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Macroeconomic stabilisation in the presence of the effective lower bound: the case of the euro area



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The secular decline in the equilibrium real interest rate observed over the past decades has materially limited the room for policy-rate reductions in recessions, and has led to a marked increase in the incidence of episodes where policy rates are likely to be at, or near, the effective lower bound (ELB) on nominal interest rates. Using the ECB's New Area-Wide Model, we show that, if left unaddressed, the ELB can cause substantial costs in terms of worsened macroeconomic performance, as reflected in negative biases in inflation and economic activity, as well as heightened macroeconomic volatility. These costs can be mitigated using nonstandard instruments, notably the joint use of interest-rate forward guidance and large-scale asset purchases. This finding underpins the importance of having forward guidance and asset purchases in the central bank's toolkit to overcome the disinflationary bias due to the ELB, as confirmed in the ECB's new monetary policy strategy with an inflation target of 2% (ECB, 2021). Similarly, when considering alternatives to inflation targeting, we find that make-up strategies such as price-level targeting and average-inflation targeting can, if they are well-understood by the private sector, considerably reduce the negative biases and heightened volatility induced by the ELB. The ECB's new strategy with its conditional commitment to an especially forceful or persistent monetary policy response to negative deviations from its inflation target when the economy is close to the ELB shares with make-up strategies the recognition that strengthening the leverage on private-sector expectations of future inflation and policy actions is key, albeit without adopting a backward-looking make-up element.

* The views expressed in this Policy Brief should be regarded as those of the authors and are not necessarily those of the European Central Bank.

Over the past decade, monetary policy in advanced economies has operated in an environment characterised by record-low nominal interest rates and disinflationary pressures that have, in most cases, kept inflation rates firmly below central banks' targets. This configuration has unfolded against the background of a secular decline in the global equilibrium real interest rate which has severely reduced the room for monetary policy to lower policy rates in recessions without hitting the effective lower bound (ELB) on nominal interest rates (e.g. Holston et al., 2017). The persistent and global nature of these developments has led to a broad-based re-assessment of, on the one hand, the incidence and severity of ELB episodes, and, on the other hand, the effectiveness of available monetary policy instruments and alternative monetary policy frameworks in achieving satisfying macroeconomic stabilisation outcomes in the presence of the ELB.

In Coenen et al. (2021), we provide a model-based analysis of these considerations with a focus on the euro area economy, using the ECB's New Area-Wide Model (henceforth NAWM; Coenen et al., 2018). To assess the ramifications of an occasionally binding ELB constraint for macroeconomic stabilisation in a low-interest-rate environment, we conduct stochastic simulations with the NAWM and present the findings in terms of summary statistics of the probability distributions for inflation, the output gap and the short-term nominal interest rate under different scenarios. First, we quantify the impairment in macroeconomic stabilisation induced by the ELB. In so doing, we consider different assumptions about the room of manoeuvre for monetary policy and document how the ELB gives rise to downward biases in and heightened volatility of inflation and economic activity. Second, we explore to which extent interest-rate forward guidance and large-scale asset purchases can curb the distortionary effects due to the ELB. Finally, we assess the capacity of make-up strategies under which the central bank promises to make up for past inflation shortfalls by generating higher inflation in the future to improve macroeconomic stabilisation.

Our analysis is related to several strands of the literature on monetary policy and the ELB. Here, we mention only a few seminal papers and refer the reader to Coenen et al. (2021) for a more detailed review of the related literature. First, Kiley and Roberts (2017), among others, find that both the incidence and the severity of episodes with a binding ELB is higher today than prior to the Global Financial Crisis. Second, a large and growing strand of the literature assesses the capacity of alternative nonstandard monetary policy instruments to stabilise the economy when faced with the ELB (e.g. Eggertsson and Woodford, 2003, and Gertler and Karadi, 2011). Finally, a third strand of the literature aims to explore whether, in a low-interest-rate environment, alternative monetary policy frameworks could help achieve better stabilisation outcomes than standard inflation targeting. Make-up strategies, in particular, are often considered as a possible means to improve upon the stabilisation properties of conventional inflation targeting in the presence of the ELB (e.g. Reifschneider and Williams, 2000, and Bernanke et al., 2019). While most of the above-mentioned literature focuses on the U.S. economy, we base our analysis on an estimated model of the euro area.

