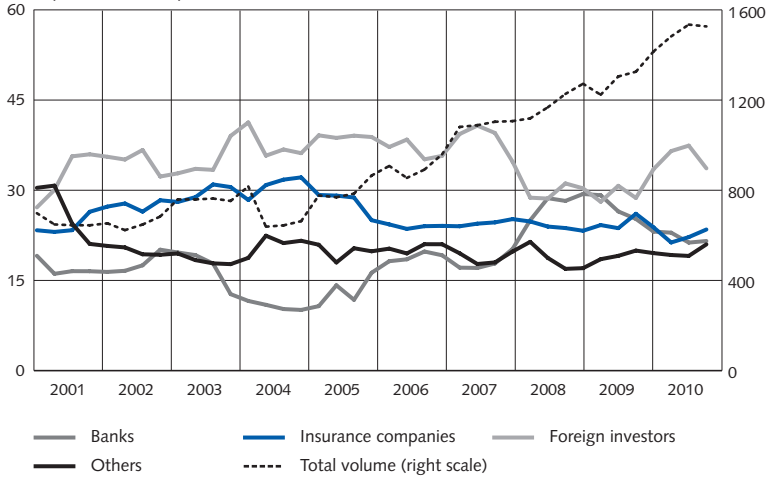


Source: Statistics Sweden

Chart 4 shows that the total outstanding volume of covered bonds has steadily increased in recent years. Foreign investors held around 35 per cent up until the end of 2007. When the financial crisis started, they reduced their holdings, at which point Swedish banks increased their share. Last year foreign investors increased their holdings, almost returning to the same level as before the crisis.

Chart 4. History of the distribution of investors in Swedish covered bonds and total outstanding volumes

September 2010, per cent and SEK billion



Source: Statistics Sweden

HIGH CREDITWORTHINESS IN COVERED BONDS, DESPITE A FALL IN HOUSE PRICES

The market for covered bonds has expanded globally to become one of the largest bond markets in the world. Despite their size and long history covered bonds have never caused a credit loss for an investor because of a defaulted payment. This underlines the confidence that is intrinsic in the covered bonds system. All Swedish covered bonds have a AAA rating, which means that they have a low credit risk.

One reason why the credit risk is so low in Swedish covered bonds is that the underlying cover pool has a good credit quality. This is mainly because most of the cover pool contains loans to Swedish households, which have historically caused very low credit losses. There are also restrictions on the loan-to-value ratios of the collateral that can be included in the cover pool. Private houses may only be included up to 75 per cent of the value of the property, while the corresponding chart for commercial real estate is 60 per cent. All banks currently have an average loan-to-value ratio of between 40 and 60 per cent.³ In addition all loans are removed from the cover pool if the lenders are late in paying. All these measures aim to ensure that the cover pool always includes loans that have a good credit quality.

The cover pool of Swedish banks includes loans for houses, commercial real estate, public real estate and agricultural real estate. The proportion of commercial real estate is very low. The cover pool also contains no loans to borrowers from the Baltic states.

³ The banks have used various approved methods to calculate their average loan-to-value ratios.

Table 2. Swedish institutions that issue covered bonds
Per cent

	HOUSES	COMMERCIAL REAL ESTATE	REAL ESTATE ABROAD	OTHER
Swedbank	91	0	0	9
Stadshypotek	91	4	0	5
Nordea hypotek	85	3	0	12
SEB	100	0	0	0
SBAB	100	0	0	0
Länsförsäkringar hypotek	100	0	0	0
Landshypotek	2	0	0	98*

* Agricultural real estate.

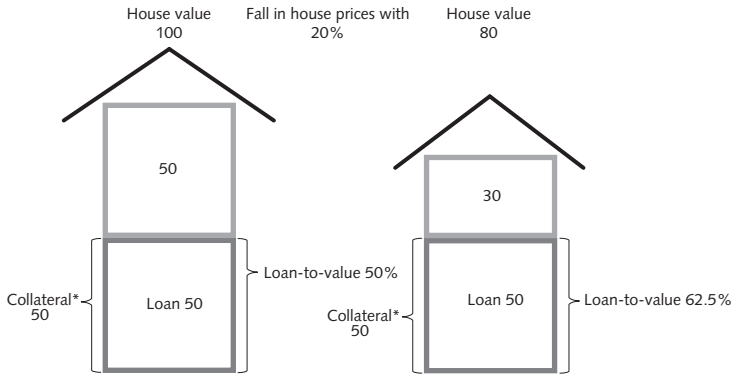
Source: Bank reports, September 2010

The nominal value of the cover pool normally exceeds the nominal value of the issued bonds. This creates over-collateralisation. The average over-collateralisation in the cover pools of Swedish banks amounts to approximately 45 per cent.⁴ This over-collateralisation in turn generates additional confidence for investors in covered bonds as the cover pool is larger than their claim on the bank. Normally a fall in property prices would lead to a fall in the value of the cover pool. The over-collateralisation falls because the outstanding volume of covered bonds does not fall (see chart 6). This can limit the banks' ability to issue further bonds from the existing cover pool.

Charts 5 and 6 show how a 20 per cent fall in house prices would affect two loans that are in the cover pool, but that have different loan-to-value ratios. Loan 1 has a loan-to-value ratio of 50 per cent, while loan 2 has a loan-to-value ratio of the maximum limit of 75 per cent. In the case of the first loan, the entire loan of SEK 50 is initially included in the cover pool, as there is only a 50 per cent mortgage on the house. When house prices fall by 20 per cent, the loan-to-value ratio increases to 62.5 per cent. As this new loan-to-value ratio is less than the maximum loan-to-value ratio of 75 per cent, the entire loan in the cover pool still qualifies after the fall in prices.

⁴ Let's take a bank that has a cover pool of 1,000 and outstanding covered bonds worth 750. The over-collateralisation would be 250, producing an over-collateralisation of 33% (250/750).

Chart 5. Loan 1, initial loan-to-value ratio of 50 per cent

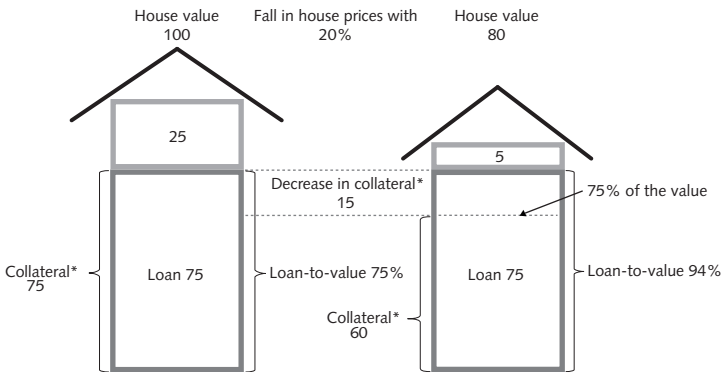


*Collateral eligible for cover pool

Source: The Riksbank

The second loan has an initial loan-to-value ratio of 75 per cent, which means that the entire loan has the exact percentage needed to be included in the cover pool at the upper limit. When the house prices fall, the value of the house falls to SEK 80; this affects the loan-to-value ratio, which increases to 94 per cent. This means that some of the loan has to be removed from the cover pool. Only SEK 60 (75 per cent of SEK 80 value of the house) can be included in the cover pool, while the SEK 15 that exceeds the limit has to be removed.

Chart 6. Loan 2, initial loan-to-value ratio of 75 per cent



*Collateral eligible for cover pool

Source: The Riksbank

The extent to which the cover pool is affected by a fall in house prices therefore depends on the loan-to-value structure of all the loans that are included. If all loans were granted at 75 per cent of the value of the house and then house prices fell by 20 per cent, the cover pool would also fall by 20 per cent. However, this is not how

mortgage institutions normally operate; they ensure that they have a relatively even distribution of loan-to-value ratios up to the maximum limit of 75 per cent. This means that the cover pool will not be affected to the same extent as house values when there is a fall in house prices. It is estimated that a fall in house prices of 20 per cent would lead to the banks' over-collateralisation falling by around 10 per cent.

