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How is the economy affected by macroprudential policy measures?

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The risks linked to the high and growing indebtedness in the Swedish household sector have led to a discussion of various possible measures to limit household sector demand for loans. This Economic Commentary provides a general description of the economic effects of a selection of macroprudential policy measures used for this purpose. The benefits from the measures are that they reduce the risk of, and alleviate the effects of, future crises. But the measures may also have macroeconomic costs in the form of lower demand and growth in the short term. When introducing a measure, the long-term benefits must be weighed against the short-term costs.

Put simply, macroprudential policy can be said to have two main tasks. Firstly, it should strengthen the resilience of the financial system as a whole. Secondly, it should counteract the build-up of financial imbalances that could later lead to costly adjustments. Financial imbalances often concern exaggerated upturns in credit granting and indebtedness, which when sentiment shifts may lead to a credit crunch and a large and prolonged fall in demand.

An important question for macroprudential policy is what measure it may be suitable to take in a particular situation. One therefore often focuses on analysing what effect the different measures will have on the quantities they are intended to influence, such as credit granting and indebtedness. At the same time, the measures taken also have an effect on the rest of the economy and they can have both positive and negative effects. It is therefore important to study the total effect of macroprudential policy measures on credit granting, indebtedness and the economy as a whole. Although macroprudential policy is a new policy area and there is as yet relatively limited knowledge of its effects on the economy, there are a number of quantitative analyses to take notice of.

This Economic Commentary provides a general description of the economic effects that a selection of macroprudential policy measures may have. The focus here is on the measures aimed at limiting household debt, as these are more relevant for the current situation in Sweden.

The purpose of the measures is to reduce the risk of crises and dampen the effects of crises when they occur...

Research and historical experiences have shown that a high and growing level of indebtedness can increase the risks to the macro economy, by both the probability of, and effects from, future crises increasing. [2] Firstly, a strong growth in household indebtedness can increase the probability of financial crises and falling house prices, and secondly, it can increase households' sensitivity to, for instance, falls in house prices when there is a high level of indebtedness. Moreover, experience shows that a low capital adequacy ratio in the banking sector risks leading to loan losses causing greater solvency problems in the banks and to a credit crunch when the banks become undercapitalised, which in turn can have negative effects on activity in the economy.[3]

There are several reasons why households and banks do not fully take into account the risks that their decisions to borrow and lend entail for the economy as a whole, where both market frictions and behavioural factors may have significance. This entails a market failure, in that indebtedness among banks and households risks being

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2. See Emanuelsson et al. (2015) for a more in-depth review of the consequences of indebtedness for the macro economy.
3. See, for instance, Sveriges Riksbank (2011).

higher than is justified from an economic perspective.[4] There may thus be reason to use regulations to ensure that indebtedness in the banks and in the household sector approaches a more desirable level.

… but they can also entail costs

The so-called life-cycle hypothesis assumes that incomes are unevenly distributed throughout individuals' life cycles so that income at the beginning of their professional life is relatively low, but is expected to grow over time and then decline again when they retire. Individuals also wish to even out their consumption over their life-cycles. It is then optimal to consume more than their income when they are young by borrowing and correspondingly to consume less than their income later in life to repay their loans. If a loan limit is introduced, it reduces the individuals' possibilities to consume more than their income at a young age. Thus, their consumption will be lower in the short term. Even if individuals are able to consume more later in life, according to the life-cycle hypothesis, a limit on loans will entail a welfare loss as the individuals are unable to even out consumption as desired.

Although macroprudential policy measures entail economic gains, they may also entail costs. Chart 1 illustrates the economic effects of macroprudential policy measures.

Effects on the economy of macroprudential policy measures

Macroprudential policy measures can mainly counteract the build-up of financial imbalances by influencing the supply of credit or the demand for credit. Examples of measures that mainly affect the supply of credit include different types of capital requirement, such as general capital requirements, countercyclical capital buffers or floors for risk weights.[5] The purpose of these measures is to strengthen the resilience of the banking system; the reduction in financial imbalances from the effects on the credit supply should be regarded as a positive side-effect.

