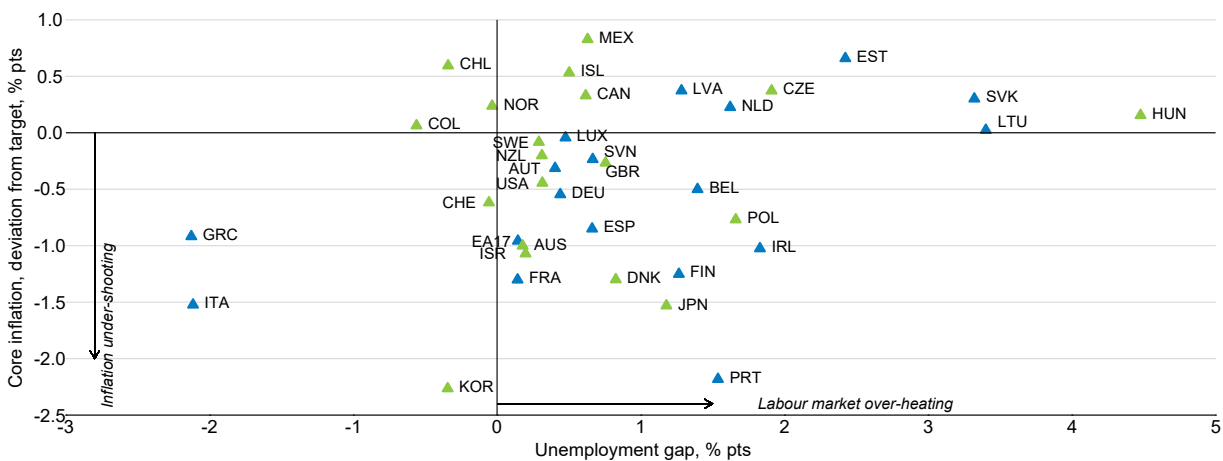


Focus Note 2: Escaping the low-inflation trap¹

Inflation has remained weak in many OECD countries, particularly in the euro area and Japan, despite the prolonged recovery and despite a broad range of indicators, including the OECD's own unemployment gap measures, suggesting little labour market slack (Figure 2.3). These outcomes appear to contradict a standard Phillips curve – a long-standing workhorse of macroeconomic analysis – which predicts that as slack is eliminated, inflation should approach "expected" inflation, usually assumed to be anchored at, or close to, the central bank's inflation target.² While there are various possible explanations for this puzzle, including that labour market slack is mis-measured, two possibilities explored in this note are: firstly, that a prolonged period of low inflation has resulted in inflation expectations slipping well below central banks' inflation targets; and secondly, that inflation responses to slack are non-linear. These two possibilities taken together point to the need for renewed policy action in some countries, most notably in Japan and the euro area, in order to escape the low-inflation trap.

Figure 2.3. In many countries core inflation remains low despite closed unemployment gap



Note: The scatter plot shows the deviation of annual core inflation in 2019Q2 from the inflation target plotted against OECD estimate of the unemployment gap averaged over the year to 2019Q2 (where a positive number indicates over-heating of the labour market). The inflation puzzle is then illustrated by the preponderance of countries in the south east quadrant. For countries where the target is a range, the mid-point is assumed, and for all euro area countries, the target is assumed to be 2% per annum, although formally the target is specified as being close to, but just below, 2% for the area as a whole. Euro area countries are distinguished from other countries by the use of a different colour.

Source: OECD calculations.

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¹ The issues discussed in this note are developed at greater length, based around empirical analysis of estimated Phillips curve relationships for all OECD countries, in Turner et al. (2019).

² The difficulty of explaining recent low inflation is confirmed by a recent ECB study in which not one of the 550 versions of an area-wide Phillips curve is able to explain low inflation outcomes in the euro area since mid-2017 (Bobeica and Sokol, 2019).