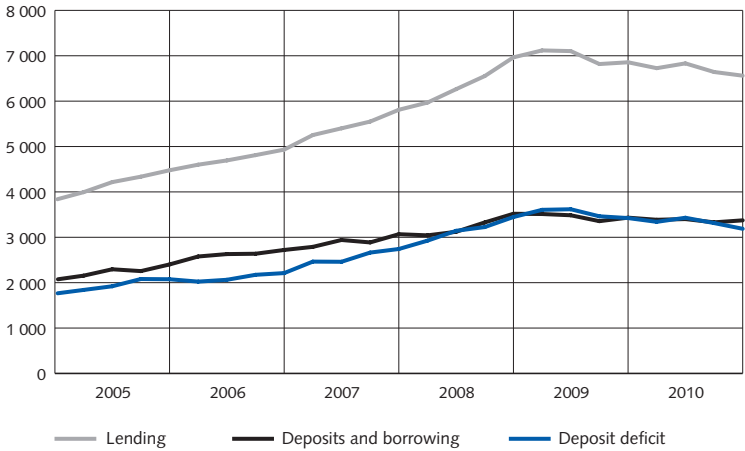
In terms of credit, banks are in a good position to deal with a fall in house prices and an increase in loan-to-value ratios; firstly, because they currently have high over-collateralisation in their cover pool. This means that banks would still have over-collateralisation, even if there were to be a reduction in over-collateralisation of 10 per cent (if house prices were to fall by around 20 per cent). Secondly, the banks are also able to fill up their cover pool if its value were to drop following a fall in house prices. The first step that banks would take is to fill their cover pool with what is known as 'substitute assets'. These are, for example, assets that are not normally included in the cover pool, for example loans to municipalities and governments. In the second stage the banks can sell some of their liquidity reserve, i.e. liquid securities that they hold to deal with unexpected events. By selling them the bank receives liquid funds that they can add to the cover pool as substitute assets.⁵ In a third stage the bank can issue short-term securities, which provides them with liquid funds that they can use to increase their cover pool.

THE DIFFERENCE BETWEEN THE MATURITY OF THE BANKS' ASSETS AND LIABILITIES CREATES A REFINANCING RISK

As previously mentioned, covered bonds have high creditworthiness due to the strict rules around them and their underlying collateral. This is why they have become a popular financing alternative for Swedish banks. As the deposit deficit for Swedish banks has increased, i.e. the difference between deposits and lending (see chart 7), market financing has become even more important, which is why covered bonds have started to play a more important role.

⁵ If the collateral that the banks have in their liquidity reserves is classed as substitute collateral, the banks can add them directly to the cover pool rather than selling them and receiving liquid funds.

Chart 7. Deposits and lending in the major Swedish banks
SEK billion



Note. Deposit deficit = lending – deposits

Sources: Bank reports and the Riksbank

The increase in the proportion of covered bonds is positive, as they are a cheaper form of financing than bank bonds, which means that customers benefit from lower mortgage rates. However, there are limitations to how much a bank can finance lending using covered bonds. For example, if they used covered bonds too much, the over-collateralisation in the cover pool would become too small, which would create problems if the banks were not able to fill the cover pool with more approved assets. Another limitation is the fact that investors in non-covered bonds might object if the proportion of covered bonds in a banks' financing was too high. This is because the bank would then pledge and therefore reserve a lot of its best quality assets for holders of covered bonds, which would mean that only lower quality assets would be left over for other creditors.

One strategy in the banks' lending is to issue covered bonds with a much shorter maturity than the mortgages they issue. This results in lower financing costs, but is based on the banks' ability to refinance old bonds with new ones when the old ones fall due. A mortgage normally has a maturity of 20-30 years, while banks typically finance them by issuing covered bonds with a maturity of three to five years.⁶ This creates a mismatch in the maturity of a bank's assets and liabilities, which in turn incurs a higher refinancing risk.

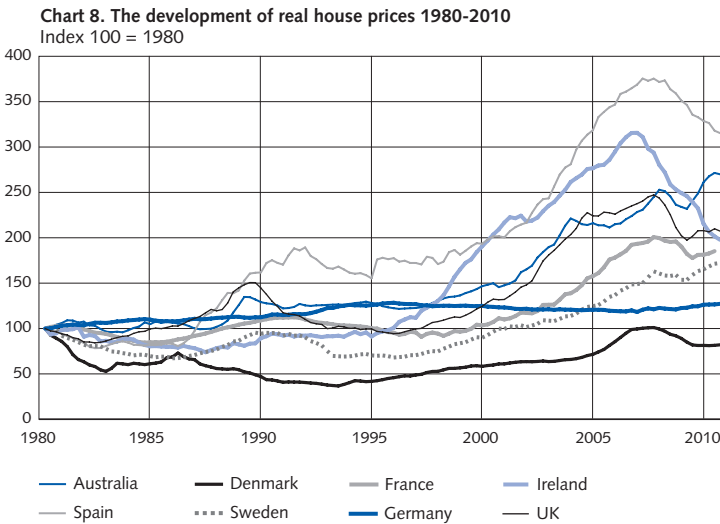
When markets are functioning normally, there is only a small risk that they will not be able to refinance. However, if there are disturbances on the financial

⁶ The public reporting of mortgage maturities differs between banks. Some banks report mortgages based on their actual maturity, while other banks report them based on when the mortgage interest rates are renewed.

markets, both internationally and in Sweden, this can lead to greater risk aversion among investors, which in turn can lead to financing becoming more difficult and the cost of issuing covered bonds more expensive.

FINANCING OPTIONS AND INTEREST EXPENSES CAN BE AFFECTED, DESPITE A GOOD CREDIT QUALITY

Unlike many European countries that experienced a strong increase in house prices at the beginning of the 2000s, the financial crisis did not lead to a turnaround on the Swedish housing market, and prices fell (see chart 8). This made Sweden one of the exceptions, along with Germany.



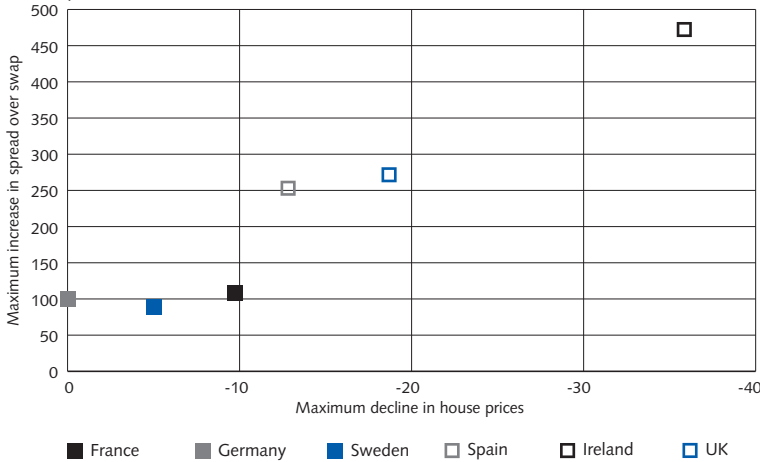
Source: Ecowin

It is possible to discern a link if you compare the fall in house prices in a number of countries with the banks' financing costs (measured as spread over swap) from issuing covered bonds in euro;⁷ the higher the fall in house prices that a country suffered, the more expensive it was to finance lending by issuing covered bonds (see chart 9). In Ireland, for example, which experienced a fall in house prices of more than 35 per cent, spread over swap increased by a maximum of around 470 basis points during that period. In Sweden, house prices only experienced a small decline in this period, while Germany, where house prices did not fall at all, did not experience the same increase in prices in spread over swap.