Measures that primarily affect the demand for credit include various limits on how much households are allowed to borrow, such as mortgage caps, debt-to-income limits, amortisation requirements and limits in the discretionary income calculations that are used by the banks to assess a borrower's ability to repay in connection with a loan decision. Changes in tax regulations can also be used for this purpose, in the form of changes in tax deductions for mortgage interest payments, for instance.[6] Several international studies have shown that tools to limit loans are effective with regard to influencing housing prices and household indebtedness.[7]

A general challenge to manage when implementing macroprudential policy measures is the risk that stricter regulation in one sector will mean that operations move to other sectors not covered by the regulation. One example of this is that while stricter capital requirements for banks reduce the banks' lending, this is to some extent compensated by an increase in lending by credit institutions not covered by the capital requirements. This is often referred to as "leakage" associated with the regulations.[8]

Capital requirements have minor effects on household indebtedness and the macro economy

The Riksbank presented, in an article in the Monetary Policy Report published in July 2014, an analysis of the macroeconomic effects of the proposals for tougher capital adequacy requirements for the major Swedish banks put forward by

4. For example, banks have incentives for low capital adequacy ratios, as they assume that they will be "saved by the state" in some way or another if they suffer solvency problems. See Sveriges Riksbank (2011). When households make decisions on mortgages they probably do not either fully take into account the fact that selling housing during an economic downturn will contribute to a fall in prices if many households sell at the same time. See Finocchiaro et al. (2011).
5. For a more detailed description of various macroprudential policy tools, see for instance Nordh Berntsson and Molin (2012).
6. For a general description of potential tools to reduce the risks linked to household indebtedness, see Andersson et al. (2011) and Sveriges Riksbank (2015). See Alfelt et al. (2015) for a description of the debt-to-income limit as a macroprudential policy measure.
7. See, for instance, Kuttner and Shim (2013).
8. See Aiyar et al. (2012).

Finansinspektionen (Sweden's financial supervisory authority) in May 2014. This analysis indicated that the effects on GDP, lending rates and lending volumes would be relatively small, taken as a whole. The conclusion was that the primary effect of the stricter capital requirements would be stronger resilience in the Swedish banking system, which was the main purpose of the measures. But if the purpose of the macroprudential policy measures is to have a more tangible effect on household indebtedness, it may be more effective to instead introduce measures that are directly aimed at households' demand for loans.[9]

Loan-limiting measures have greater effects on household indebtedness...

The mortgage cap, the debt-to-income limit, the amortisation requirements and the limits to discretionary income calculations are some possible tools for influencing demand for mortgages and which may thus have a more direct effect on lending to households than capital adequacy requirements.

The Riksbank analysed the effects of an amortisation requirement in autumn 2014.[10] The analysis assumed a main scenario based on the Riksbank's forecast for household indebtedness in September 2014. The assessment was that the introduction of amortisation requirements would result in a lower indebtedness than in the main scenario in varying degrees, depending on how the requirements were formulated. This is illustrated in Chart 2. The green line shows how Finansinspektionen's proposal for amortisation requirements was assessed as affecting household indebtedness. According to these calculations, household indebtedness would in the long run be between 10 and 15 percentage points lower than in the main scenario. However, these results are uncertain. A recently-published study shows that the effects of Finansinspektionen's amortisation requirements on household indebtedness could actually be much smaller than this. The results depend on a number of factors, for instance, that households can choose to extend other loans to fund amortisation payments on mortgages.[11] However, in this Commentary we have used the results of the Riksbank's analysis in autumn 2014 as a basis.

Debt-to-income limits, mortgage caps, discretionary income limits and amortisation requirements are all different types of loan limits and the aggregate effects can therefore be analysed in a similar manner. [12] Chart 2 illustrates the effects of the various measures on household indebtedness in relation to the main scenario. The size of the effects is mainly connected to how many of the new borrowers are affected by the measures, and partly to the size of the actual measure.