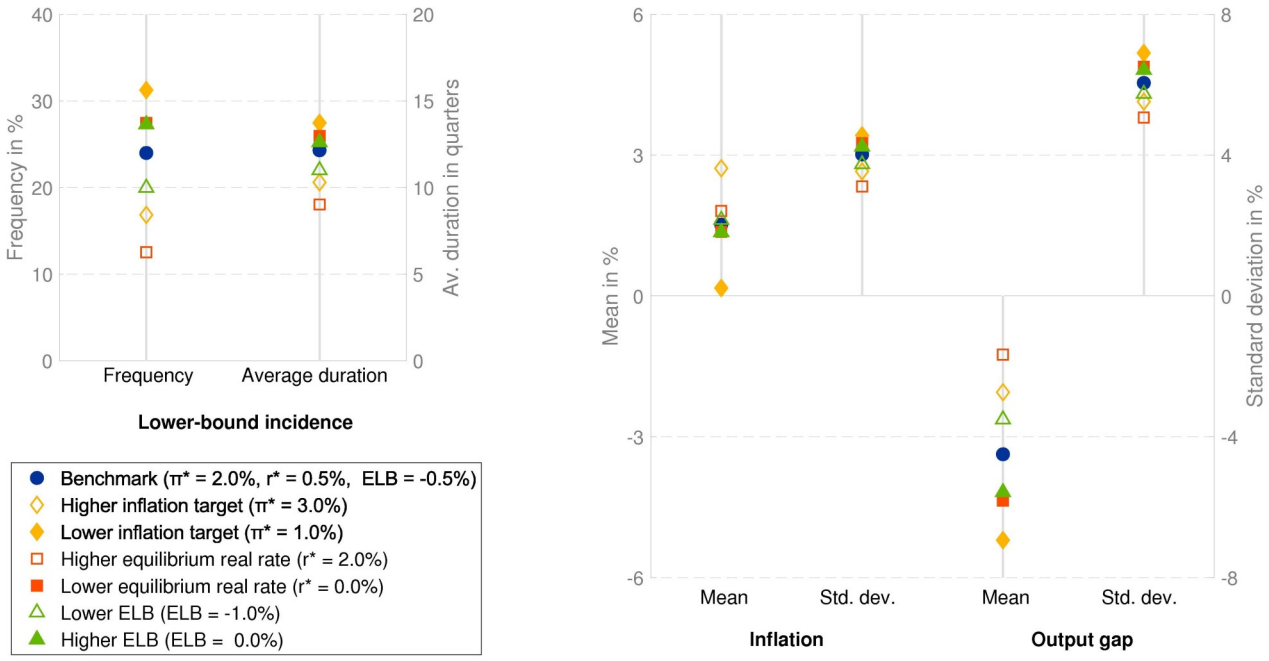
The ELB causes substantial macroeconomic costs

The incidence of ELB events and the extent to which the ELB constraint hampers macroeconomic stabilisation depend on the longer-run economic conditions in which monetary policy is operating. In this respect, three key parameters are the long-run equilibrium real interest rate, the inflation target, and the level of the ELB constraint. Together, they determine the average “space” for monetary policy to reduce its policy rate in recessions. In our benchmark calibration, we impose, with a view to broadly capturing the present configuration in the euro area, an inflation target of 2%, a long-run equilibrium real interest rate of 0.5% and an ELB at −0.5%.