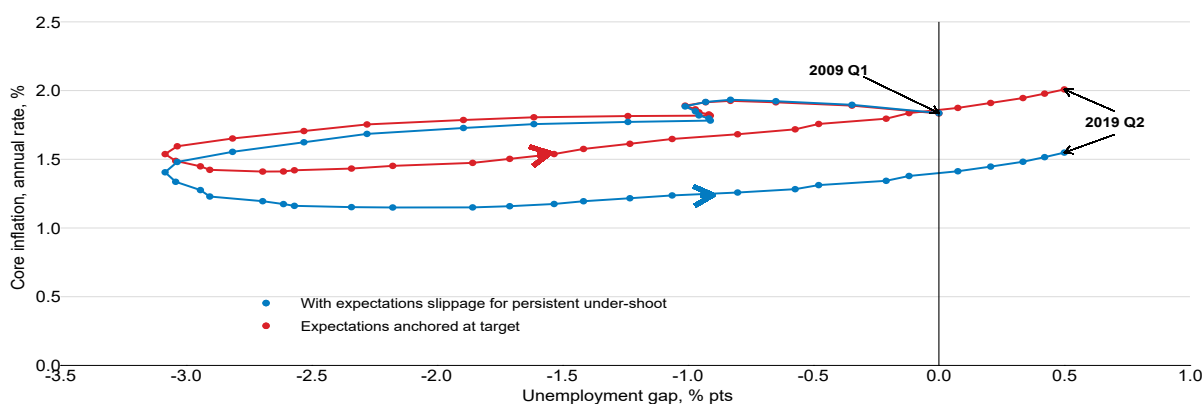
The slippage of inflation expectations

Japan provides a salutary example of the danger of allowing inflation expectations to become entrenched at very low levels. A recent sectoral study suggests that Japan is an outlier compared to other countries with a default expectation that prices remain unchanged, so that expected inflation is essentially zero (Watanabe and Watanabe, 2018). This is confirmed in estimated Phillips curves for Japan and, while the introduction of the 2% inflation target in 2013 does appear to have impacted inflation, the effect seems to have been temporary and is difficult to perceive beyond 2015.

Empirical work suggests that a "slippage" variable, which captures persistent past under or over-shooting of the inflation target, helps to explain recent inflation developments across most OECD countries. This slippage term performs better empirically than survey measures of professional forecasts, which are more often used in empirical work to proxy for expectations. The addition of a slippage effect to other potential determinants of inflation also has a clear policy implication because it directly tests for "the risk that a too prolonged period of low inflation becomes embedded in inflation expectations" (Draghi, 2014). The strength of the slippage effect suggests that for most euro area countries, expectations have indeed slipped below target.

The role of the slippage term can be demonstrated by simulating the euro area inflation response to the unemployment gap shock experienced following the Great Recession, with and without the slippage effect (Figure 2.4). In a first simulation, inflation expectations are anchored to the inflation target, which is assumed to be 2% per annum, whereas in a second simulation, expectations are also influenced by persistent deviations of inflation from the target according to an estimated slippage effect. While the initial fall in inflation is quite similar across the two simulations, the long-term effects are strikingly different. In the first simulation, inflation returns quite quickly to the target once the unemployment rate returns to its pre-crisis level. However, in the second simulation, which better approximates what has actually happened, persistent under-shooting of the inflation target leads to slippage in inflation expectations and inflation remains below target, even after unemployment is back to where it started.

Figure 2.4. Simulation of the Great Recession unemployment shock on euro area inflation



Note: The chart compares the simulation properties of the two estimated Phillips curves for the euro area to the unemployment gap shock experienced following the Great Recession, which is here taken to be exogenous. In the first simulation, represented by the red line, inflation expectations are anchored on the inflation target assumed to be 2% per annum. In the second simulation, represented by the blue line, expectations deviate from the target as a result of persistent deviations of core inflation from the target where the magnitude of this effect is determined by estimation.

Source: OECD calculations.

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Evidence of non-linear effects

The Phillips curve is typically modelled as a linear relationship linking a measure of economic slack to inflation. However, a strand of research has also explored the possibility that the Phillips curve may be non-linear, which could help to explain why inflation has remained weak. The non-linearity may be a function of inflation itself, or a function of economic slack.

Non-linearity depending on inflation

Low sensitivity of inflation to unemployment at low levels of inflation could be due to the presence of downward nominal wage rigidities. If workers resist nominal wage cuts, then excess capacity may have a weaker effect on prices when inflation is already low. It is difficult to carry out convincing tests for this form of non-linearity because most OECD countries have had relatively few years of very low inflation. However, Japan is an important exception because it has a much longer experience of low inflation and tests decisively confirm the presence of downward rigidities when core inflation is below 1% per annum. If this form of downward nominal rigidity were widespread among other countries, it would help to explain why inflation did not fall more following the Great Recession and might also help to explain why inflation has been slow to recover since. The slow recovery of inflation could be a consequence of firms' inability to cut real wages in the immediate aftermath of the Great Recession having carried over into reluctance to grant wage increases in the recovery phase.

Non-linearity depending on the degree of slack

Another potential form of non-linearity in the Phillips curve may stem from capacity constraints introducing convexity into the effect of economic slack and reducing the sensitivity of inflation to negative output or unemployment gaps (Clark and Laxton, 1995; Macklem, 1997). Spare capacity in depressed conditions may allow firms to satisfy higher demand without abrupt price increases, whereas during strong expansions firms may increase prices more readily as capacity constraints bite and marginal costs increase. Thus, as economic conditions strengthen, inflation may become increasingly sensitive to economic slack, imparting a convex shape to the Phillips curve. According to a survey of dozens of studies published in the last two decades, the slope of Phillips curves is two to three times steeper in boom phases than in contractionary phases (St-Cyr, 2018). Evidence for a similar form and scale of non-linearity is found in the largest OECD economies when adapting a baseline Phillips curve specification to allow for a non-linear effect from the unemployment gap.