The effects of the various macroprudential policy measures on the aggregated debt ratio is based on a random sample of data on new borrowers' indebtedness from Finansinspektionen's Mortgage Survey 2014. For each measure, a calculation is made of how much each individual borrower needs to reduce the size of their loan to manage the requirement. If, for instance, the mortgage cap is cut to 80 per cent, all borrowers in the random sample with a loan-to-value ratio above 80 per cent will need to borrow less to manage the requirement. A debt-to-income limit or a minimum level for the discretionary income calculation will function in the same way, that is, the loan amount will be limited for new borrowers. It is assumed in the calculations that 5 per cent of all borrowers in the stock take on new loans (and are therefore affected by the measure) every year. This means that the effects on household indebtedness occur gradually.[13] Chart 2 shows that both a debt-to-income limit of 600 per cent and a discretionary income limit of SEK 3,000 have largely the same effect on household indebtedness as Finansinspektionen's proposal regarding amortisation requirements, while reducing the mortgage cap from 85 to 80 per cent would have half as large an effect. On the other hand, a debt-to-income limit of 400 per cent would have a much greater effect on household indebtedness.

9. See Sveriges Riksbank (2014a).
10. See Sveriges Riksbank (2014b).
11. See Hull (2015).
12. See also Andersson et al. (2011).
13. Let us assume that there are 100 borrowers in the economy. After a period of time, 5 per cent of these have taken on new loans, which means that 95 borrowers have not renewed their loans. After two periods, 5 per cent of the 95 remaining borrowers have renewed their loans, and so on.

A reduced or abolished tax deduction for interest paid will work differently from the above-mentioned measures, as it is a tool that affects households' interest expenditure after tax rather than their possibility to take on loans. If a change in the tax deduction is formulated so that all borrowers are covered instead of only new ones, a substantial reduction in or abolition of the deduction would probably have a relatively substantial dampening effect on household indebtedness. It is assumed in the calculation that households will in the long run reduce their debts so that interest expenditure remains unchanged after the measure. With regard to the other measures that only apply to new borrowers, the effect on total indebtedness arises through households choosing to borrow less when taking on new loans. But a reduction in the tax deduction that is aimed at all borrowers cannot immediately affect the size of existing loans. It is therefore assumed when calculating the effects of a reduced tax deduction that household will gradually reduce their debts. This means that the effect of a lower tax deduction would also be gradual, despite the fact that this affects all borrowers.

Chart 2 shows that a change in the tax deduction could affect household indebtedness to a greater extent than most of the measures discussed earlier. Today, however, when interest rates in general are low, the effects on household indebtedness of a reduction in the tax deduction are less than in a situation where interest rates are high. One should also bear in mind that the general government revenue will increase if the tax deductions are reduced. The increased revenue can be used to increase expenditure or for tax cuts, which would reduce the effect on indebtedness. If the higher interest expenditure is compensated by, for instance, lower income tax, households have less need to reduce their loans. However, the following does not take into account such changes in tax revenue, which means that the effects described can be regarded as an upper limit.

At the same time, it is important to remember that the effects on total household indebtedness are not the only possible benefits from the measures. There are many indications that the distribution of debt has considerable significance for the macroeconomic costs linked to a financial crisis. Several empirical studies indicate, for instance, that households with a high level of indebtedness reduced their consumption much more than other households in connection with the most recent financial crises. This means that they contributed to a large degree to the downturn in total household demand.[14] This indicates that tools aimed at limiting the maximum indebtedness among households, such as the mortgage cap and the debt-to-loan limit, fulfil an important function, even if the effects on total indebtedness are in most cases relatively limited.

… and on the macro economy

The purpose of limiting the possibilities to borrow is to reduce the risk of a crisis occurring and to alleviate its effects – this is the benefit of the measures. But costs for the macro economy also arise in the short term. One can understand these effects by imagining an economy that consists of borrowers who are directly affected by the measures and savers who are not directly affected by the measures; these households are affected in different ways. *For the households who borrow* and who are directly affected, consumption will decline during a transitional period when the opportunities to borrow are limited, as discussed earlier.[15] But in the long term, a lower indebtedness means that interest expenditure will be lower and the scope for consumption will increase. *For the households who save* and who are not directly affected by the measures, the effects on consumption will not be as great in either the short or long term.[16]

14. See Emanuelsson et al. (2015).
15. One can imagine that household consumption consists of both consumption of housing and other consumption. When introducing a loan limitation, total consumption will decline in the short term for the loan-limited households, where part of the adjustment is by means of their consumption of housing declining (they "buy cheaper housing") and part is through a decline in their other consumption. This contributes to a fall in both housing prices and demand for consumption in the economy.
16. Their demand for housing will increase when prices fall, which in itself will slow down the fall in housing prices somewhat. However, the fall in prices will also enable increased housing consumption at the expense of other forms of consumption, and their other consumption could therefore fall somewhat in both the short and long term.

