

## The CPI will increase more rapidly than the CPIF over the next few years

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In April 2011, the annual rate of increase in the CPI was 3.3 per cent, while the rate of increase in the CPIF was only 1.8 per cent. The difference between the two measures, that is 1.5 percentage points, is due to the fact that the CPI is directly affected by changes in mortgage rates, while these are held constant when the CPIF is calculated. The repo-rate increases predicted by the Riksbank are therefore expected to lead to inflation measured in terms of the CPI being higher than inflation measured in terms of the CPIF in the years immediately ahead, and particularly in 2011. In the longer term, when the effects of the repo-rate changes have petered out, the two measures will coincide. This Economic Commentary describes the difference between the CPI and the CPIF and how changes in mortgage rates affect inflation measured using the CPI.

The target for monetary policy is that CPI inflation should be 2 per cent

Inflation can be measured in different ways. One key question for monetary policy is therefore which price index the inflation target should refer to. The Riksbank discusses this in the booklet "Monetary Policy in Sweden" and notes there that the inflation target should be tied to a broad price index that represents common purchases and that is familiar to the public.<sup>1</sup> According to "Monetary Policy in Sweden", this is the most important reason why the Riksbank has formulated its inflation target in terms of the consumer price index (the CPI), which Statistics Sweden calculates and reports every month. In addition, the CPI statistics are of good quality, are not normally revised and are published soon after the end of the month.

However, although the inflation target is formulated in terms of the CPI, other measures of inflation may also be useful when attempting to analyse and forecast the development of inflation (See Hansson, Johansson and Palmqvist, 2008). This is because the CPI is often affected by factors that usually have only temporary effects on inflation, and which the Riksbank should not therefore react to. Mortgage rates are one such factor and have a direct impact on the CPI when the Riksbank changes the repo rate. It should also be noted that this impact is "in the wrong direction" given that the Riksbank normally raises the repo rate to fend off a future increase in inflation, while the direct impact on mortgage costs instead to further increases the CPI. The Riksbank therefore launched the CPIF (the CPI with a fixed mortgage rate) in 2008. All mortgage costs are held constant in the CPIF, and this measure of inflation therefore does not have the "peculiar" characteristic that it increases when the Riksbank raises the repo rate. In order get a better understanding of the difference between the two measures we can study how mortgage costs are calculated in the CPI.

1. "Monetary Policy in Sweden" can be downloaded as a PDF file from the Riksbank's website: [www.riksbank.se](http://www.riksbank.se)

This Economic Commentary describes the difference between two measures of inflation: the CPI and the CPIF. These two measures are identical in all but one respect. Changes in mortgage rates have a direct impact on inflation measured in terms of the CPI. In the CPIF, mortgage rates are held constant. When the financial crisis began, the Riksbank cut the repo rate substantially. Now it is expected that the Riksbank will continue to raise the repo rate to more normal levels during the forecast period. As this will lead to rising mortgage rates, inflation measured in terms of the CPI will exceed the target. However, the rate of increase in the CPIF will be lower and close to 2 per cent during the forecast period. In the long term, the two measures will coincide, but as fixed mortgage rates are also increasing this is not expected to happen until around 2016. The expectation that the difference between the CPI and the CPIF will be unusually large, above all during 2011, relates to the fact that mortgage rates are rising rapidly from a low level.

## Mortgage rates at different maturities affect the CPI but not the CPIF

The index for mortgage costs constitutes approximately 5 per cent of both the CPI and the CPIF and aims to measure the households' capital costs for living in owner-occupied, single-family dwellings. The index is affected by changes in mortgage rates but also by changes in the value of the properties the mortgages relate to, in accordance with the following simple formula:

$$\text{Mortgage cost index} = \text{Interest rate index} * \text{Capital stock index}$$

The capital stock index measures the purchase price of the properties covered by the mortgages. A substantial increase in property prices over a long period of time will, via the effects on the capital stock index, help to push up the mortgage cost index and thus both the CPI and the CPIF.<sup>2</sup>

Changes in property prices thus have the same effect on the CPI and the CPIF. The difference lies in how the interest rate index is calculated in the two measures. In the CPIF, the interest rate index is held constant. In the CPI, the interest rate index measures the development of the average rate for variable mortgages (last mortgage loans at banks and variable mortgages at mortgage institutes) and fixed mortgages at terms of 1, 2, 3, 5 and 8 years. **The rates for fixed mortgages are calculated as a moving average over time.**<sup>3</sup> The interest rate index is then calculated as a weighed mean value of the six mortgage-rate types included, where the weights constitute each type's proportion of total mortgage costs in the year prior to the index year. The weight of the variable mortgage rate, for example, is therefore affected by both the level of the variable rate and how large a proportion of the households' mortgages have been taken out at a variable rate. The more mortgages that are taken out at a variable rate and the higher the variable rate is in relation to other rates, the higher the weight given to variable rates in the interest rate index.