⁷ Spread over swap is the cost of issuing a long-term bond that is swapped down at 3M EURIBOR, compared to financing on the interbank market at 3M EURIBOR.

Chart 9. Fall in nominal house prices, and an increase in spread over swap for covered bonds issued in euro

Maximum change in the period March 2007-November 2010, basis points and per cent



Note. For Sweden and France the period is October 2008-November 2010

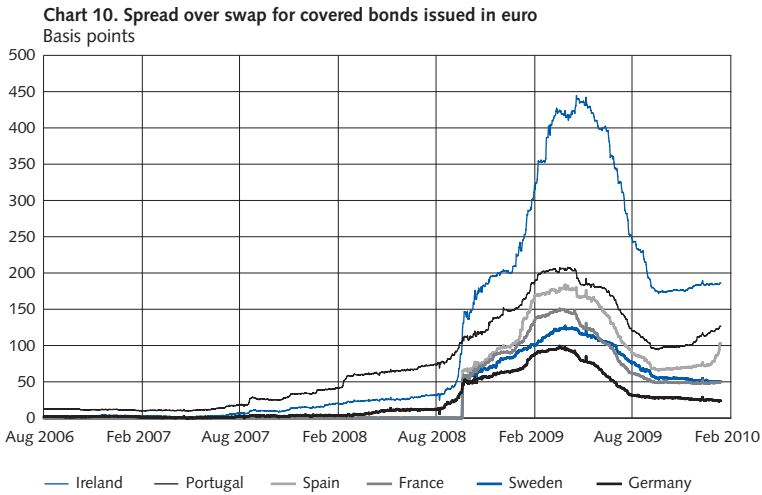
Source: Iboxx and Ecwin

However, it is important to point out that many factors can affect these spreads. For example, in 2010 Ireland and Spain were affected by serious problems in their national finances, which led to their spreads increasing. Banks in a country suffering from problems in their national finances, where there is also a fall in house prices, run considerable risk of suffering from higher borrowing costs. However, a fall in house prices could probably be enough in many countries to impact the banks' financing costs.

There is therefore a risk that falling real estate prices in Sweden could affect the willingness of investors to buy Swedish covered bonds. Although the loan-to-value ratios of collateral linked to covered bonds would probably not rise to a critical level if house prices were to fall by 20 per cent, the level of uncertainty around bonds would increase and the value of the underlying collateral would rise if the prices of real estate were to fall quickly. A fall in real estate prices could therefore mean that Swedish banks would find it more expensive and more difficult to issue bonds, which is exactly what has happened in many other European countries.

Even if the house prices did not fall in Sweden, a fall in house prices in other countries could still affect Swedish covered bonds. During the financial crisis the cost of issuing covered bonds rose, while the systematic risk on the financial markets also increased (see chart 10). The spreads (still measured as spread over swap) followed each other in 2008 and 2009, with a positive and relatively similar correlation between different countries. This could be interpreted as the markets having the same credit and liquidity risks. The cost of issuing covered bonds rose

both in Europe and in Sweden, even though Sweden fared relatively well during the crisis compared with many other countries. This highlights just how interconnected the various markets are and how problems in one country can spread to others.



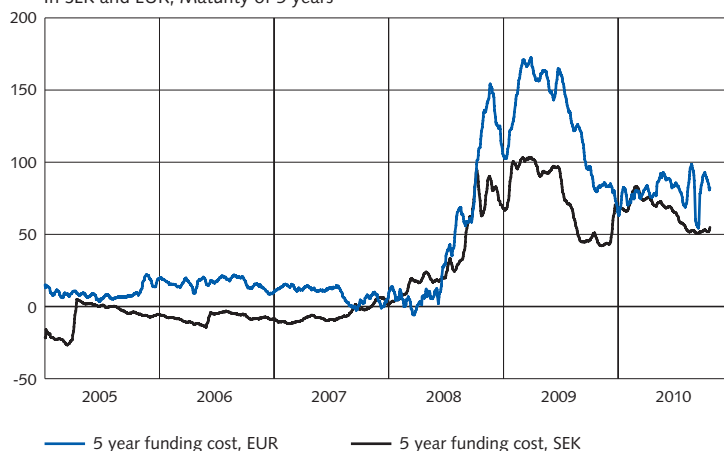
Source: Iboxx

THE COST OF ISSUING FOREIGN COVERED BONDS AND THEN CONVERTING THEM TO SWEDISH KRONA CAN ALSO INCREASE

In Sweden the demand for mortgages has risen in pace with the demand for buying houses. This has created problems for the banks to finance all its lending by issuing covered bonds in Swedish krona. A market does not currently exist that can handle such large volumes in a cost-effective way. This is why the banks also issue covered bonds denominated in other currencies, mainly in euro. This allows banks to diversify their lending among different geographic markets and investors. Historically there has been little difference between issuing covered bonds in Swedish krona and issuing them in foreign currency and then swapping them to Swedish krona (see chart 11). It has therefore been cost-effective for banks to issue on different markets.

Chart 11. Cost of issuing a covered bond in euro and swapping at 3M STIBOR compared with issuing directly in Swedish krona

In SEK and EUR, Maturity of 5 years



Sources: Bloomberg and Ecowin

The banks' total financing in foreign currency exceeds their assets in foreign currency (see table 3) and the surplus, around SEK 600 billion is converted to Swedish krona. Consequently, Swedish banks borrow Swedish krona through swaps.⁸ Swedish banks are therefore very dependent not only on foreign investors (normally fund managers and pension funds) wanting to buy securities from Swedish banks, but also on banks being prepared to swap foreign financing to Swedish krona (normally foreign investment banks).

Table 3. The major banks' assets, liabilities and equity divided by currency
SEK billion

	SEK	FOREIGN CURRENCY	TOTAL
Assets	4 862	6 575	11 438
Liabilities and equity	4 237	7 201	11 438
Difference between assets and liabilities and equity	626	-626 ⁹	

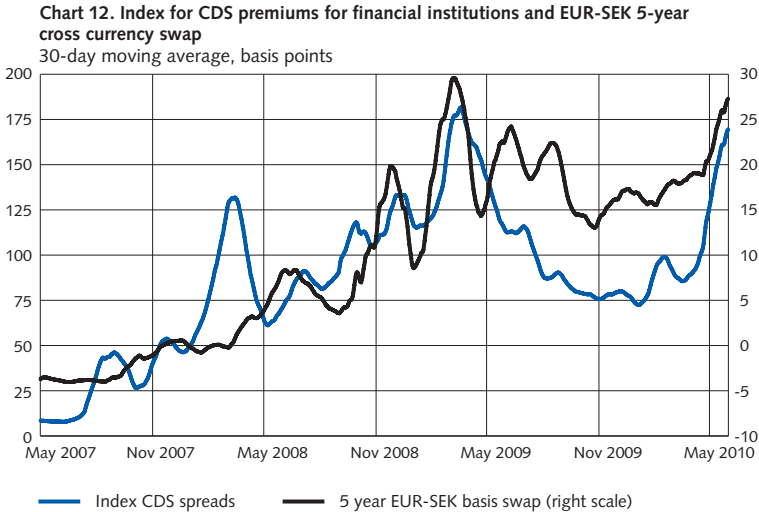
If house prices fall in Sweden or in Europe, this will probably lead to an increase in the systematic risk of covered bonds. In this scenario it is also likely that the CDS premiums for financial institutions will increase (see chart 12).¹⁰ When these CDS

8 In a swap transaction two currencies are exchanged at spot price, while a futures contract is set up for exchanging the currencies back again. To put it in simpler terms, the bank that receives a currency 'borrows' it during the maturity of the transaction. From this point on the term 'borrow' is used to describe this swap transaction.