As shown in Figure 1, a decline in the long-run equilibrium real interest rate leads to an increase in the incidence of episodes where the ELB is binding, and aggravates, both, the negative stabilisation biases and economic

volatility. When the equilibrium real interest rate falls from 0.5% to zero, the neutral level of the policy rate falls, all else equal, from 2.5% to 2.0%, so that the central bank has less space to reduce its policy rate in response to contractionary shocks, resulting in an increase in the ELB frequency by 3.5 percentage points. The heightened asymmetry in the ability of the central bank to adjust its policy rate in response to shocks raises the negative inflation bias to 0.6 percentage point. In a similar vein, a lower inflation target of 1% results in an increase in the ELB frequency of 7.3 percentage points and raises the negative inflation bias to 0.8 percentage point. Hence, a reduction in the inflation target leads to a more than one-for-one decline in the mean of inflation. By the same token, a higher inflation target or a lower level of the ELB attenuate the ELB incidence and improve macroeconomic stabilisation outcomes. For instance, when the NAWM is simulated with an inflation target of 3%, rather than 2%, the negative inflation bias shrinks to 0.3 percentage point. If the numerical value of the ELB is assumed to be -1.0% instead of -0.5%, the negative inflation bias is 0.1 percentage point smaller than in the benchmark simulations.

Figure 1. The roles of the inflation target, the equilibrium real rate, and the level of the ELB



Notes: This figure presents summary statistics of the probability distributions for the short-term nominal interest rate, annual consumer price inflation, and the output gap. These statistics include the incidence of the ELB constraint (measured by the frequency, i.e. the number of times, the short-term nominal interest rate is at the ELB, in percent, and the (average) duration of an ELB event, in quarters); and the mean and standard deviation of consumer price inflation and the output gap (all in percent). The distributions are derived from stochastic simulations around the NAWM's non-stochastic steady state. The simulations are carried out for alternative combinations of the central bank's inflation target, the equilibrium real interest rate and the ELB.

Nonstandard instruments can provide substantial macroeconomic stabilisation

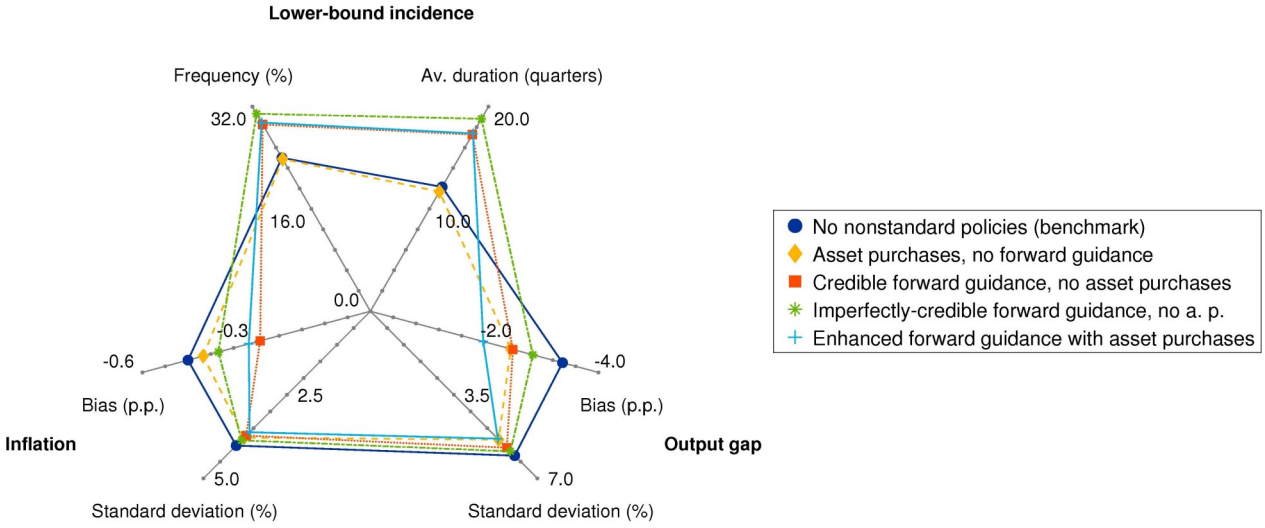
In an attempt to soften the adverse economic consequences of the ELB constraint, central banks have expanded their set of policy instruments to include, amongst others, interest-rate forward guidance and large-scale asset purchases. We model both forward guidance and large-scale asset purchases as a state-dependent policy prescription, as in Coenen et al. (2020). In the case of forward guidance, the central bank promises to keep its policy rate at the ELB beyond the point in time where a standard interest-rate rule would imply an increase in the policy rate, and the length of the additional period for which the policy rate is kept low depends on the severity of