The weight for variable rates fell in 2009 and remained low in 2010, even though an increasing proportion of the households took out mortgages at a variable rate. This was because the variable mortgage rate fell more than the fixed rates in 2008 and 2009. The low rate meant that the proportion of expenses for variable mortgages fell. The variable mortgage rate increased in 2010 and as a result the weight for the variable mortgage rate almost doubled from 2010 to 2011. In 2011, variable-rate mortgages have had a weight of almost 60 per cent in the interest rate index.<sup>4</sup>

## Changes in the repo rate are important to movements in the CPI

There is a strong link between the Riksbank's repo rate and the variable mortgage rates. Changes in the repo rate therefore have a direct impact on the CPI, but not on the CPIF, via the effects on the interest rate index. However, the variable mortgage rates are not only affected by changes in the repo rate, other factors also play a role. For example, the turbulence on the financial markets in recent years has led to a situation in which the variable mortgage rates have increased more than the repo rate.

As mentioned above, the fixed rates in the remaining part of the interest rate index are represented in the calculations as a moving average over time. A change in the repo rate, to the extent that the fixed rates are also affected by this, will also affect the interest rate index in the CPI for a long time.

2. See the box "The rate of increase in the CPIX will be below the CPI for a long time" in the Monetary Policy Report published in July 2008.

3. The reason for this is that not all fixed mortgages are renewed every month. If a household fixed its five-year mortgage rate two years ago, then this household's five-year mortgage rate will be lower than the five-year rate another household will have to pay if it wishes to fix its rate for five years today. In order to capture the average five-year rate the households actually pay, the fixed rates are calculated as a moving average over the period for which they are fixed, i.e. 60 months in the case of five-year rates.

4. The weights for other mortgage types in 2011 are as follows: 1-year rate: 1.7 per cent, 2-year rate: 4.8 per cent, 3-year rate: 13.1 per cent, 5-year rate: 15.2 per cent and 8-year rate: 7.2 per cent.

## The level of the mortgage rates is significant

The link between a change in the mortgage rates and a change in the interest rate index also depends on the level of the mortgage rates. A change in mortgage rates has a greater effect the lower the level of the rates is. If the mortgage rate increases by 1 percentage point from 2 to 3 per cent, this will have a greater impact on the index than if it increases from 4 to 5 per cent.

Compare, for example, the repo-rate increases that were initiated in early 2006 with the situation in 2010 to 2012, as illustrated in Figure 1. In the first case, the repo rate was increased from 1.5 to 4.0 per cent over a period of two years. The change thus constituted an increase of over 160 per cent. This change had less of an impact on the interest rate index than is expected for the period from mid-2010 to mid-2012. In this two-year period, it is expected that the repo rate will be increased from 0.25 to 2.75, that is an increase of 1 000 per cent. Consequently, the interest rate index in the CPI will rise dramatically in the years immediately ahead. As the mortgage rates increase, each extra increase will be smaller as a percentage. The difference between the rate of increase in the CPI and the rate of increase in the CPIF will therefore be greater at the start of the forecast period than at the end.

## The rate of increase in the CPI and in the CPIF will coincide in the long term

As the only difference between the CPI and the CPIF is that mortgage rates are held constant in the CPIF, the rate of increase in the two measures will coincide when the effects of the repo-rate changes peter out. Given the current situation, however, it will take time for this to happen and it is not until 2016 that the two measures are expected to coincide again.