9 The whole sum is not only used to finance mortgages, it is also used to finance other kinds of lending.

10 A CDS can be described as an insurance against losing an investment if the counterparty goes bankrupt. The seller of a CDS pledges to pay the nominal value in the event of bankruptcy or another credit event, and in return receives a premium from the purchaser, an amount known as the *spread*.

premiums increase, there is a risk that the cost of borrowing Swedish krona in swaps will also increase. In historic terms, there has therefore been a co-variation between higher CDS premiums for financial institutions and the cost of issuing foreign covered bonds in euro and then swapping them to Swedish krona in a 'cross currency swap'. The premium, or the spread, in this cross currency swap can be interpreted as being the additional cost that a Swedish bank has to pay to issue in foreign currency and then convert this borrowing to krona, compared with borrowing directly in Swedish krona.



Note. Index for CDS premiums refers to iTraxx financials. This is an index that consists of an equally weighted average for CDSs for 25 financial institutions from Europe.

Source: Bloomberg

On the whole the creditworthiness of the banks should not generally be threatened if house prices fall. This is because the banks have a large buffer due to their high over-collateralisation in their cover pool and their ability to fill this cover pool with new assets if it falls in value.

However, both the costs and access to financing can be affected despite good credit quality. A simple comparison also shows that the higher the fall in house prices that a country suffers, the more expensive it is to finance through covered bonds. The cost of issuing covered bonds can also be affected even if house prices do not fall in Sweden. The financing costs of Swedish banks can be affected by a fall in a house prices in Europe and a subsequent increase in the systematic risk of covered bonds. The interest costs can increase in two main ways. Firstly, the interest on the bonds can increase and secondly the cost of borrowing Swedish krona in swaps can increase. If the financing costs for banks increase, it is probable that this

cost will be transferred to the customers at the same time as fewer credits will be granted.

During the financial crisis a number of tools were used to facilitate the banks' financing and thereby their loans to the general public.¹¹ If a fall in house prices would cause financing difficulties for the banks, one conceivable solution is to re-activate these tools.

2. How banks' credit losses are affected by a fall in house prices

This section investigates the effect that a fall in house prices can have on financial stability in terms of credit losses in the banking sector. The basis of the analysis is that a fall in house prices would probably not incur any major credit losses for the banks through payment defaults on the households' mortgages. If a household has a mortgage where the debt exceeds the market value of the house, this should not have a direct impact on the household's ability to manage its interest and amortisation payments. Instead, the banking sector is expected to incur credit losses on its lending to companies as a result of households changing their consumption behaviour following a fall in house prices. This therefore forms the basis of the analysis of model-based macro-economic developments that can be expected to take place when house prices fall. These results indicate that credit losses are normally determined by the economic development that takes place when house prices fall. In the worst case scenario, where house prices fall and GDP falls at the same time and short rates increase, the banks can experience heavy credit losses, but probably not so high that they would constitute a direct threat to financial stability.

Macro-economic effects of a fall in house prices

This report investigates the extent to which a fall in house prices can affect credit losses in the banking sector, and what kind of threat this could constitute to financial stability through the banks' capital adequacy. Falling house prices can affect the macro-economy through different channels. One such channel is households. A fall in house prices reduces the wealth of households, which contributes to a fall in consumption expenses. The fall in demand caused by lower consumption also results in a fall in GDP and inflation. This lower inflation then leads to a stimulus from the central bank as part of its monetary policy, which can help to reduce the fall in demand. The vector autoregressive model applied in report II.1 is used to show the empirical patterns and how these variables work together in this channel. This model captures the empirical connections between the variables and enables

¹¹ See Sellin, P (2009).

the macro-economic scenario linked to a 20 per cent fall in house prices to be studied. This macro-economic scenario is set out in table 4a.

As well as affecting household wealth, the loan-to-value ratio of a household can play an important role in how households behave when there is a fall in house prices. If house prices fall, some households will have a debt that they perceive as being too high in relation to the value of their house. In this event the household would probably reduce their consumption expenses in order to amortise their debt obligations. This would then lead to a fall in demand and GDP, which would result in a fall in inflation. The monetary policy reaction to lower inflation would be to reduce the base rate, stimulating the economy and ensuring that the fall in GDP is not too steep. However, there are circumstances that could lead to monetary policy not being able to react. The fall in GDP would then be higher. Both these situations are investigated in this report by using the dynamic general equilibrium model (DSGE model) applied in report II.1. This model captures how the loan-to-value ratio can affect the macro-economic development if house prices fall. Two different scenarios are produced using the DSGE model. In one scenario it is assumed that monetary policy can react to a fall in demand, while in the second scenario it is assumed that monetary policy cannot react to a fall in demand. The two scenarios from the general equilibrium model are set out in tables 4b and 4c.

All of the factors that are presented in table 4 affect company profits and therefore company bankruptcies. The credit losses that the banks make on their lending to companies will also be affected by a fall in house prices. The effect that a fall in house prices has on the macro economy is used as the basis for investigating the extent to which credit losses are affected by a fall in house prices. These macro-economic effects are then used in a model that connects the risk of bankruptcy in the company sector to the macro-economic development.¹²

12 See Åsberg Sommar and Shahnazarian (2009).

Table 4. Macro-economic development from different models; difference compared with the main scenario, per cent

a) Scenario from the BVAR model			
	YEAR 1	YEAR 2	YEAR 3
Growth in GDP	-3.0	-1.2	1.0
Growth in industrial production	-11.2	-6.3	-0.3
Short rate	-0.8	-2.4	-2.9
b) Scenario from the DSGE model, with a monetary policy reaction			
	YEAR 1	YEAR 2	YEAR 3
Growth in GDP	-0.7	-0.4	0.3
Growth in industrial production	-4.9	-4.1	-2.2
Short rate	-0.5	-0.5	-0.2
Inflation	0.0	-0.1	-0.1
c) Scenario from the DSGE model, without a monetary policy reaction			
	YEAR 1	YEAR 2	YEAR 3
Growth in GDP	-0.9	-0.9	0.1
Growth in industrial production	-5.4	-5.4	-2.7
Short rate	0.0	0.0	0.0
Inflation	-0.2	-0.5	-0.5

Note. The three models produce a scenario of how GDP would be modified. The historic link between GDP growth and industrial production growth is then used to produce the scenario for industrial production growth.

The risk of bankruptcy that a company runs, and therefore the credit risk that a bank runs when lending to companies, depends on the macro-economic development. If there is a decline in economic activity, the profits of Swedish companies fall as their revenues fall. However, a lower interest rate can improve the companies' situation as their costs fall. This affects the companies' ability to survive and the probability of them going bankrupt. The Åsberg Sommar and Shahnazarian (2009) model can be used to link the macro-economic scenarios in table 4 above to the probability of corporate bankruptcy and, consequently, to the credit losses in the banking sector. This model is based on a connection by which the bankruptcy probability of Swedish companies is linked to industrial production, short rates and inflation. By investigating how bankruptcy probabilities change when the macro-economic development changes, it is possible to assess the development of credit losses in the different scenarios.

Credit losses when house prices fall

The bankruptcy probabilities and the credit losses that occur in the different macro-economic scenarios are presented in table 5 and chart 13.

