

ARTICLE – The CPIF and measures of underlying inflation

The Riksbank's target variable for monetary policy is inflation according to the CPIF, which means that monetary policy is adjusted so that CPIF inflation is around 2 per cent two to three years ahead. CPIF inflation can sometimes fluctuate up or down due to individual price movements. For example, rapidly rising energy prices contributed relatively substantially to CPIF inflation in 2018. On condition that the effect on the CPIF is temporary, such a change is not something to which monetary policy needs to react. The Riksbank calculates different measures of underlying inflation to obtain a picture of how much of the development in CPIF inflation is temporary and how much is persistent. Underlying inflation can be measured in many different ways, the common denominator being that all the measures exclude or reduce the significance of temporary price movements. According to the measures calculated by the Riksbank, the persistent component of inflation was slightly below 2 per cent in 2018.

Inflation in terms of the CPIF is the Riksbank's target variable

The Riksbank's goal is low and stable inflation. More specifically, the target is that the annual change in the consumer price index with a fixed interest rate (CPIF) shall be 2 per cent. When the Riksbank introduced the inflation target in 1993, the target was expressed in terms of the annual rate of change in the CPI, but in September 2017, the target variable for monetary policy was changed to the CPIF. The main reason for the change was to clarify the role played by the CPIF in recent years, as this price index had in practice been more important for the design of monetary policy than the CPI.⁵

When the Riksbank makes monetary policy more or less expansionary, it affects the economy and inflation via different channels. Some channels have a relatively rapid impact on inflation, but many of them take longer and most monetary policy effects on inflation occur with a time lag. Monetary policy is therefore based on forecasts of future developments. To achieve the inflation target, the Riksbank normally adjusts monetary policy so that CPIF inflation, according to the forecast, will be close to the target of 2 per cent a few years ahead.

The forecasts two to three years ahead show the persistent change in CPIF inflation

Inflation is normally defined as an increase in the general price level in the economy. A substantial change in an individual price is thus not the same as inflation when other prices increase at a normal rate. However, the *measures* used to estimate inflation, such as the CPIF, can be affected quite considerably by movements in individual prices. If, for

example, the prices of fruit and vegetables increases substantially due to poor harvests, it may affect and temporarily push up inflation measured in terms of the CPIF. On condition that the effect of the price increase is not permanent and does not have knock-on effects on other prices, the upturn in CPIF inflation is nothing that the Riksbank needs to offset with monetary policy.

For this reason, it is important that the Riksbank analyses inflation outcomes carefully in order to understand what is presently driving inflation and what it might mean for inflation going forward. If the assessment is that temporary factors are affecting CPIF inflation, this will be reflected in the forecasts that stretch a few years ahead. If the effects on CPIF inflation are temporary, they will normally not affect inflation in two to three years.

Measures of underlying inflation complement the forecasts for CPIF inflation

To create a general picture of how much of the development in the CPIF is temporary and how much is persistent, the Riksbank also calculates various measures of 'underlying' inflation. There is no clear-cut definition of the term underlying inflation and it can be measured in many different ways. The measures can roughly be divided into two groups.⁶

Certain measures of underlying inflation identify specific prices that have historically been driven by more temporary factors and remove these prices from the CPIF. Such measures are given particularly sharp focus when it is obvious that inflation outcomes have been affected by these individual prices, for example food or energy prices, and the intention is to illustrate what effect this has had on CPIF inflation.

⁵ See further the article "CPIF as target variable for monetary policy" in Monetary Policy Report September 2017.

⁶ More details on how the Riksbank calculates measures of core inflation can be found in the article "Why measures of core inflation?" in Monetary Policy Report October 2018 and in Johansson, M. Löf, O. Sigrist and O. Tysklind (2018), "Measures of core inflation in Sweden", *Economic Commentaries* No. 11. Sveriges Riksbank.

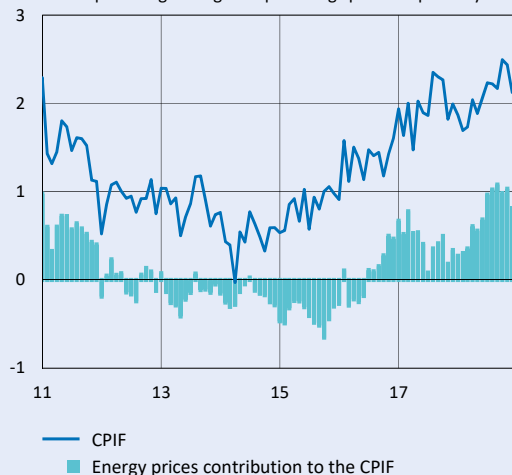
For other measures of underlying inflation, the basis is more neutral in that it is not determined in advance which prices are to be removed. Instead, statistical methods are used to identify prices in the CPIF that historically have varied quite considerably. These are then either removed from the CPIF or their significance is reduced when all prices are added together into an aggregate measure.