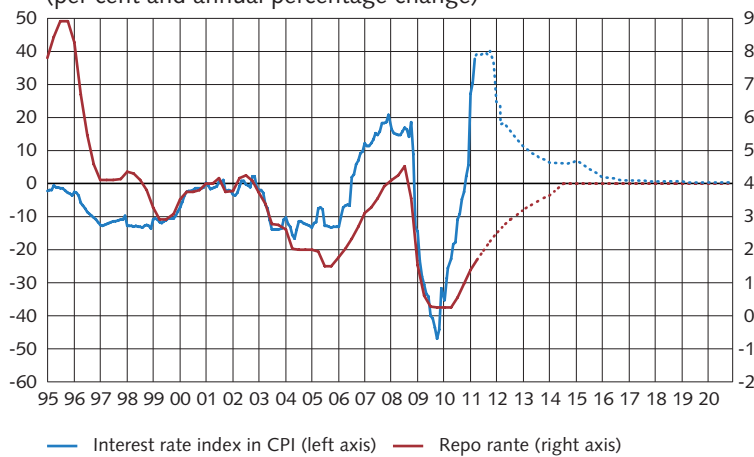
The fact that the rate of increase in the two measures will coincide in the long term is illustrated in Figure 2, which shows outcomes and forecasts for the CPI and the CPIF assuming that the repo rate will stabilise at 4 per cent and that CPIF inflation will stabilise at 2 per cent beyond the normal forecast horizon. The figure shows that it takes approximately three years after the series of repo-rate increases is ended for the rate of increase in the CPI and in the CPIF to coincide.<sup>5</sup> The reason it will take such a long time relates to the fact that fixed mortgage rates have also increased and are expected to continue increasing in pace with the Riksbank's repo-rate increases, at the same time as fixed rates will be included in the calculations as a moving average over time.

Mortgage rates have fluctuated significantly in recent years and are expected to continue doing so during the forecast period. During the initial phase of the financial crisis the repo rate was cut substantially, which led to falling mortgage rates. Now the Riksbank has begun to raise the repo rate again and it is expected that it will continue to raise the repo rate to more normal levels during the forecast period. This is in order to stabilise inflation close to the target of 2 per cent and to avoid resource utilisation being too high. As this will lead to rising mortgage rates, inflation measured in terms of the CPI will exceed the inflation target in the years ahead while the CPIF will be lower and approach 2 per cent during the forecast period. Eventually the rate of increase in the two measures will coincide, but as the fixed rates have increased, and are expected to continue doing so, this will take time and is not expected to happen until around 2016. The expectation that the difference between the CPI and the CPIF will be unusually large, above all in 2011, relates to the fact that mortgage rates have risen from a very low level.

5. See the article "The CPI and measures of underlying inflation" in Monetary Policy Report, October 2010.

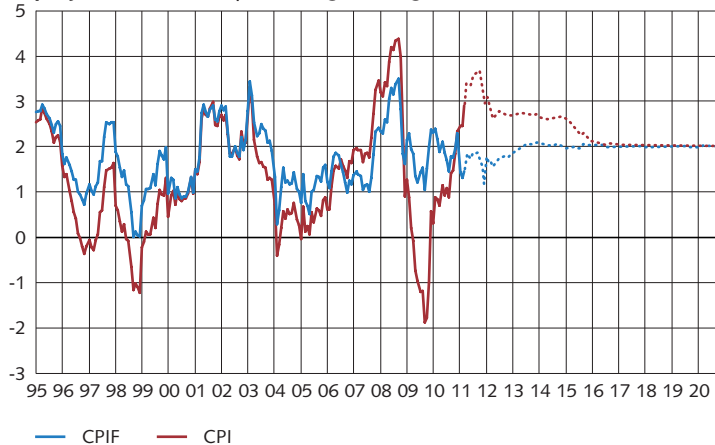
## Figures

**Figure 1. The repo rate and the interest rate index in the CPI, outcomes, forecasts and projection**  
(per cent and annual percentage change)



Note. The forecast is the forecast in the Monetary Policy Update of April 2011. Beyond the forecast horizon it is assumed that the repo rate will increase to 4 per cent and then remain at this level until 2020.  
Sources: Statistics Sweden and the Riksbank

**Figure 2. The CPI and the CPIF, outcomes, forecasts and projection** (annual percentage change)



Note. The forecast is the forecast in the Monetary Policy Update of April 2011. Beyond the forecast horizon it is assumed that the CPIF will increase by 2 per cent and that the repo rate will reach 4 per cent and then remain at this level until 2020.  
Sources: Statistics Sweden and the Riksbank

## References

Hansson, Jesper, Jesper Johansson and Stefan Palmqvist (2008), "Why do we need measures of underlying inflation?", *Economic Review* 2008:2, pp. 23-40, Sveriges Riksbank.