the previous downturn. As regards central bank asset purchases, we assume that they are initiated when the ELB constraint becomes binding and that they comprise purchases of long-term government bonds and long-term private-sector loans. The size of the purchases also depends on the severity of the recession in which the short-term nominal interest rate is constrained by the ELB.

Figure 2 shows the effectiveness of forward guidance and central bank asset purchases in mitigating the impact of the ELB constraint. First, credible interest-rate forward guidance reduces the negative inflation bias by about 0.2 percentage point and extends the average duration of ELB episodes by 5 quarters. The increase in the average duration of ELB episodes reflects the "low for longer" element of forward guidance. Credible forward guidance is also successful in mitigating the output gap bias, and in reducing economic volatility. If, instead, forward guidance has low credibility, the improvement in stabilisation outcomes is much more muted. For instance, under low credibility, forward guidance reduces the negative inflation bias only by 0.1 percentage point. Credibility is therefore essential for interest-rate forward guidance to effectively steer private-sector expectations about future policy and, thus, about future inflation and economic activity.

Large-scale asset purchases, on their own, have a rather small effect on inflation in the model simulations. Central bank asset purchases, while inflationary in the short run, give rise to dis-inflationary pressures over the medium term due to reducing the firms' marginal costs that prevent a more sizeable reduction in the negative inflation bias. However, they may also help the central bank to enhance the credibility of interest-rate forward guidance when both nonstandard instruments are used together and, thereby, increase the capacity of monetary policy to stabilise the economy. Under this configuration, referred to as "enhanced forward guidance with asset purchases", the two nonstandard instruments together reduce the negative inflation bias by about 0.2 percentage point, and lower the volatility of inflation by 0.4 percentage point. Similar improvements are achieved in terms of the output gap bias and volatility.

Figure 2. Effects of nonstandard policies on ELB incidence and macroeconomic stabilisation



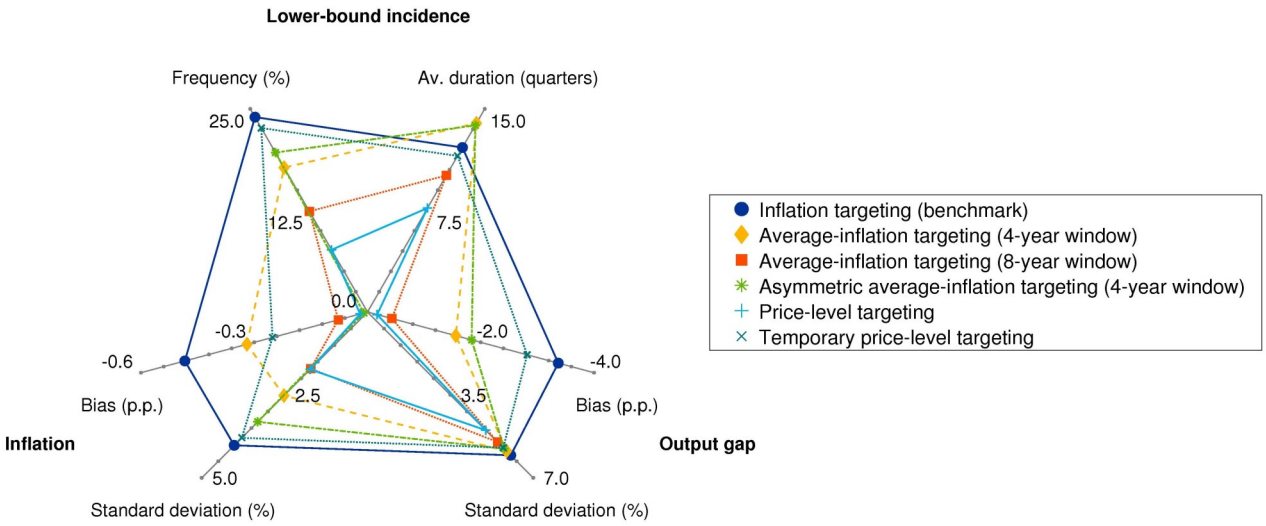
Notes: This figure presents summary statistics of the probability distributions for the short-term nominal interest rate, annual consumer price inflation, and the output gap. The distributions are derived from stochastic simulations around the NAWM's non-stochastic steady state with an inflation target equal to 2% and an equilibrium real interest rate of 0.5%. The simulations are carried out for alternative combinations of state-dependent asset purchases and state-dependent forward guidance on short-term nominal interest rates taking into account an ELB at -0.5%. See Figure 1 for further details.

