Analysis

How well do inflation swaps reflect expected inflation?

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Inflation swaps are financial instruments used for the purpose of hedging against future inflation. Inflation expectations extracted from inflation swaps are often used as a measure of the market's inflation expectations, but the evolution of the swaps does not always correspond to actual changes in inflation expectations. When the market's expectations are assessed on the basis of inflation swaps, it is important to pay attention to the specific features of these agreements. Consequently, in assessing changes in short-term inflation expectations, forward inflation (e.g. annual inflation one year ahead) should be used rather than inflation swap rates.



Swap agreements to hedge against future inflation

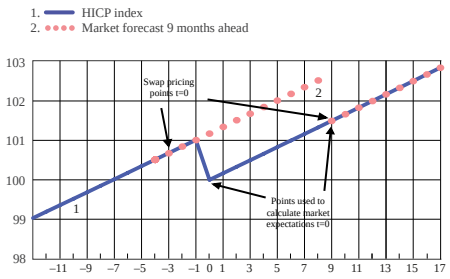
An inflation swap is a derivative subject to trading on the financial markets and can be used to

provide protection against uncertainty about future inflation. Euro area inflation swaps are linked to the Harmonised Index of Consumer Prices (HICP), compiled by Eurostat, excluding tobacco. The market's most actively traded swaps are zero-coupon inflation swaps, in which cash flows based on the agreement are paid in full when the agreement reaches maturity. One of the parties pays a pre-defined amount on the due date, whereas the other party's payment depends on the development of the inflation index during the life of the swap. This exchange of fixed for floating rates is the origin of the term swap.

The use of inflation swaps can be illustrated by looking at a situation where the parties involved have agreed at time *t* on an inflation swap with 12-month maturity (Chart 1). Party A pays a pre-defined amount that reflects expected annual inflation. The payment of party B is not pre-defined, but depends on actual inflation developments. The cash flow is determined by both HICP inflation with a lag of three months from the agreement date and HICP inflation with a lag of three months from maturity. Values with a lag of three months are used in order to have knowledge of final HICP values at agreement maturity. This type of an agreement can be entered into e.g. in a situation where A wants to hedge future earnings against inflation. The higher inflation is expected, the more A must pay for the swap agreement. The price of an inflation-linked swap thus depends on expected inflation.

Chart 1.

A one-off decline in the consumer price index triggers no decline in inflation expectations



Source: Bank of Finland.

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The price of an inflation swap may change while expectations remain unchanged

Below, we look at a situation where at time t=0 HICP inflation falls by 1% on the value of the previous period (Chart 2). During other periods, the annual rate of increase of the index is 2%. The red dots in the chart describe the market's annual inflation expectation 9 periods ahead. Even if there is an unexpected and one-time fall in the HICP, it does not affect market participants'

inflation expectations, which remain at a stable annual 2% inflation for 9 months ahead.

The price of an inflation swap at time t=0 is determined by HICP levels measured at times t-3 and t+9. If a direct line is drawn between the dots showing these times, its slope coefficient is smaller than before and thus the price of the inflation swap declines (Chart 3). The same holds true for inflation swaps entered into at time t=1 and t=2. At time t=3 the situation changes. The price of the swap is now determined by changes in HICP levels between times t=0 and t=12. Since both of these points in time are already on a new, lower path, the change between them is again consistent with 2% annual inflation. This technical decline in the price of inflation swaps and the price increase three months later are illustrated by the return back to the 2% level at time t=3 of the one-year swap (the blue line in Chart 3). Swaps with longer maturities move simultaneously with the one-year swap, but their movements moderate in a linear fashion relative to the horizon under review. Accordingly, the distorting impact of abrupt price changes is smaller on ten-year swaps than on swaps with shorter maturities.

Chart 2.

