Box A: Underlying Inflation in the United Kingdom

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Inflation is a sustained rise in the general price level. It matters because a high rate of inflation can reduce the real purchasing power of money and fixed incomes and can make relative price movements difficult to spot. It can distort resource allocation and intrude into wage and price setting behaviour, as well as having an important influence on interest rates. Knowing the 'true' underlying trend rate of inflation is important for decisions by the Bank of England in setting interest rates because monetary policy shouldn't respond to volatile or transitory changes.

This concept of inflation is different from what people in the United Kingdom generally mean by 'inflation,' where they are most often referring to the twelve-month percentage change in the consumer price index (CPI) published by the Office for National Statistics (ONS). However, the price level can change due to one-off factors, such as an indirect tax rise on alcohol and tobacco, for example. This would not be inflation on the definition adopted here, because it would be neither general nor persistent. That is not to deny that the change in the price level would be important in affecting living standards. But its effects would not be on goods and services generally, and it would drop out of the twelve-month change in prices after a year. It would not require a monetary policy response. Effectively, it would be 'noise' that would obscure the 'signal' of where inflation - the persistent process of price increase – stands.

This box reviews a number of measures that economists and policy makers have used to measure the signal in the price data and to reduce the noise. There may be no single 'best' measure that works in all sub-periods, so that analysing a variety of measures is advisable because of shifts in the drivers of movements in the general price level. Thus, there is no unanimous definition nor methodology for a singular measure of 'core' or underlying inflation; rather, each measure provides a different insight into the 'inflation story' (Mankikar and Paisley, 2002). We believe that incorporating some of these measures that try to extract the signal from the noise could help improve public understanding of the causes of inflation.

Measures of 'core' or underlying inflation

It is useful to look at measures of 'core' or underlying inflation to understand current inflation dynamics. These measures aim to indicate where inflation 'really' is, once transient shocks, like volatile energy price rises, pass.

Two common statistical approaches for measuring underlying inflation are exclusion-based and trimming-based measures. Exclusion-based measures eliminate certain components from the price index. For instance, CPI excluding energy, food, alcoholic drink and tobacco – commonly referred to as core CPI - excludes components that commonly see volatile and transient price movements, often providing more noise than signal. Equally, a measure of services inflation may be useful if there is reason to believe that excluding goods inflation will provide a clearer picture of underlying inflation. On the other hand, trimming-

based measures exclude a certain percentage of goods and services on both ends of the distribution of price changes. The logic here is that, by 'throwing out' information at the tails of the distribution that could represent highly volatile price movements, or outliers, one can get rid of some of the noise. NIESR's measure of trimmed-mean inflation excludes the 5 per cent largest price changes on either end of the CPI distribution in order to eliminate extreme volatility without throwing out too much information. In this box, we also consider the ONS measure - which trims the CPI distribution by 15 per cent on either end – as well as median inflation – which trims the CPI distribution at all points except the middle value.