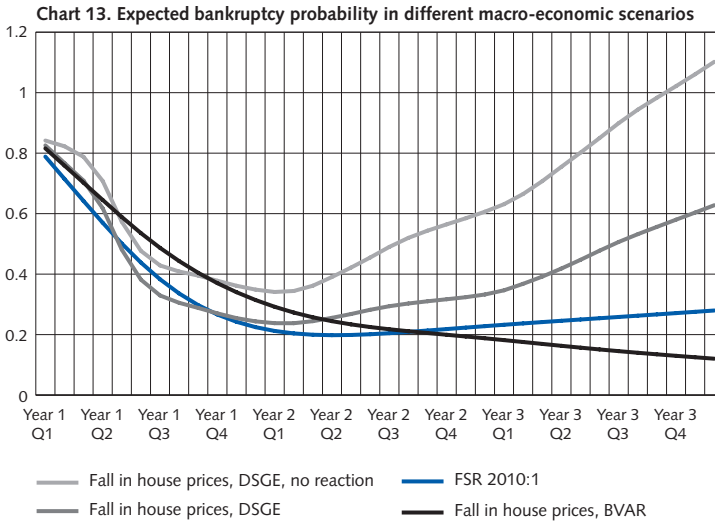


Chart 13 would indicate that the development of expected bankruptcy in the various scenarios differs. For the scenarios taken from the equilibrium model, the probability of bankruptcy is larger than in the main scenario in Financial Stability 2010:1 (FSR 10:1). The macro scenario that comes from the BVAR model, on the other hand, presents a probability of bankruptcy that is higher than the main scenario during the first half of the observed period and lower than the main scenario during the second half of the period. The reason why the bankruptcy probability is lower at the end of the period is the strong response in the short rate in this model. Despite falling industrial production, company costs fall as a result of interest rate reductions to such an extent that the net effect of the bankruptcy probability is lower than in the main scenario.

Table 5. Credit losses in different macro-economic scenarios, SEK billion

	YEAR 1	YEAR 2	YEAR 3	TOTAL
FSR 10:1	3.4	3.3	3.2	9.9
BVAR, table 4a	4.9	2.8	1.4	9.2
DSGE, table 4b	3.6	4.7	7.1	15.5
DSGE, table 4c	5.2	8.7	12.6	26.5

Table 5 shows that the credit losses caused by the banks' lending to Swedish companies are mainly due to the macro-economic development that takes place in the wake of a fall in house prices. If house prices fall, the credit losses will increase more as the real economy falls, particularly if there is only a limited monetary policy reaction.

As a whole the results from the calculations above indicate that a fall in house prices could definitely affect the financial stability of the banking sector, but not to such an extent that it would threaten capital adequacy.

Although the analysis above indicates that a fall in house prices is not expected to affect financial stability through credit losses, it is important to remember that there are other channels through which a fall in house prices can affect financial stability. One of these channels is the banks' financing (see above).

Historic links are not always representative of future links

The analysis above is based on the assumption of linear effects and the assumption of a general effect on the creditworthiness of the companies. The approach is therefore of a macro-economic nature and not specific to any sector. One possible risk is, for example, that real estate companies could be affected more than other companies, which would therefore cause higher credit losses than expected. The model analysis is also completely dependent on historic links continuing to remain, which may not be the case in the future and could therefore be an uncertainty factor.

Conclusions

This report investigates the extent to which a fall in house prices can affect financial stability through banks financing their lending through covered bonds and the banks' credit losses from lending to companies. The conclusion is that the creditworthiness of covered bonds should not be under threat if house prices were to fall. However, the banks' costs and access to financing could be affected despite the good credit quality of the covered bonds; for example, investors could be less willing to buy Swedish covered bonds if house prices started to fall unexpectedly. This could then lead to higher mortgage rates, which could also have a negative impact on house prices. In terms of credit losses, the main conclusion is that the macro-economic development that takes place when house prices fall is a key factor for credit losses. An analysis of the credit losses in a macro-economic scenario, where monetary policy can react to a fall in house prices, shows that there would not be any major impact on credit losses in the banking sector. Although a different macro-economic development could cause large credit losses, this would probably not threaten the banks' capital adequacy either. The effect of the banks' financing and their credit losses are assessed as being the most probable channels through which a fall in house prices could affect financial stability. There are of course other channels that could have a more general effect on the economy as a whole. A strong fall in house prices would, for example, result in a drop in the mobility of the workforce if households had loan-to-value ratios of more than 100 per cent.

References

- Sellin, Peter (2009), "The central banks' extraordinary measures during the financial crisis", Economic commentaries no. 9, 2009, Sveriges Riksbank.
- Åsberg Sommar, Per, Shahnazarian, Hovick (2009) Interdependencies between Expected Default Frequency and the Macro Economy, International Journal of Central Banking, 5:3, page 83-110.
- Sveriges Riksbank (2010), "Financial Stability 2010:1", www.riksbank.se.

■ Insolvent mortgage borrowers – a comparison between the USA and Sweden

TOM ANDERSSON AND SOFIA LINDH*

In this article, we provide a description of how the regulations in the USA and in Sweden work when a mortgage borrower becomes insolvent. We also include a comprehensive discussion about the extent to which these rules could provide an explanation for the differences in loan-loss levels in mortgage lending in both countries. Comparisons show that the legal possibilities for a household to discharge itself from the obligation to pay its mortgage loan are greater in the USA than in Sweden. This is due primarily to the fact that borrowers in the USA can in certain cases give up or sell the property without any risk of being left with a residual debt. No such rules or loan terms exist in Sweden. Another important factor is the difference between the insolvency frameworks. The rules in the USA imply that lenders do not always have as much to gain from an insolvency procedure as Swedish lenders. The economic risks of a fall in prices on the housing market in the USA is therefore borne to a large extent by the lenders. In Sweden, it may be said that the opposite is the case.

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Introduction

In both the Swedish crisis in the 1990s and the latest global financial crisis, Swedish credit institutions' losses on mortgage lending were very limited. This is in stark contrast to the situation in the USA, where banks' and other financial institutions' severe losses on mortgage loans were themselves the very origin of the current crisis. The difference in loan-loss levels in both countries can be explained by a series of different legal, structural and economic factors. For example, it is likely that the US model, in which a large number of mortgage loans are securitised and sold, has had a negative effect on prudence in granting loans as well as the management of problem credits. Another explanation, which is often heard in the Swedish debate, is that US households have significantly greater possibilities than Swedish households of discharging themselves from the obligation to repay their debts if they get into payment difficulties and that the risks would therefore be greater for banks lending to households in the USA.

In this article, we provide a more detailed description of how the US and the Swedish regulations work when a mortgage borrower becomes insolvent. We also include a comprehensive discussion about the extent to which these rules *could provide* an explanation for the differences in loan-loss levels in mortgage lending in both countries. However, it is important to point out that this discussion only revolves around how the rules work and is not based on any empirical analysis. We are unable to comment in more detail in this article on the extent to which the rules themselves are an actual explanation for the level of the banks' loan losses.

The system in the USA

It should be pointed out to begin with that it is not possible to speak of a uniform set of insolvency regulations in the USA. The rights and obligations of lenders and borrowers in an insolvency situation may vary considerably from state to state. There are, however, several basic elements that are common to all states. The description provided below is therefore a general description of the typical procedure in a situation where a household is unable or unwilling to meet its mortgage payments.

When a household in the USA is unable to meet its payments on a mortgage loan, the lender can instigate a foreclosure process. The aim for the lender is to minimise its losses on the loan. The borrower, on the other hand, can take a number of alternative courses to avoid foreclosure. The borrower can, for example, try to negotiate with the lender on a temporary easing of the loan terms, for instance by obtaining a respite from amortisation or a reduction in the interest rate. If the lender is unwilling to negotiate, the borrower can attempt to delay or prevent foreclosure by filing for personal bankruptcy. However, if the borrower do not consider that it

is worth the trouble to fight to keep its home, he may, on his own initiative or in agreement with the lender, sell or transfer ownership of the property. In certain cases, the borrowers can thereby become free from their debts, even if those debts exceed the value of the property.