All in all, loan limits of various kinds mean that total saving in the economy must increase in the short term, which will push down consumption and thus also GDP growth. Loan limits can also dampen housing prices by reducing the demand for housing. In the long term, the effects on the macroeconomy will be significantly weaker, because, for instance, interest costs decrease when indebtedness falls, which gives borrowing households scope to increase their consumption. However, the size of these effects is an empirical question.

But how great are the macroeconomic effects?

On the assumption that Finansinspektionen's proposal for amortisation requirements will affect household indebtedness, the Riksbank assessed that the maximum effect on household consumption and GDP would arise at around three years ahead. [17] During this period, growth in household consumption and GDP were expected to be on average around 0.2 and 0.1 percentage points lower respectively. This means that the level of household consumption and GDP would decline by at most around 0.7 per cent and 0.3 per cent respectively.

At the same time, the analysis showed that the effects on housing prices are a key issue in the assessment of the macroeconomic effects. It is assumed in several of the models used that housing prices are fundamentally valued, and the effects of the amortisation requirement on housing prices were therefore relatively small.[18] An alternative analysis was therefore presented, with larger effects on housing prices, where annual growth in both household consumption and GDP was expected to decline by around 0.3 percentage points on average over a three-year period (see Table 1). This means in terms of levels that household consumption would decline by around 1 per cent and GDP by around 0.8 per cent (see Table 2). The long-term effects on household consumption and GDP were assessed to be very minor. The effect of around 0.3 percentage points a year on GDP growth during a short period can be related to it being around 2 per cent a year over long periods. However, it must be emphasised that these estimates are highly uncertain, for example with regard to the development of housing prices. [19]

As discussed earlier, the aggregate effects hide large differences between groups of households, where those affected by the measure adapt their consumption much more than those not affected by it. This means that even if the total decline in consumption is relatively limited, some household may need to adapt their consumption substantially.

We saw earlier that the debt-to-income limit, the mortgage cap, the discretionary income calculation limits and the amortisation requirements entail a decline in households' debt ratios in relation to a main scenario without these measures (see Chart 2). Based on the analysis of amortisation requirements, it is therefore possible to make a rough estimate of the macroeconomic effects from the perspective of how much household indebtedness declines, taking into account large and small effects on housing prices. We have assumed in our analysis that the relationship between the effect on household indebtedness and the effect on the macro economy are the same as for Finansinspektionen's proposal for amortisation requirements. If, for instance, the effect of a measure on household indebtedness is twice as large as the effect of the amortisation requirement, then the macroeconomic effect of the measure is also assumed to be twice as large. As the measures influence household indebtedness over around the same time horizon as the amortisation requirement, we have also assumed that the macroeconomic effects arise over the same time horizon as for the amortisation requirement. Tables 1 and 2 summarise these estimates, where the interval illustrates the effects of both small and large effects on housing prices.

As shown earlier, a debt-to-income limit of 600 per cent and a discretionary income limit of SEK 3,000 have largely the same effect on household indebtedness as Finansinspektionen's proposal for an amortisation requirement. The effects on household consumption and GDP are therefore estimated to be roughly the same.

17. See Sveriges Riksbank (2014b).
18. If housing prices instead reflect irrational expectations and "bubble behaviour", changes in conditions could cause large adjustments in prices.
19. See Sveriges Riksbank (2014b).

We also saw that cutting the mortgage cap from 85 to 80 per cent would have roughly half as great an effect on household indebtedness, which would correspond to a decline in consumption of on average just over 0.1 percentage points per year over a three-year period, while the effect on GDP would be even less (see Chart 2 and Table 1). This means that the level of household consumption and GDP would fall at most by less than 0.5 percentage points (see Table 2). As a debt-to-income limit of 400 per cent would have a much greater effect on household indebtedness, the effects on the macro economy would correspondingly also be greater – over a three-year period average growth in household consumption would fall by around 0.8 percentage points a year, while GDP growth would fall by around 0.7 percentage points a year (see Table 1). In terms of levels, consumption would decline by at most around 2.5 per cent, while GDP would decline by at most around 2 per cent (see Table 2).