Figure A1   Annual consumer price index headline and trimmed-mean (5 per cent) inflation
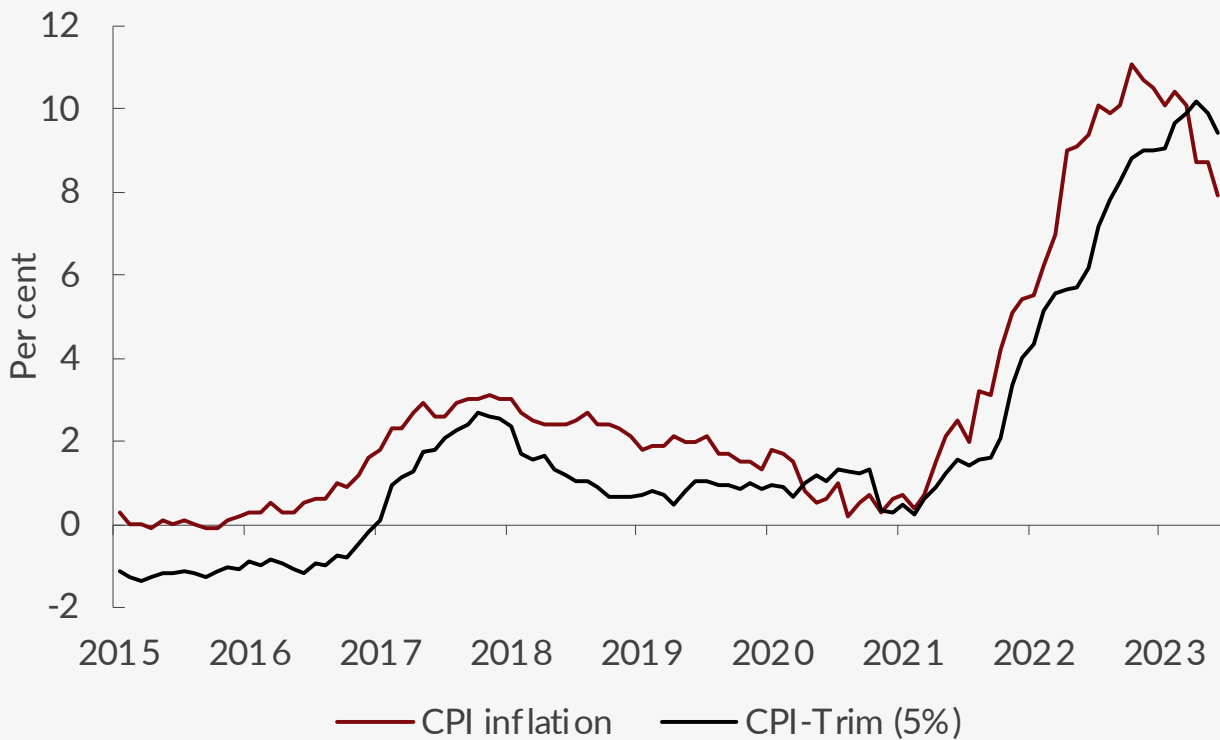
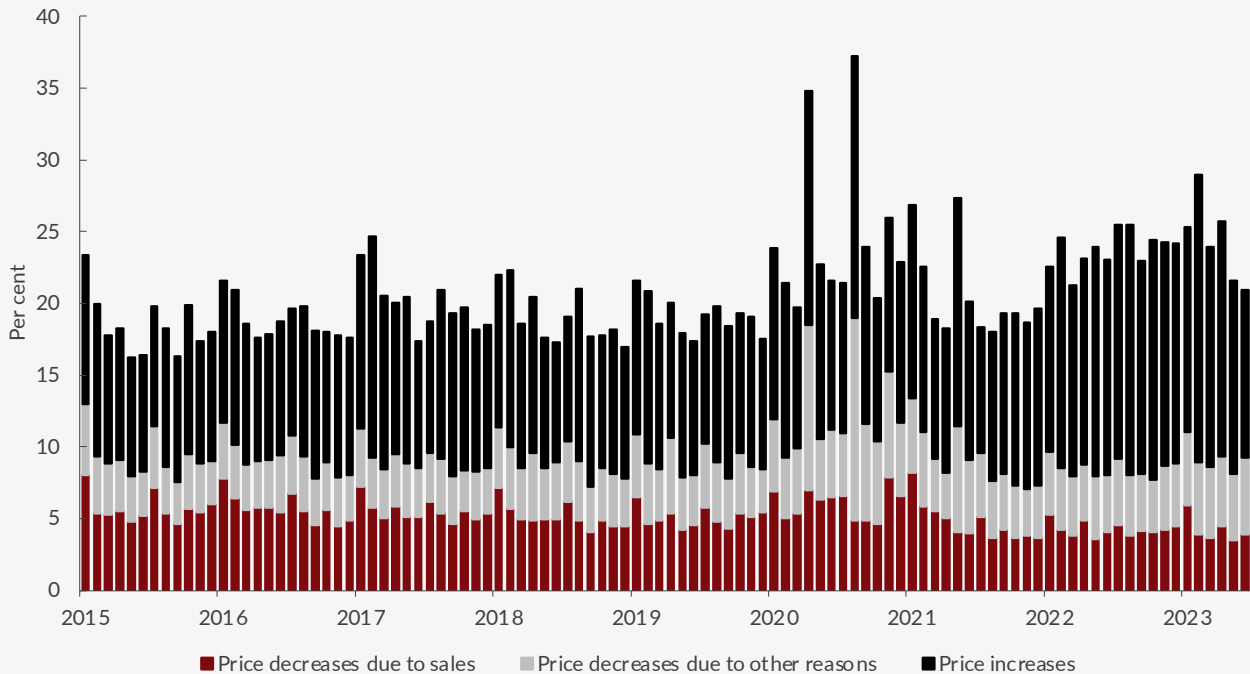
Source: ONS, NIESR Calculations.