Make-up strategies also mitigate the negative impact of the ELB

Finally, we consider an alternative class of monetary policy strategies in which the central bank seeks to compensate, at least in part, for past episodes of too low (high) inflation by temporarily aiming for a rate of inflation above (below) the central bank's inflation target. Under price-level targeting (PLT), the central bank aims to keep the price level close to a pre-announced target path that grows at a rate consistent with the inflation target. Under average-inflation targeting (AIT), the central bank aims to stabilise an average rate of inflation over a pre-specified time window. The longer the averaging window, the more similar AIT becomes to PLT. Under the asymmetric average-inflation targeting (AAIT) rule, the policy rate responds to an average rate of inflation whenever average inflation is below target, and it responds to annual inflation, in accordance with the benchmark rule, otherwise. Under the temporary price-level targeting (TPLT) rule, the central bank switches to price-level targeting whenever the ELB becomes binding.

As shown in Figure 3, we find that make-up strategies, notably PLT and AIT with a sufficiently long averaging window can largely undo the negative biases and heightened volatility induced by the ELB. For instance, under a permanent and symmetric AIT rule with an 8-year averaging window, the negative inflation bias shrinks to 0.1 percentage point – 0.4 percentage point smaller, in absolute value, than in the absence of a make-up element. Likewise, the output gap bias is relatively small. We also find that TPLT and AAIT can be about as effective as strategies with a permanent and symmetric element. The noticeable improvement in stabilisation outcomes associated with the considered make-up strategies is due to their reliance on two key expectation channels. One is that by committing to a make-up element, the central bank is, in effect, committing to a lower-for-longer interest-rate policy. Expectations of future short-term interest rates should get incorporated into longer-term rates and thereby provide additional accommodation. The other channel is that by committing to higher inflation in the future, the make-up strategies should boost inflation expectations. Those higher inflation expectations reduce ex-ante real rates, again providing additional accommodation.

Figure 3. Effects of make-up strategies on ELB incidence and macroeconomic stabilisation



Notes: This figure presents summary statistics of the probability distributions for the short-term nominal interest rate, annual consumer price inflation, and the output gap. The distributions are derived from stochastic simulations around the model's non-stochastic steady state with an inflation target equal to 2% and an equilibrium real interest rate of 0.5%. The simulations are carried out for alternative make-up rules, taking into account an ELB at -0.5%. See Figure 1 for further details.

A note of caution

While the ELB introduces severe distortions in macroeconomic performance, the considered remedies to these distortions are of course not without practical limitations. The efficacy of asset purchases is likely to be dependent on, e.g., the severity of prevailing financial impairments, and central bank asset purchases may face quantitative limits. The stabilising macroeconomic effects of forward guidance hinge on its credibility with the private sector and on the importance of forward-looking private-sector planning, in general. Moreover, if a central bank decides to adopt a make-up strategy it may face practical challenges that we abstract from in our model-based analysis, mainly in terms of communication. This is likely to be particularly challenging in the initial transition phase when people still have to learn and build trust into the new strategy.

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