The intention is therefore that measures of underlying inflation should capture the persistent component of inflation at present, which can give a better picture of future inflation if current CPIF inflation is being affected by temporary factors. But it is important to point out that measures of underlying inflation are a complement to forecasts for CPIF inflation a few years ahead. It is the forecasts for CPIF inflation that the Executive Board of the Riksbank bases its monetary policy decisions on.

Energy prices made a major contribution to CPIF inflation in 2018

As mentioned previously, CPIF inflation in 2018 was affected quite considerably by developments in energy prices during the year. Over the course of the summer and autumn, the increase in electricity and fuel prices contributed in total about 1 percentage point to the outcome for CPIF inflation (see Figure 2:9). This situation differs considerably from the period 2012–2015, when energy prices contributed to holding back CPIF inflation for an unusually long period of time.

Figure 2:9. CPIF and contribution from energy prices
Annual percentage change and percentage points respectively



Note. The group 'energy prices' consists of fuel and electricity prices. The contribution of energy prices to the CPIF in the forecast is approximately equal to the annual percentage change in energy prices multiplied by their current weight in the CPIF.

Sources: Statistics Sweden and the Riksbank

Another way of illustrating the effect of energy prices on the CPIF is to study the underlying inflation measure 'CPIF excluding energy'. This gives a clearer picture of what CPIF inflation would have been without the contribution from

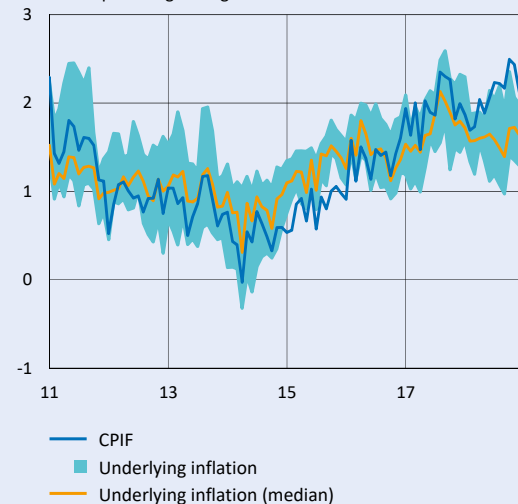
energy prices. On average for 2018, inflation in terms of the CPIF excluding energy was 1.4 per cent, compared with 2.1 per cent in terms of the CPIF.

The assessment made by the Riksbank in 2018 was that the most of increase in energy prices was temporary and that the contribution from energy prices to CPIF inflation would decrease in the period ahead. The oil price fell quite significantly towards the end of the year. The electricity price, which had been pushed up by the extremely hot and dry summer, remained on a high level but was expected to fall towards a more normal level in the spring of 2019 as the demand for electricity decreases and the supply of hydroelectric power increases.

Measures of underlying inflation indicate persistent inflation slightly below 2 per cent in 2018

Even though the contribution from energy prices to CPIF inflation was considerable in 2018, CPIF inflation was naturally also affected by other price components (see Chapter 1). As previously mentioned, the CPIF excluding energy prices is just one of several feasible measures of underlying inflation. Even though the contribution from energy prices was temporary, it is not obvious how much of the outcome for inflation in 2018 reflected temporary factors and how much reflected a more persistent development.

Figure 2:10. CPIF and measures of underlying inflation
Annual percentage change



Note. The field shows the highest and lowest outcomes among different measures of underlying inflation. The measures included are: CPIF excluding energy, CPIF excluding energy and perishables, CPIFPC, CPIFPV, Trim1, Trim85 and UND24. For an explanation of the measures, see the references in footnote 6.

Sources: Statistics Sweden and the Riksbank

Figure 2:10 shows CPIF inflation together with a field stretching from the lowest to the highest estimate of underlying inflation each month according to seven measures regularly calculated by the Riksbank.⁷ The figure illustrates that there can be a relatively large variation in the different

⁷ These measures are described in more detail in the references in footnote 6.

measures from one month to the next, but it is also clear that the persistent component of inflation in 2018 is generally estimated to be lower than CPIF inflation. The median of the measures fluctuated between 1.4 and 1.7 per cent during the year.

The different ways of calculating underlying inflation have various strengths and weaknesses and can work more or less effectively depending on various circumstances. But an evaluation of the measures has shown that two of them in particular fulfil a number of desirable criteria over time. One of these measures gives weights to CPIF components depending on how much they vary over time. The other calculates the common trend among CPIF components. In 2018, the average for these measures was 1.7 per cent and 1.6 per cent respectively.⁸ This is hence a slightly higher estimate of the persistent component of inflation than indicated by inflation in terms of the CPIF excluding energy, but also clearly lower than CPIF inflation for the year.

⁸ The two measures are called UND24 and CPIFFC.