Figure A1 compares headline CPI inflation with NIESR's measure of trimmed-mean CPI inflation. Clearly, both measures of inflation are extraordinarily elevated compared to recent years.

NIESR's measure of trimmed-mean inflation has risen steadily over the past year, reaching a series high of 10.2 per cent in April. In June, NIESR's trimmed-mean estimate remained elevated at 9.4 per cent, having fallen from 9.9 per cent in May. This measure suggests that, even though the original inflationary impulse at the start of 2022 could be seen as a product of volatile price movements, by 2023 the headline rate broadly reflected the annual price change among most items in the CPI basket.

It is notable that, historically, this trimmed-mean measure was always below the headline level. This is because the distribution of price changes is skewed: there are far more volatile price rises than volatile price decreases (see figure A2). As such, you tend to eliminate more information when you trim the top end of the distribution. That trimmed-mean inflation is

higher than headline at the moment suggests that there are currently a lot more extreme price decreases driving the fall in headline CPI. As discussed in the main text of this Outlook, this is largely due to last year's energy shocks 'dropping out' of the annual calculation.

Figure A2 Decomposing price changes: Decreases due to sale, decreases due to other reasons and increases

Source: NIESR calculations.

Figure A3 illustrates the ONS core CPI inflation and trimmed-mean measures, median inflation and services inflation. Concerningly, all four measures seem to have flatlined at an average rate of 6.5 per cent over the last year. These measures indicate that, as a result of the original inflation shock, inflationary pressures have permeated indirectly to other areas of the economy (sometimes referred to as 'second-round inflation effects'). Broadly speaking, it is useful to think of these measures as picking up the inflation that the MPC wants to, and can, return to the 2 per cent target through using its conventional monetary instrument. Overall, these trends indicate that, despite interest rates being at 5 per cent already, we are likely to see inflation remain persistently elevated throughout 2023 and into 2024.