As mentioned earlier, a change in the tax deduction differs from the other credit-limiting measures, and the effect on both indebtedness and the macro economy is very uncertain. Having said that, we can make some simplified assumptions to gain an idea of the size of the effects. To begin with, we disregard the fact that tax revenue would increase if the tax deduction is reduced and that households could therefore be compensated through, for instance, lower income tax. We also assume that the relationship between the effect on household indebtedness and the macro economy is the same as for the other measures, and that the effects on the macro economy arise within the same time horizon. Under these assumptions, the effect of the measure on household indebtedness could be relatively large, as could the macroeconomic effects (see Chart 2 and Tables 1 and 2). Completely abolishing the tax deduction could then mean that growth in household consumption and GDP was around 1 percentage point lower during a three-year period. This is equivalent to the level of household consumption declining by at most around 4 per cent and GDP by at most around 3 per cent.

Balancing benefits and costs

When deciding whether to introduce a measure, it is thus necessary to weigh the benefits, in the form of a reduced probability of a crisis and less sensitivity to shocks in the longer run, against the costs, in the form of lower demand and GDP in the short run. The Riksbank has previously analysed how monetary policy – in addition to stabilising inflation and the real economy in the short run – can take into account the effects of the interest rate on household indebtedness and thereby the risks to the macro economy in the longer run. Essentially, the main purpose is to attain the inflation target in a long-term perspective, by reducing the risk of, and alleviating the effects of, a future crisis.[20]

With regard to macroprudential policy, the balance is similar in a way, as it concerns weighing short-term costs against long-term benefits (see Chart 1). But in another way it is the reverse; as the main purpose of macroprudential policy can be said to be managing risks in the longer run. The effect on the macro economy in the short term must be taken into account, but it is not the main objective.

Debt-to-income limits, mortgage caps, limits in the discretionary income calculations and amortisation requirements are examples of measures that can contribute to dampening the development of household indebtedness. They only affect new borrowers. There are many indications that the macroeconomic costs, in the form of lower consumption and growth, are therefore limited. An adjustment of the tax deduction is a potentially more powerful tool for dealing with household indebtedness, as it can affect all borrowers, depending on how it is formulated. But the macroeconomic costs can thus also become greater.

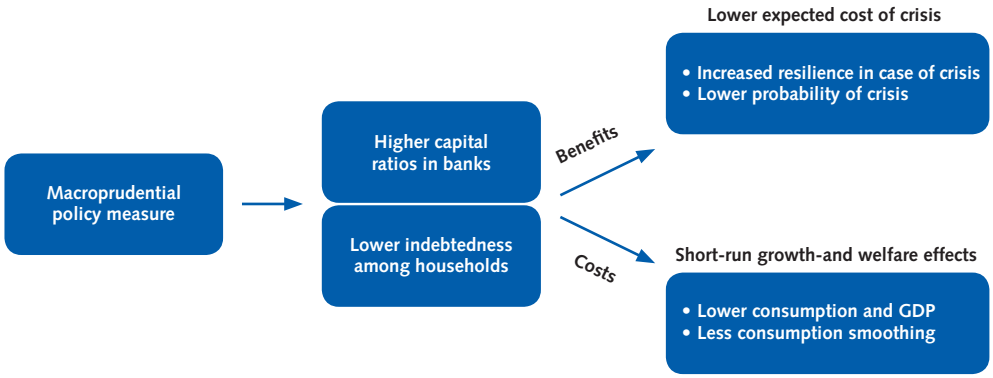
Ultimately, the lower expected cost of future crises must be weighed against the lower expected macroeconomic costs in the short term. The experiences of the most recent

20. See Sveriges Riksbank (2013).

financial crisis clearly point to the need of taking preventing action to a greater extent than before to limit the expected cost of future crises. Macroprudential policy has an important role to play in this context. But in a decision on which measure should be implemented and to what extent, it is important to take into account the overall effects on the macro economy.