Given that linear Phillips curves imply very weak unemployment gap effects, the policy implications of having two to three times larger effects in boom phases are not necessarily alarming. Such a conclusion is supported by an entirely different type of study by Babb and Detmeister (2017), who find strong statistical support for a non-linear Phillips curve for the United States using metropolitan-wide data, but also calculate that the inflation implications are “only slightly different to the linear version over the next couple of years”.

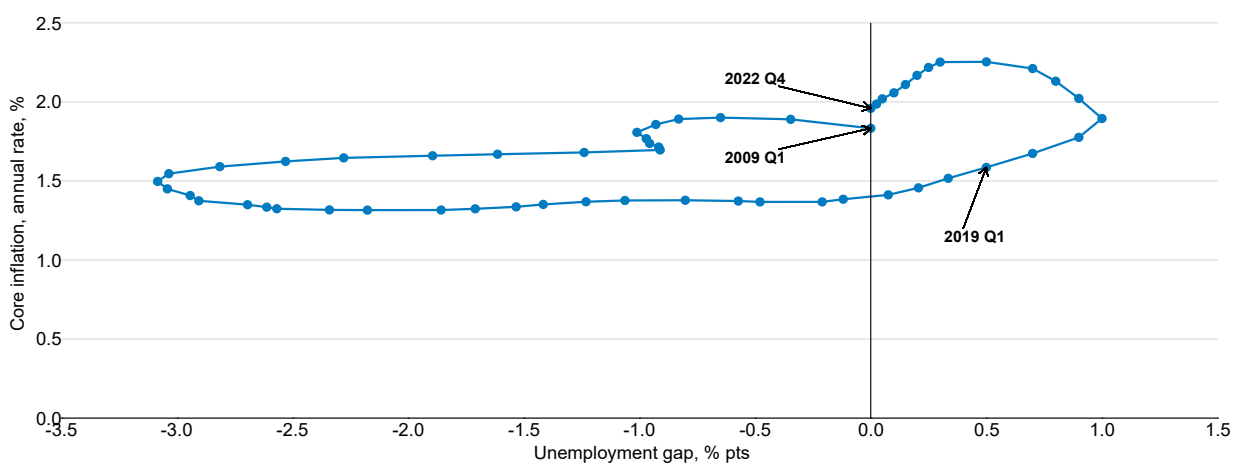
Summary and possible policy implications

Persistent low inflation outcomes, particularly with unemployment close to pre-crisis levels, raise concerns that the prolonged period of low inflation has become embedded in inflation expectations, particularly in euro area countries and in Japan. Models allowing for the possibility that persistent under-shooting of the inflation target lowers inflation expectations suggest that expectations may be closer to 1% than 2% in many euro area countries. The euro area may be particularly vulnerable to such risks because the commitment to inflation is area-wide and does not apply to any individual country. A lack of close integration of product and, especially, labour markets throughout the euro area means that persistent low national

inflation may more easily come to be reflected in national inflation expectations than would be the case if there were an explicit target for national inflation. This slippage of inflation expectations is a cause for concern. With nominal interest rates close to their effective lower bounds, persistently low inflation keeps real interest rates higher than they would otherwise be, which may explain why recoveries have been tepid in some countries. Moreover, if faced with another large negative demand shock, the scope for conventional monetary policy to lower nominal interest rates would be highly constrained.

A linear Phillips curve, incorporating a mechanism by which persistent under-shooting of the inflation target leads to slippage of expectations, if taken literally, would carry the surprising implication that to re-anchor expectations over any medium-term horizon would require a "Great Boom" to mirror the effects of the "Great Recession". However, evidence of non-linearities in the Phillips curve, whereby positive gaps have a larger inflationary effect than the weak disinflationary effect of negative gaps, would suggest that a more modest period of over-heating might be required, as illustrated by the simulation of a euro area Phillips curve that incorporates such non-linearities (Figure 2.5). Japan is in a similar, but more extreme, situation with inflation expectations more entrenched and even further below the official target and so is likely to require a more prolonged period of over-heating to jump-start inflation expectations, as well as clear communication regarding the permanent commitment to the inflation target as is currently the case.

Figure 2.5. Simulated effect on euro area core inflation of the Great Recession and hypothetical recovery based on non-linear Phillips curve



Note: The chart simulates an estimated non-linear euro area Phillips Curve to the unemployment gap shock experienced following the Great Recession followed by a hypothetical recovery where the unemployment gap is treated exogenously. Inflation is anchored by expectations, which are initially equal to the inflation target (assumed to be 2%) but also influenced by persistent deviations of core inflation from the target. The estimated non-linearity allows for the possibility that inflationary effects of a positive unemployment gap are larger than the disinflationary effect of a negative unemployment gap.

Source: OECD calculations.

StatLink  <https://doi.org/10.1787/888934044898>

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