Figure A3   Annual core, ONS trimmed-mean, median and services inflation
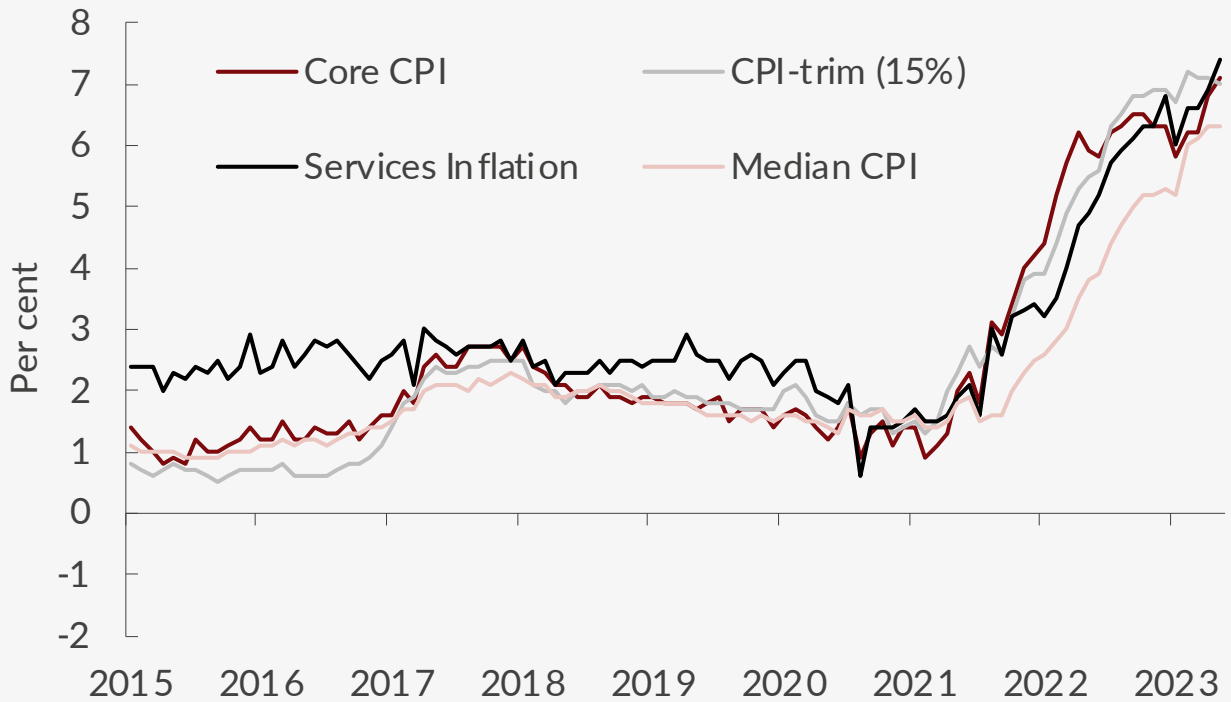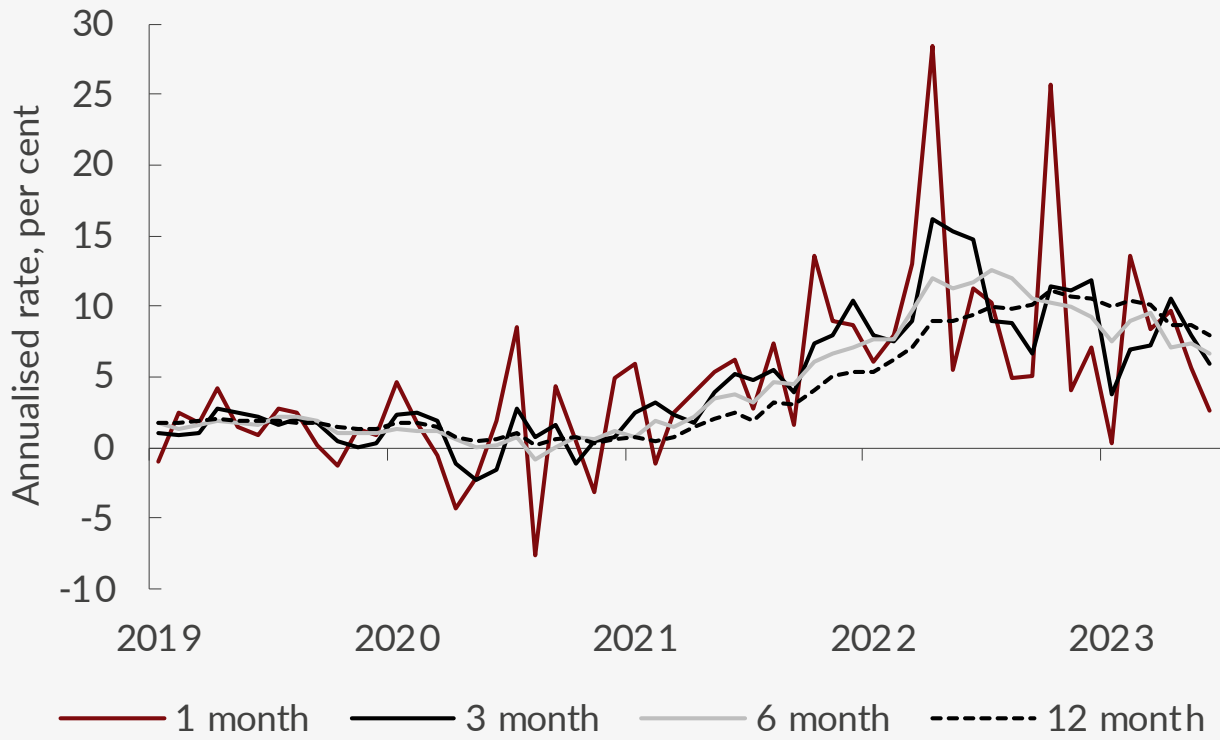

Source: ONS.