FORECLOSURE – THE LENDER’S OPTION

Foreclosure gives the lender the legal right to take possession over and sell the collateral provided for a mortgage if the borrower fails to make interest and amortisation payments under the contract. There are two main types of foreclosure procedures: *foreclosure by judicial sale* and *foreclosure by power of sale*¹. A foreclosure by judicial sale means that the property is sold under the supervision of a court. The proceeds from the sale go firstly to the lender that granted the mortgage loan. Secondly, the proceeds go to other lenders that have taken the residential property as collateral and lastly they go to the borrower himself. Foreclosure by judicial sale is an available option in all states and required in many. A foreclosure by power of sale means instead that the lender has a right to carry out the sale without court supervision. The proceeds from the sale follow the same order of priority as in a sale supervised by a court^{2,3}.

The foreclosure procedure is instigated by the lender and is normally started approximately three to six months after the first missed payment. The way in which foreclosure is managed varies greatly from state to state. The mortgage contract usually contains provisions on when a lender is entitled to instigate a foreclosure procedure. How long it then takes to sell the property also differs from state to state and may also depend on the situation on the housing market. Under normal market conditions, the process usually takes a couple of months. However, in a disadvantageous market situation, it can take a significantly longer time.

If the proceeds from the sale do not cover the loan and the lender’s expenses, i.e. if a residual debt arises, most states grant the lender the right to lay claim on the borrower’s other assets by pursuing a so-called *deficiency judgement*. However, even if this right exists, it is uncommon for lenders to file such a claim. This is largely due to the fact that there are seldom any other assets to lay claim on, either because the borrower simply lacks assets of any value or because the existing assets are pledged as collateral for other loans or covered by exemptions in bankruptcy law and cannot therefore be sold (see the section below on personal bankruptcy). Even if a deficiency judgement is permitted, in some states it can still not be pursued for

1 Two less common forms consist of *strict foreclosure* and *foreclosure by entry and possession*.

2 In most states, the borrower is also granted a right to repurchase (*right of redemption*), which means that the borrower has the right to repurchase the foreclosed property until it has been made subject to forced sale. In some federal states, the right of redemption continues to exist even after the property has been sold.

3 Li (2009).

certain types of mortgage loans. The state law may require that these – and other types of loans – must be *non-recourse*. This means that the lender can only require payment from the assets pledged as collateral for the loan.⁴

The financial risk of a fall in house prices is therefore largely borne by the lender. The lender cannot file a claim against the mortgage borrower for a residual debt if the mortgage loan is non-recourse or if state laws do not permit deficiency judgements. And in other cases the lender has little or perhaps nothing to gain by trying to collect a residual debt either because no assets exist or because any assets that do exist are pledged as collateral for other loans or are exempted from distraint under bankruptcy law.

THE BORROWER'S OPTIONS

If the borrower is concerned that a foreclosure may be instigated or when the lender has *de facto* given notice that it intends to start a foreclosure process, the borrower has a number of different options to attempt to avoid this happening.

Making missed payments

In several states the borrower has a certain period of time in which to make previously missed payments after the lender has given notice of foreclosure. However, that presupposes that the borrower has sufficient money to catch up with missed payments and additional charges. In the states where the borrower does not have such a right, the lender can cancel (*accelerate*) the loan or proceed with foreclosure as soon as the borrower falls behind with the payments.⁵

Renegotiation of loans

Another option is for the borrower and the lender to attempt to reach an agreement on the terms of the loan. It may be in the lender's interest to allow certain relief in the terms because a foreclosure is a costly process to go through. Foreclosure can also result in considerable losses for the lender, particularly if the value of the property has fallen since the loan was granted. An agreement can include everything from a temporary respite on interest and amortisation payments to lower interest rates or write-downs. One further option for the borrower is to attempt to obtain a loan with more favourable terms and use this to pay off the old loan.⁶

Despite the fact that seeking an agreement with the borrower would often be a cheaper solution for the lender, most insolvency cases still end with foreclosure. One explanation for this is that loans are often managed by a so-called service

4 Elias (2009).

5 See www.hud.gov and Elias (2009).

6 See www.hud.gov and Elias (2009) and also Adelino et al., (2009).

companies and not by the actual lender⁷. In general, these service companies have weak incentives to renegotiate the loan since they do not 'own' the loan themselves and therefore are not affected by any losses resulting from a foreclosure.⁸ Another explanation is that the lender simply calculates that it would cost less to let the house go to foreclosure than to renegotiate the loan.⁹

In February 2009, the US government introduced the *Making Home Affordable Program* to make it easier for insolvent mortgage borrowers to renegotiate or refinance their mortgage loans. The aim is to reduce the number of foreclosures and help stabilise the US residential property market. The programme offers some financial relief for the service companies in return for adjusting borrowers' interest payments for a limited period.¹⁰

Personal bankruptcy

A last resort for an insolvent borrower who wishes to attempt to avoid or delay foreclosure is to file for personal bankruptcy. There are two types of bankruptcy procedure applicable to private individuals. These are governed at federal level in chapters 7 and 13 of the U.S. Bankruptcy Code. A common feature of both procedures is that foreclosure processes and other types of collection actions from lenders are automatically stayed as soon as an application for bankruptcy is submitted. This stay can only be lifted by a federal court.¹¹

When a borrower files for bankruptcy under *chapter 7*, the debts are paid off by liquidation of the borrower's assets. Debts which are not covered by the liquidated assets are written off. However, certain assets are exempt from inclusion in the bankruptcy. One central exemption is the so-called "*homestead exemption*"¹², which *can* protect the borrower from losing his home in the event of personal bankruptcy. If the amount exempted is larger than the borrower's equity in the residential property, the administrator in bankruptcy cannot sell the property to pay off any debts that the borrower may have *in addition to* the mortgage loan. In this way, the property and the mortgage can be kept outside the bankruptcy. A write-off of the remaining debts can enable the borrower to regain the ability to pay interest and amortisation on the mortgage. Because it is possible that the borrower may regain his ability to pay when other debts have been written off, personal

7 Mortgage loans are managed by service companies and not by the lenders themselves because loans are securitised to a large extent.

8 See Thomson (2009).

9 See Adelino et al., (2009).

10 See www.makinghomeaffordable.gov.

11 An individual must fulfill certain criteria to be granted bankruptcy. These criteria have become more stringent in recent times, which has made it more difficult for bankruptcy to be granted.

12 The proportion of the value of the property exempt in the event of liquidation varies from state to state. In most states, the exemption applies up to a certain limit, but in some states the exemption applies to the entire property.

bankruptcy according to this procedure can be favourable for the lender granting the mortgage. However, if the borrower still will be unable to meet the payments on the mortgage a foreclosure procedure will follow.¹³

Personal bankruptcy under *chapter 13* means, instead, that the borrower may keep its assets. At the same time, he must allocate all his income to repay his debts in accordance with a repayment plan, although with certain deductions for living expenses. The borrower, or his representative, submits a proposed repayment plan to a bankruptcy court. If the court approves the repayment plan, payments will take place over a certain period, normally three or five years. If the repayment plan is fulfilled, most of the borrower's debts are written off. However, specific rules apply to mortgage loans. The payment on these loans cannot be adjusted in the repayment plan, but must instead take place according to the original loan terms. The loan is generally not written off after the repayment plan has expired. The aim of this special treatment is to ensure that the borrowers are given a chance to service their mortgages and keep their homes by obtaining relief on other types of debts. This kind of bankruptcy can also be favourable to the mortgage lender because the relief obtained by the borrower on his other debts means that he is in a better position to pay the mortgage. If, despite the bankruptcy, the borrower still are unable to service his loans during the repayment plan period, the court can dismiss the bankruptcy. As a consequence, the court can instead decide on bankruptcy through liquidation (chapter 7). In this case there is a considerable risk that the borrower may lose his home through foreclosure.¹⁴

Despite the fact that personal bankruptcy according to both procedures can make it easier for a borrower to pay his mortgage and keep his home, a large proportion of these cases still end up with foreclosure. This is because the borrower often fails to meet his payments to the lender even after bankruptcy. The lender also loses income since the payments are stayed during the bankruptcy procedure, while there is also a risk that maintenance of the property will not be kept up during the bankruptcy process, which will lead to a reduction in value.¹⁵

It should also be pointed out that even though a personal bankruptcy can in several respects be favourable for the borrower, it also leads to a number of negative consequences. Besides the fact that it can lead to a person losing his home, it also leads to a poorer credit score for the borrower. This means, first and foremost, that it becomes more difficult and more expensive to obtain credit in future. However, it can also affect such things as the possibility of renting accommodation or getting a job.

