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# Economic commentaries

## CPIXE, a new indicator of underlying inflation

*Einar W. Nordbø, Adviser, Norges Bank Monetary Policy*

# CPIXE, a new indicator of underlying inflation

By Einar W. Nordbø, Adviser, Norges Bank Monetary Policy

The operational target of monetary policy is annual consumer price inflation of approximately 2.5 per cent over time. In general, the direct effects on consumer prices resulting from changes in interest rates, taxes, excise duties and extraordinary temporary disturbances are not taken into account.

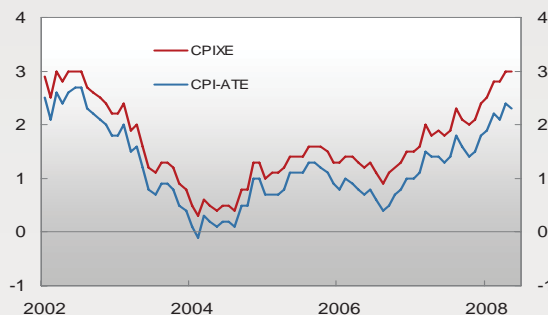
Indicators of underlying inflation seek to remove movements in consumer prices resulting from temporary disturbances. The CPIXE is a new indicator of underlying inflation. This commentary discusses the sensitivity of the new indicator to alternative assumptions about changes in energy prices ahead.

Since the end of the 1990s, energy prices have risen more rapidly than other prices, and as a result the CPI-ATE has underestimated the general rise in prices. This is a substantial weakness of the CPI-ATE as an indicator of underlying inflation. The CPIXE is a weighted average of the rise in the CPI-ATE and the rise in an estimated energy price trend in the CPI.<sup>1</sup> The CPIXE will therefore rise in pace with the CPI as long as the tax level is not substantially changed.

Developments in the CPIXE and the CPI-ATE since 2002 are shown in Chart 1. The twelve-month rise in the CPIXE has on average been as high as the twelve-month rise in the CPI in this period, but 0.4 percentage point higher than the twelve-month rise in the CPI-ATE. In May, the CPIXE was 3.0 per cent higher than in the same month the previous year, 0.7 percentage point higher than the twelve-month rise in the CPI-ATE.

<sup>1</sup> The new indicator is formally estimated as follows:  $\pi_{XE} = \pi_{AE}(1 - w_E) + \pi_E w_E$ .  $\pi_{XE}$  is the twelve-month rise in the new indicator,  $\pi_{AE}$  is the twelve-month rise in the CPI-ATE and  $\pi_E$  is the twelve-month rise in the energy price trend.  $w_E$  is energy products' weight in the CPI, currently between 8 and 9 per cent. The energy price trend is estimated using a Hodrick Prescott filter, with a standard smoothing parameter ( $\lambda=14400$ ). The trend is estimated on the basis of monthly figures for the level of historical developments in energy prices in the CPI (both electricity and petrol) up to end-May. Thereafter, the estimated energy prices underlying the projections in PPR 2/08 have been used. Energy price estimates are based on futures prices in the market for electricity and oil to end-2009. We apply an average of market prices on Nord Pool over the past ten trading days, up to and including 20 June. From 2010 we assume that energy prices rise in pace with other prices. Futures prices for 2010 and 2011 do not exhibit substantially different developments.

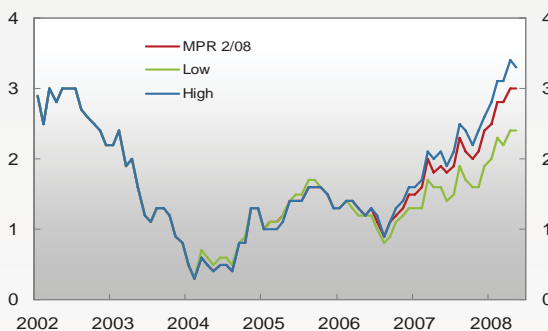
Chart 1 CPI-ATE<sup>1)</sup> and CPIXE<sup>2)</sup>, 12-month change. Per cent. January 2002 – May 2008