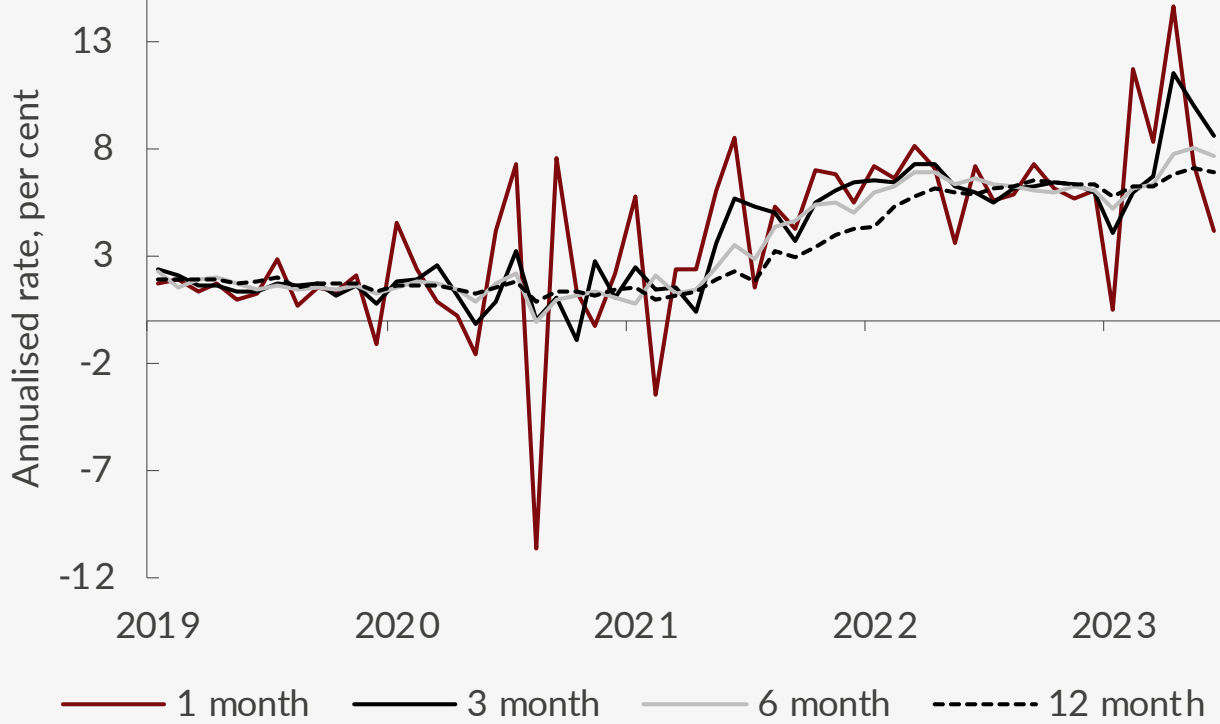**Seasonally adjusted one, three and six-month CPI inflation rates**

When examining how inflation is changing, we really want to know how new information changes our assessment of inflation. The twelve-month change in the price level (ie, the annual rate of inflation) is the sum of twelve month-on-month changes. When the data roll forward by one month, the month-on-month change 13 months ago drops out of the twelve-month sum and a new month-on-month change 'drops in'. This forms the basis for the various projections presented in the monthly blog Huw Dixon writes for NIESR. (See, eg, Dixon, 2023). But comparing how the twelve-month change in prices is shifting is too backward-looking if you want to understand current inflationary pressure. In some countries, notably the United States, more weight is given to shorter comparisons, such as the change over one, three and six months expressed at an annualised rate. (See Federal Reserve Bank of Cleveland, 2023). Unfortunately, the ONS does not publish a seasonally-adjusted CPI series (though it does produce a seasonally-adjusted real wage series that employs the CPI as its denominator).

Figure A4   Seasonally-adjusted CPI inflation rates

Source: ONS, authors' calculations.

Figure A5   Seasonally-adjusted core CPI rates

Source: ONS, authors' calculations.

We seasonally adjusted the CPI and the core CPI; the one, three and six-month annualised changes along with the 12-month change, are shown in figures A4 and A5. The one-month change is the most volatile and the 12-month change the least. It is apparent that the headline inflation rate is very volatile on all frequencies except the 12-month.

