

Box 3

ESTIMATION OF CONSTANT-MATURITY INDEX-LINKED BOND YIELDS AND BREAK-EVEN INFLATION RATES FOR THE EURO AREA

Since the issuance of the first inflation-linked bond indexed to the euro area HICP (excluding tobacco) in 2001, the ECB has been monitoring the yields of such bonds, which measure (expected) real interest rates, as well as so-called break-even inflation rates which – being calculated as the yield differential between nominal and index-linked bonds – are an important indicator of market participants' inflation expectations.

This box introduces new complementary indicators for euro area break-even inflation rates and real interest rates based on the estimation of comparable zero-coupon yield curves for index-linked and conventional nominal bonds.¹ The estimation of zero-coupon break-even inflation rates and real yields offers two major advantages. First, it allows the calculation of time series of real yields and break-even inflation rates with constant maturity, for example a break-even inflation rate with always exactly ten years to maturity. By contrast, the break-even inflation rates calculated directly from observed yields of nominal and index-linked bonds refer to periods of time that are not constant but decline gradually with the residual maturity of the bonds used in their calculation. This may pose problems for the interpretation of developments in index-linked bond yields and break-even inflation rates, in particular over a long period of time. For example, changes in the maturity of bonds may lead to changes in break-even inflation rates even if inflation expectations remain constant. Second, the calculation of zero-coupon rates makes it possible to avoid potential distortions related to the different duration of the bonds used in the calculation of break-even inflation rates, distortions that stem from the differences in the cash-flow structure of index-linked and nominal bonds of similar maturity.²

A comparison of the new indicators of constant-maturity zero-coupon real yields and break-even inflation rates with standard real yields and break-even inflation rates – like the euro area break-even inflation rates reported in Chart 11 of the main text – suggests that, at least over the last two years or so, the measures of real rates and break-even inflation rates regularly reported so far seem to be rather good approximations of the preferable zero-coupon constant-maturity measures and are little biased by potential distortions related to duration mismatching.

A further advantage of the estimation of term structures of zero-coupon real rates and break-even inflation rates is the possibility of calculating implied forward rates at any horizon of interest, which is also constant over time. However, the lack of a sufficient number of index-linked bonds at short maturities in the euro area market at present calls for extreme caution when using such measures for horizons below three years, but reliable estimates of the market's real interest rate and inflation expectations over medium and long-term horizons can be constructed from available bonds. For example, one-year forward real rates and break-even

1 The term structures are estimated on the basis of the widely-used parametric approach proposed by Nelson and Siegel (1987) "Parsimonious Modeling of Yield Curves for U.S. Treasury Yields", *Journal of Business*, Vol. 60, pp. 473-489. This approach is motivated by the number of the available inflation-linked bonds in the euro area. Specifically, the estimates since mid-May 2005 have been based entirely on index-linked bonds with AAA ratings. Due to the lack of a sufficient number of AAA-rated bonds, backward series are estimated including also bonds rated only AA.

2 The duration is defined as the weighted average maturity of the bond's cash-flows, where the weights are the present values of each of the payments as a proportion of the total present value of all cash flows.

Chart A One-year implied forward real rates four and nine years ahead

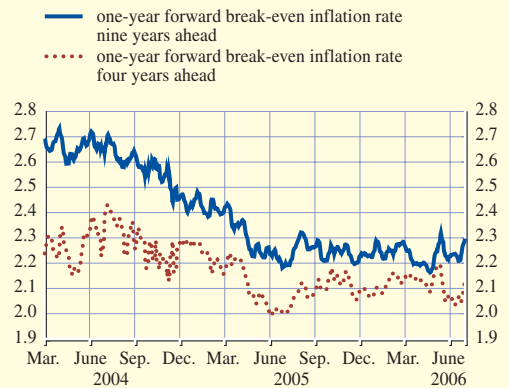
(percentages per annum; daily data)



Sources: Reuters and ECB calculations.

Chart B One-year implied forward break-even inflation rates four and nine years ahead

(percentages per annum; daily data)



Sources: Reuters and ECB calculations.

inflation rates four and nine years ahead (see Charts A and B) provide valuable information on developments in market expectations four and nine years ahead for monetary policy purposes.

Chart B, for example, suggests that euro area medium to long-term inflation expectations have remained broadly unchanged in the last three months, despite the increase in actual inflation and shorter-term inflation expectations indicators (see also Chart 11 in the main text). Moreover, from a somewhat longer perspective, forward break-even inflation rates declined sharply in the course of 2004 and early 2005, and remained rather stable thereafter.³ As regards real yields, the rise in medium to long-term index-linked bond yields since Autumn 2005 is also evident in Chart A.

³ For further information, see the article entitled “Measures of inflation expectations in the euro area” in this issue of the Monthly Bulletin.