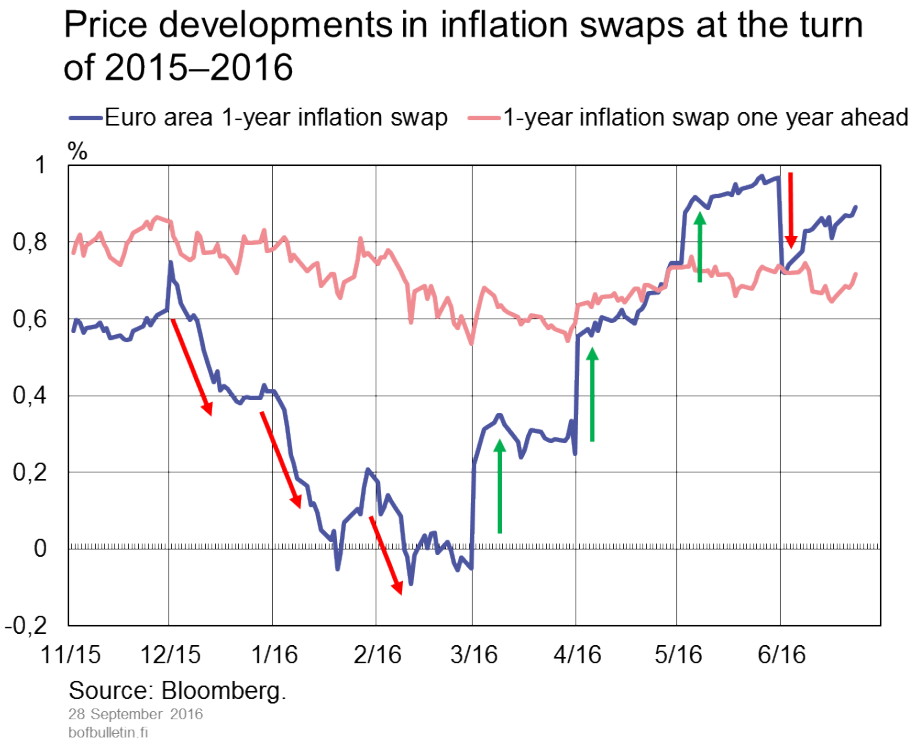
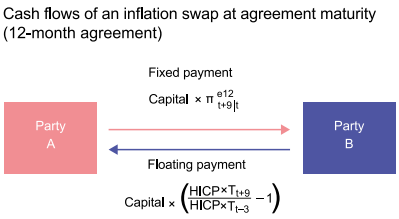


Chart 3.



Source: Bank of Finland.
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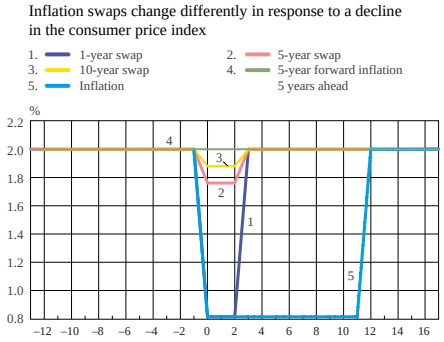
Market implied forward inflation (such as the following year's expected inflation one year ahead or the following five years' average inflation expectation five years ahead) typically used for measuring inflation expectations does not change as a result of a one-off change in the HICP level. Forward inflation thus reflects the evolution of the market's actual inflation expectations better than pure inflation swap rates do.

Unexpected, one-off shifts in HICP levels have recently become increasingly significant for the prices of inflation swaps, particularly amid large fluctuations in oil prices. This becomes apparent when examining the development of both one-year forward inflation one year ahead and one-year inflation swap rates over the period November 2015 to mid-June 2016 (Chart 4).

The sharp drop in the price of oil at the end of 2015 and the beginning of 2016 is reflected in the decline in the price of the one-year swap (red arrows in Chart 4[1]). These changes unwind in the form of a strong opposite movement (three upward green arrows in Chart 4) after three months on the first trading date of the month in March, April and May.

The last red downward arrow in the chart at the beginning of June 2016 reflects the timing of Easter so as to take place already in March this year. The pricing of one-year inflation swaps in June 2016 is based on changes in HICP inflation between March 2016 and March 2017. Given that inflation is normally higher at Easter and in 2017 Easter again falls in April as usual, the prices of inflation swaps entered into in June 2016 decline. By contrast, inflation expectations derived from forward rates (one-year forward one year ahead in Chart 4) remain relatively stable and provide a more reliable picture of the evolution of the market's inflation expectations.

Chart 4.



Premia also affect the price of hedging

In addition to technical transitions due to different seasonal effects and the structure of inflation swaps, the prices of inflation swaps are also affected by a number of factors called premia. For example, the ease of selling a swap on the markets (liquidity), the length of maturity or changes in the uncertainty related to inflation may impact the pricing of inflation swaps, whereby the price is no longer merely a reflection of the market's inflation expectations. If the premia are small, the price of a swap can be thought to reflect the market's expected inflation. It is, however, difficult to assess the size of the premia by reliable methods, while their magnitude may also vary over time.

Overall, inflation swaps offer a useful guide for analysing inflation expectations, but expectations derived from forward inflation rates provide a more reliable way of tracking developments in the market's inflation expectations. However, owing to volatility in the magnitude of premia embedded in them, forward inflation rates also fail to provide a fully explicit manner of accounting for market expectations.

Notes

1. In January, a particularly large seasonal component also pushed down inflation. ↑

Keywords

consumer prices, financial markets, inflation, inflation expectations