Turning points in the 12-month change come after the three and six-month changes. If policymakers were to concentrate on the 12-month change, it would be akin to driving the car looking out of the rear-view mirror. Preferably, they should determine policy on the three and six-month annualised rates, after correcting for any known one-off factors. Of course, this only makes sense if seasonally-adjusted data are used. Our strong recommendation is that the ONS should publish seasonally-adjusted CPI data, as the Bureau of Labor Statistics (BLS) does in the United States.

Most of the three-month annualised measures of inflation started to turn down in the spring of this year, two years after they started to rise. The slow policy response to this is one of the main reasons that inflation remains so high. The turning point in the six-month annualised rate came a little later, and twelve-month rates have recently started to edge down.

Local level model of core inflation

A problem with taking moving averages is that new data are afforded a full weight in the calculation no matter how much of an outlier they appear to be. A way of avoiding this pitfall is to compute a smoothed trend that gives diminished weight to data when the data are volatile. One such method is the 'local level' model that is based on the Kalman filter. Figure A6 shows the smoothed series for the month-on-month annualised rate of increase in the core CPI. Despite the most recent news of a subdued rate of increase in the core CPI in June, the filter indicates that the trend level of month-on-month core inflation is still 7 per cent at an annual rate.

While the shortages associated with Covid and its aftermath have reduced, a worrying aspect of recent inflation data has been the acceleration in services inflation. Services comprise about half the CPI, and as our smoothed month-on month series shows (seasonally adjusted with X-12), the trend monthly annualised rate is now 7 per cent and has yet to show signs of slowing.

Figure A6   Smoothed core monthly inflation
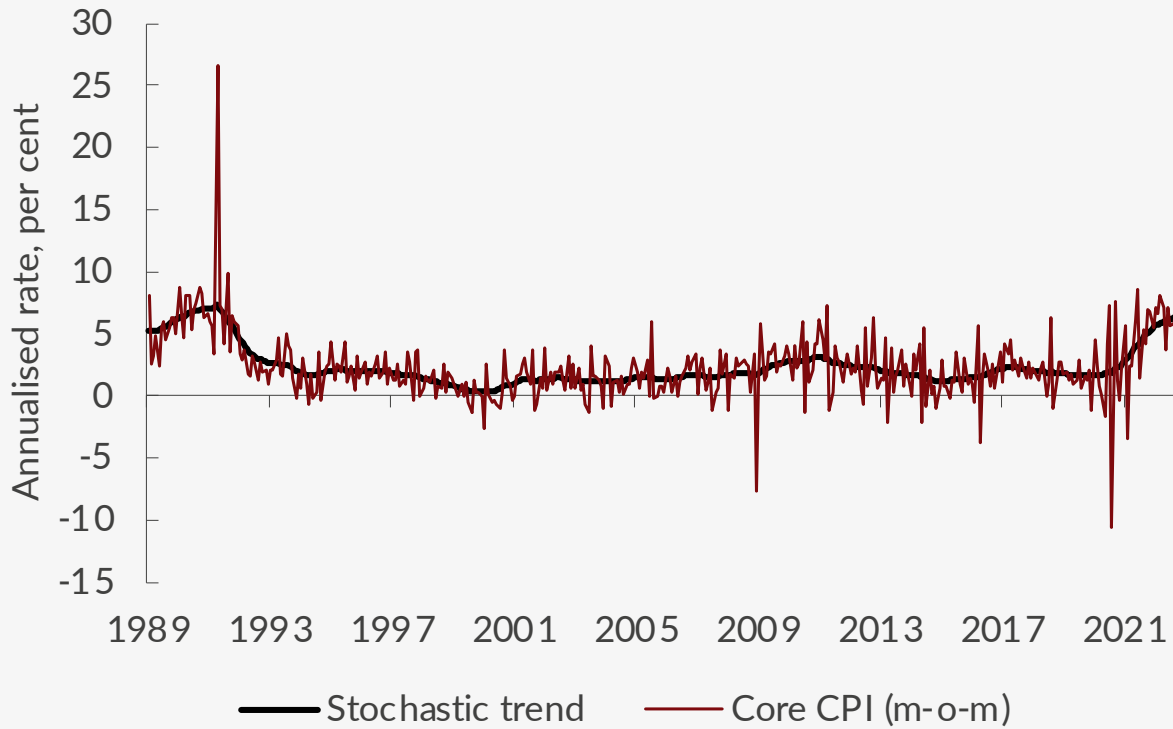
Source: ONS, authors' calculations.