13 Li (2009), Ström & Zackrisson (2006), see also www.uscourts.gov.

14 Li (2009), Ström & Zackrisson (2006), see also www.uscourts.gov.

15 Li (2009)

Giving up the property

In the options discussed above, the borrower's aim may be to prevent or delay foreclosure in order to carry on living in the home. A household which, for financial or other reasons, is unable or unwilling to carry on living in the home has several options for divesting themselves of the property.

One option is for the borrower to simply abandon the property and deliberately allow it to proceed to foreclosure. This can be a financially advantageous strategy if the mortgage is non-recourse as the lender then cannot file a claim for any residual debts that remain after the property is sold. The borrower can then, in practice, leave the property and thus be discharged from his mortgage loan even if the sale fails to cover the full amount of the loan. However, the borrower will be liable to pay income tax on the amount that he thus avoids paying. The borrower cannot obtain a discharge in this way from other types of loans, for example unsecured loans and mortgage loans that are not non-recourse.¹⁶

The borrower can also seek voluntary agreement with the lender on how the property is to be divested. A first alternative, a so-called *short sale*, is when the lender allows the borrower to sell the property at a lower value than the loan and any residual debts are then written off. This can be an advantageous option for borrowers who do not have any chance of having their residual debts written off, for example if they do not have a non-recourse loan. A second alternative is for the lender and the borrower to sign a so-called *deed in lieu of foreclosure*. This means that the borrower hand over the ownership of the property to the lender. The difference between this option and the option described above in which the borrower relinquishes ownership by abandoning the property is that in this case this is done in consensus with the lender.¹⁷

In all of these cases, the lender suffers loan losses when the property is sold at a lower value than the size of the mortgage loan. As far as the borrower is concerned, there are also a number of negative implications in addition to the fact that the home is lost. Regardless of the form in which the property is divested, it will, for example, lead to a poorer credit score for the borrower. And, as pointed out above, this will mean that the borrower has less chance of obtaining loans in future and may also experience difficulties getting a job. As already stated, the borrower may also be obliged to pay tax on the debts written off.

The system in Sweden

When a Swedish household has a problem with payments, the lender is able to institute a distraint process similar to the US foreclosure procedure. In order to

¹⁶ See www.hud.gov, Elias (2009).

¹⁷ Elias (2009), see also www.freddiemac.com and www.hud.gov.

avoid distraint, the borrower's options consist of meeting the payments missed or attempting to come to an arrangement with the lender. However, an arrangement presupposes that the lender can be persuaded that it has more to gain by this than if the property is sold, which may be particularly difficult if the value of property is greater than the loan. Unlike the US system, there is no possibility for borrowers to make use of the Swedish insolvency rules to prevent foreclosure.

With regard to the borrower's possibilities of being discharged from his debts if the property is worth less than the mortgage loan, his only option, besides seeking an agreement with the lender, is to apply for so-called *skuldsanering* (debt restructuring). However, in most cases this can only be done after the property and other assets have been sold, either on the borrower's own initiative or through distraint and forced sale. In Sweden there are no rules corresponding to the rules often existing in the USA (requirements that a loan must be non-recourse or lack of rights to pursue a deficiency judgement) which forbid or prevent lenders from filing further claims after the property has been sold. Neither do the same generous exemption rules exist in insolvency law for private individuals to protect the borrower from having other assets distrained in order to repay any residual debt.

THE LENDER'S OPTIONS

If a borrower is over one month late with two or more payments or if the unpaid debts exceed a certain proportion of the sum owed, the Swedish Consumer Credit Act gives the lender the right to cancel the loan and file a claim for repayment of the entire loan amount plus accrued interest. However, reminders and demands for payment will have been sent out before an institution cancels a loan. Since the borrower can be invoiced quarterly and because the unpaid sums must amount to a certain proportion of the loan, it can take more than six months from the first missed payment before the bank is able to cancel the loan. The bank therefore enters into discussions with the borrower in order to bring about some form of arrangement to enable cancellation to be avoided.

If the borrower fails to fulfil the demand for repayment after the loan has been cancelled, the lender can apply for a payment injunction from Kronofogdemyndigheten (the Swedish Enforcement Authority). The borrower is then informed about the payment injunction. Discussions between the lender and the borrower can continue even though the case has been referred to the Enforcement Authority. If the market value of the residential property exceeds the loan amount, the bank often attempts to reach an agreement with the borrower regarding sale on the market. Provided that the payment injunction has not been contested or withdrawn (for example if the bank and borrower reach an agreement), a decision is made to issue a distraint order against the residential

property. The lender then has two months to apply for an executive sale of the property, after which the distraint order expires^{18,19}

At an executive sale, the residential property is sold and the proceeds from the sale is distributed in accordance with an established order of priority between, first, the parties with a lien on the property and, second, parties without liens. The costs for the executive sale shall in principle always be covered before the creditors are paid.²⁰

If the sale does not cover the bank's claims, the borrower has a residual debt. This debt remains with the bank until it is paid or written off. If the mortgage lender has not requested a distraint order for the residential property, it can receive a distraint order for the borrowers other assets as long as this does not occur in competition with other lenders. If there are other lenders, the mortgage lenders first reference is to the lien on the residential property. Often, the lender's claim is so large that only the residential property is sufficient to cover the claim. But, if a residual debt remains after the residential property is sold, the lender can compete with other creditors for the borrower's other distrained assets.²¹

In Sweden, distraint and executive sale can only be carried out by the Enforcement Authority. There is no possibility for the lender, as in some US federal states, to sell the property on its own initiative (foreclosure by power of sale).

4 000 applications for distraint of cooperative housing and properties were received in 2010. Approximately a quarter of these were sold at executive auction.²² In most cases, the borrower and the lender thus reached an agreement on an alternative solution to avoid distraint.

THE BORROWER'S OPTIONS

The primary option for a borrower who is unable to meet his payments on a loan is to try to get some form of agreement with the bank. If this is not possible, the process described above begins. If this ends in distraint and executive sale, leaving the borrower with a residual debt, the borrower – if he still cannot get an agreement with the bank – can apply for debt restructuring with the Enforcement Authority.

18 The borrower's obligation to pay, however, does not expire and, as a result of the decision, the lender can apply for the distraint of both the residential and other property.

19 www.kronofogden.se, see also SOU 2008:82.

20 www.kronofogden.se.

21 The rule for residential properties and tenant-owned apartments differs slightly since tenant-owned apartments are defined as personal property. For example, there is an exception in the Swedish Debt Enforcement Code that says that a tenant-owned apartment shall not be distrained if the apartment's value is unreasonable or if the apartment should be kept in respect of the needs of the borrower (see Chapter 5, section 1 of the Swedish Debt Enforcement Code). There is no similar rule for residential properties.

22 According to statistics from the Swedish Enforcement Authority.

Voluntary arrangement

An insolvent borrower can contact the bank to try to negotiate an arrangement. The aim is to reduce the burden of the loan to enable the borrower to get back on his feet. Such an agreement with the bank can involve improved terms through the adjustment of interest or repayments, for example.²³ Discussions concerning an agreement can continue even when the mortgage loan has been cancelled by the bank. As stated above, the bank would prefer to find a solution because that often means a lower loan loss.