<sup>1)</sup> CPI adjusted for tax changes and excluding energy products.  
<sup>2)</sup> CPI adjusted for tax changes and excluding temporary fluctuations in energy prices.  
 Sources: Statistics Norway and Norges Bank

As shown in Chart 1, the rise in the CPIXE will follow approximately the same path as the rise in the CPI-ATE, but with a difference depending on the estimated energy price trend. When we look back a few years, this trend will be more or less given with the estimation method used here. Because the assumptions concerning energy price developments ahead are included in the trend estimation, the estimated trend and the estimate of the CPIXE today will be uncertain. We have illustrated this in Chart 2 by providing estimates based on different assumptions about energy prices ahead.

Chart 2 CPIXE<sup>1)</sup> with different energy price assumptions ahead. 12-month change. Per cent. January 2002 – May 2008



<sup>1)</sup> CPI adjusted for tax changes and excluding temporary fluctuations in energy prices.  
 Sources: Statistics Norway and Norges Bank

The red line shows the CPIXE based on energy price assumptions underlying the projections in PPR 2/08. Energy prices are assumed to develop in line with futures prices in the markets for electricity and oil to end-2009 and then rise approximately in line with other prices (year-on-year rise of 2.5 per cent). Futures prices on the Nordic power exchange Nord Pool indicate a substantial rise in electricity prices through summer and autumn. This is partly because electricity prices

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in southern Norway have recently been unusually low as a result of high reservoir levels and disruptions in external transmission. The market expects this to normalise in the course of the year. At the same time, the rise in oil prices has pushed up electricity prices in continental Europe, contributing to higher price expectations also in Norway. We assume that energy prices in May next year will, on the whole, be almost 25 per cent higher than in May this year. Under this assumption, the twelve-month rise in the CPIXE in May this year will be 3.0 per cent, 0.7 percentage point higher than the CPI-ATE.

Alternatively, we can assume that the expected rise in energy prices does not materialise and that energy prices will rise in pace with other prices from today, by about 2.5 per cent annually. Since we should be able to assume that current futures prices for electricity are in line with the current price of oil, such developments in electricity prices would imply that the price of oil must fall considerably from the current level. This results in a rise in the CPIXE of 2.4 per cent in the year to May this year, 0.1 percentage point higher than the year-on-year rise in the CPI-ATE (see green line in chart). This illustrates that the expected increase in electricity prices ahead is the main reason why the CPIXE in the baseline scenario in *Monetary Policy Report 2/08* is currently somewhat higher than the CPI-ATE.

Another alternative is that the rise in energy prices will be higher than indicated by current futures prices. In this alternative we assume that the rise in energy prices in the year and a half ahead will be about six percentage points higher than assumed in the *Report*, and that energy prices will thereafter continue to increase by about 6 per cent annually. The year-on-year rise in energy prices in the CPI has on average been just below 6 per cent in the past ten years. This results in a rise in the CPIXE of 3.3 per cent in May this year.

Different, but not entirely improbable assumptions concerning developments in energy prices ahead result, in other words, in a rise in the CPIXE that varies between 2.4 and 3.3 per cent today. In comparison, traditional indicators of underlying inflation currently show a rise of between 2,3 and 3,3 per cent. If energy prices follow a different path than assumed or the energy price outlook changes, the same estimation method will produce different results, including results somewhat back in time. The change in the energy price assumptions from *Monetary Policy Report 1/08* to *Monetary Policy*

*Report 2/08* have, for example, pushed up the projected rise in the CPIXE in May this year by 0.3 percentage point. Futures prices for energy products have changed considerably in this period. Oil futures prices in 2009 have risen by almost 40 per cent, while the price on the power exchange Nord Pool of a one-year contract for delivery in 2009 is now approximately 25 per cent higher than it was in March.

The estimation method will quickly capture substantial changes in the energy price outlook. If the trend in energy prices was instead estimated using a purely backward-looking method, for example a historical moving average, history would not have been revised. Should energy prices fall markedly, this type of method could, however, result in higher CPIXE inflation than both CPI and CPI-ATE inflation for a long period after energy prices have fallen. It would be unreasonable to base our assessment of underlying inflation on such an indicator.