Figure A7   Smoothed services inflation
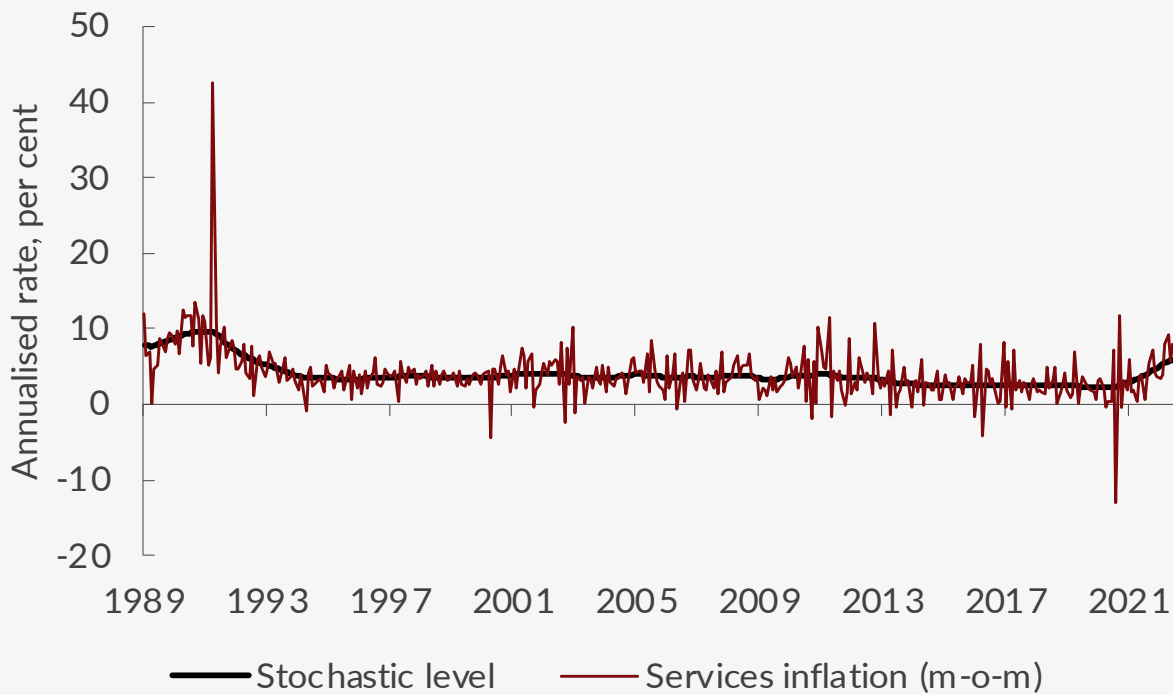
Source: ONS, authors' calculations.

Conclusion

It is important for helping manage inflation expectations down that policymakers and the ONS reduce the attention given to the 12-month change in prices. This box has argued that incorporating seasonally-adjusted one, three and six-month measures of CPI inflation as well as distinct measures of underlying inflation would be useful to help economists, policymakers and the general public have a better understanding of current inflation dynamics and where inflation is heading. We have also noted that it is important to study the evolution of different measures of underlying inflation, as each gives us a different insight that can help inform our understanding of overall inflation dynamics.

Studies have found that the British public generally have a fairly good understanding of what inflation is, while simultaneously having a poor understanding of the causes of inflation or the Bank of England's target for the inflation rate (Runge and Hudson-Sharp, 2020). While esoteric measures may not currently be well understood or trusted by the public, incorporating some of these measures in public debate and statistical communication could help improve overall understanding of inflation dynamics. For instance, while core inflation has its shortcomings, the public appreciate that energy, food, alcoholic drinks and tobacco prices are volatile (Runge and Hudson-Sharp, 2020), thus more emphasis on this measure could be useful, especially under the present circumstances of inflationary shocks to food and energy prices. Further research into public understanding of measures of underlying inflation would be essential for gauging how these measures may best be incorporated into public discourse.

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