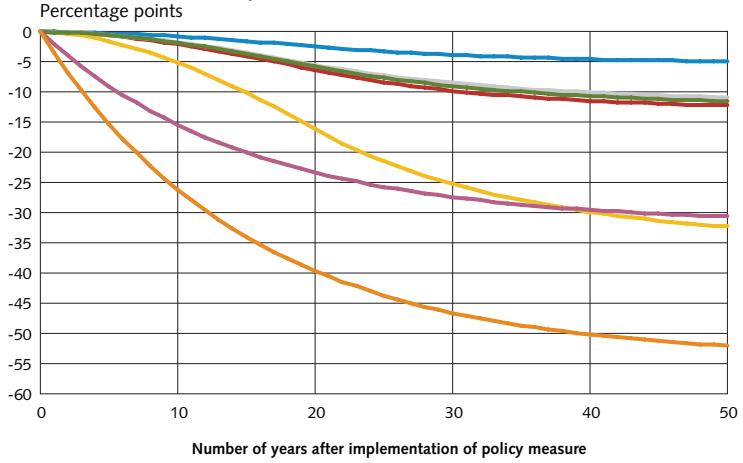
Charts and tables

Chart 1. Illustration of the economic effects of macroprudential policy measures



Source: The Riksbank

Chart 2. The effects of various macroprudential policy measures on the aggregate debt-to-income ratio compared with the main scenario
Percentage points



Source: The Riksbank

Table 1. Summary of the effects of different measures on growth in household consumption and GDP

MEASURE	AVERAGE GROWTH EFFECT ON GDP OVER THREE YEARS, DEVIATION FROM THE MAIN SCENARIO PERCENTAGE POINTS PER YEAR°	AVERAGE GROWTH EFFECT ON CONSUMPTION OVER THREE YEARS, DEVIATION FROM THE MAIN SCENARIO PERCENTAGE POINTS PER YEAR°
Finansinspektionen's amortisation requirement	0.1-0.3	0.2-0.3
Lower mortgage cap, 80 per cent	0.0-0.1	0.1-0.1*
Debt-to-income limit 400 per cent	0.2-0.7	0.6-0.8
Debt-to-income limit 600 per cent	0.1-0.2	0.2-0.3
Discretionary income calculation, minimum level SEK 3,000	0.1-0.2	0.2-0.3
Lower tax deduction, 15 per cent	0.2-0.6	0.6-0.8
Abolished tax deduction	0.4-1.1	0.9-1.3

° refers to the average decline in quarterly growth, calculated at an annual rate.
* indicates that the effects only differ to the second decimal point.

Note. The macroeconomic effects are based on a number of different macroeconomic models in which the effects of the measures are compared with a main scenario in which no measures are implemented. The table shows the maximum negative effects achieved. For all of the effects on the macro economy the results are presented in the form of an interval, where the lower limit relates to small effects on housing prices and the upper limit refers to large effects on housing prices, in line with the results of the Riksbank's analysis of the effects of amortisation requirements. See Sveriges Riksbank (2014b).
Source: The Riksbank

Table 2. Summary of the effects of different measures on the level of household consumption and GDP

MEASURE	MAXIMUM EFFECT ON GDP LEVEL, DEVIATION FROM THE MAIN SCENARIO PER CENT	MAXIMUM EFFECT ON CONSUMPTION LEVEL, DEVIATION FROM THE MAIN SCENARIO PER CENT
Finansinspektionen's amortisation requirement	0.3-0.8	0.7-1.0
Lower mortgage cap, 80 per cent	0.1-0.3	0.3-0.4
Debt-to-income limit 400 per cent	0.7-2.0	1.7-2.5
Debt-to-income limit 600 per cent	0.3-0.7	0.6-0.8
Discretionary income calculation, minimum level SEK 3,000	0.3-0.7	0.6-0.9
Lower tax deduction, 15 per cent	0.7-1.9	1.7-2.5
Abolished tax deduction	1.2-3.2	2.8-4.0

Note. The macroeconomic effects are based on a number of different macroeconomic models in which the effects of the measures are compared with a main scenario in which no measures are implemented. The table shows the maximum negative effects achieved. For all of the effects on the macro economy the results are presented in the form of an interval, where the lower limit relates to small effects on housing prices and the upper limit refers to large effects on housing prices, in line with the results of the Riksbank's analysis of the effects of amortisation requirements. See Sveriges Riksbank (2014b).
Source: The Riksbank

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