Debt restructuring

The idea of debt restructuring is that the borrower pays off all or part of his debt according to a specific repayment plan and the debt is then written off. Debt restructuring is governed in the Swedish Debt Restructuring Act and is intended for debtors who are so indebted that they are unable to pay their debts in the foreseeable future. The procedure builds on the same principle as chapter 13 of the US bankruptcy regulations (see above). However, one important difference in the countries' rules is that a Swedish borrower cannot apply for debt restructuring in order to have his non-housing-related debts written off in order to obtain a better chance of service his mortgage loan and thereby keeping his home. The primary rule during a debt restructuring is that assets that are not considered to be necessary for the indebted person shall be sold before a debt restructuring can occur. However, there are exceptions. The indebted person could, for example, be allowed to keep a property that has a small positive equity. The mortgage then becomes excluded from the debt restructuring process and the indebted person may also reserve some of his income for servicing the mortgage. If the property has a negative equity and it is considered reasonable that the indebted person shall continue to live there during the debt restructuring, the amount of the mortgage that corresponds to the appreciated value of the property is exempt and the rest is restructured.²⁴

If debt restructuring is decided on, the borrower must pay off his debt according to a specific repayment plan. The period for paying off the debt is normally five years. There is no floor or ceiling for the size of the repayments and they can be established at everything from zero kronor upwards. However, the aim is that the person subject to the debt restructuring should live at subsistence level during the repayment period and that all income over that level should go to paying off debts. When the five-year period has expired, all the borrower's debts are written off.²⁵

²³ See www.konsumentverket.se.

²⁴ See www.kronofogden.se and the Swedish Debt Restructuring Act and SOU 2008:82.

²⁵ See the Swedish Debt Restructuring Act and SOU 2008:82.

At this stage, the bank also writes off any remaining parts of the debt. According to statistics from the Swedish Enforcement Authority, just over one third of debt restructurings lead to zero arrangements, in other words the borrower does not need to pay anything at all during the restructuring period. There is therefore an incentive for the lender to attempt to avoid debt restructuring and instead write down the loan and agree on a payment plan for the customer. The borrower is then obliged to pay off the remaining part of the loan. Such a solution often generates more income for the bank than debt restructuring.

Private individuals can in principle only be granted debt restructuring once during their lifetime²⁶, unlike in the USA where there may be a possibility of obtaining debt restructuring under chapter 13 more than once²⁷. Approximately 4,000 applications for debt restructuring were approved in Sweden in 2009. A mortgage loan formed the basis of the debt problem in 16 per cent of the cases.²⁸

Before the Debt Restructuring Act was passed in 1994 it was substantially more difficult for private individuals to have their debts written off. At that time, an insolvent debtor could apply for personal bankruptcy, but in order to have his debts written off he was forced to reach a composition settlement with the lender²⁹, which means that the lender writes down a certain part of the debt.

PERSONAL BANKRUPTCY – AN OPTION FOR BOTH PARTIES

Private individuals can also be subject to personal bankruptcy. An application for personal bankruptcy can be submitted by both the owner of the debt and the indebted person. In a bankruptcy, the borrower's property is sold off and the proceeds are used to pay the debts in accordance with the Swedish Rights of Priority Act³⁰. Debts that are not paid off remain outstanding. During the bankruptcy, the borrower loses the right of disposal over his or her assets. Instead, a trustee has the right of disposal over the borrower's assets and sells them to repay the lender and other creditors. If a property is sold in conjunction with a bankruptcy, the lender may be paid for its claim to the extent the lien is covered by the sale price. If the claim is not covered by the sale price, the lender is referred to any eventual payments to unprioritised creditors. The claim that remains after the bankruptcy is valid as long as it is not prescribed.³¹

26 www.kronofogden.se and SOU 2004:81.

27 Bankruptcy Abuse Prevention and Consumer Protection Act.

28 According to statistics from the Swedish Enforcement Authority.

29 Government bill 1993/94:123 Debt Restructuring Act.

30 The regulations set out in section 6 of the Swedish Rights of Priority Act apply to both distraint and bankruptcy.

31 See Ström & Zackrisson (2006) and Bankruptcy Act (1987:672).

Conclusions

The above comparison shows that the possibilities for a household to discharge itself from the obligation to pay its mortgage loan are greater in the USA than in Sweden. This is due primarily to the fact that in certain cases it may be legally possible for borrowers in the USA, unlike in Sweden, to give up or sell the property without any risk of being left with a residual debt. No such rules or loan terms exist in Sweden. The only possibility for a Swedish borrower to be discharged from a residual debt is to reach a debt write-down agreement with the bank or undergo a debt restructuring process. Another important factor is the difference in the US and the Swedish insolvency frameworks for private individuals. The rules for personal bankruptcy in the USA imply that the banks – even though they have a legal right to file a claim for a residual debt – do not always have as much to gain in an insolvency procedure. In addition, the US bankruptcy rules, unlike the Swedish Debt Restructuring Act, can be used to prevent or delay foreclosure. In Sweden, debt restructuring is, in principle, only granted after all assets have been sold off.

From the point of view of the borrower, this means that the financial risks involved in getting into debt are lower in the USA than in Sweden, something which is probably also important for the amount of credit households demand. All other things being equal, it is reasonable to suppose that households in the USA are willing to take on a greater burden of debt than Swedish households. And higher indebtedness on the part of households also means greater loan risks in the lending institutions.

Overall, this means that the risks involved in mortgage lending are greater in the USA than in Sweden. The possibilities of evading liability for any residual debts means that the financial risks involved in a fall in prices on the residential property market are largely borne by the lenders. In Sweden, it may be said that the situation is the opposite. The inability to leave a residential property that is burdened with a loss and get rid of the debt, in combination with relatively strict insolvency rules, mean that the risk of a fall in prices is largely borne by households themselves.

References

- Adelino, M. Gerardi, K. Willen, P., (2009). "Why Don't Lenders Renegotiate More Home Mortgages? Redefaults, Self-Cures, and Securitization", Federal Reserve Bank of Boston, *Public Policy Discussion Papers* No. 09-4.
- Bankruptcy Abuse Prevention and Consumer Act (BAPCPA) of 2005
- Bankruptcy Act (1987:672)
- Consumer Credit Act (2010:1846)
- Debt Restructuring Act (2006:548)
- Debt Restructuring Act (2006:548) Government bill 1993/94:123 Debt Restructuring Act
- Elias, Stephen. (2009) "The Foreclosure Survival Guide", Nolo, 2nd Edition, September 2009
- Li, W. (2009)."Residential Housing And Personal Bankruptcy" Federal Reserve Bank of Philadelphia, *Business Review* , Q2 2009.
- Making Home Affordable Program, www.makinghomeaffordable.gov
- SOU 2004:81, Ett steg mot enklare och snabbare skuldsaneringsförfarande (A step towards simpler and faster debt restructuring procedure)
- SOU 2008:82, Vägen tillbaka för överskuldssatta (The Road Back for the Indebted)
- Ström, M. Zackrisson, M. (2006) "Rätten att misslyckas. En studie av insolvenslagstiftningar i EU och USA samt dess konsekvenser för entreprenörskap", Institutet för tillväxtpolitiska studier.
- Swedish Consumer Agency, www.konsumentverket.se
- Swedish Debt Enforcement Code (1981:774)
- Swedish Enforcement Authority, www.kronofogden.se
- Swedish Rights of Priority Act (1970:979)
- Thomson, E., (2009). "Why Servicers Foreclose When They Should Modify and Other Puzzles of Servicer Behaviour", National Consumer Law Center Inc, October 2009.
- United States Courts, www.uscourts.gov
- US Department of Housing and Urban Development, www.hud.gov

