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The effective lower bound and the desirability of gradual interest rate adjustments

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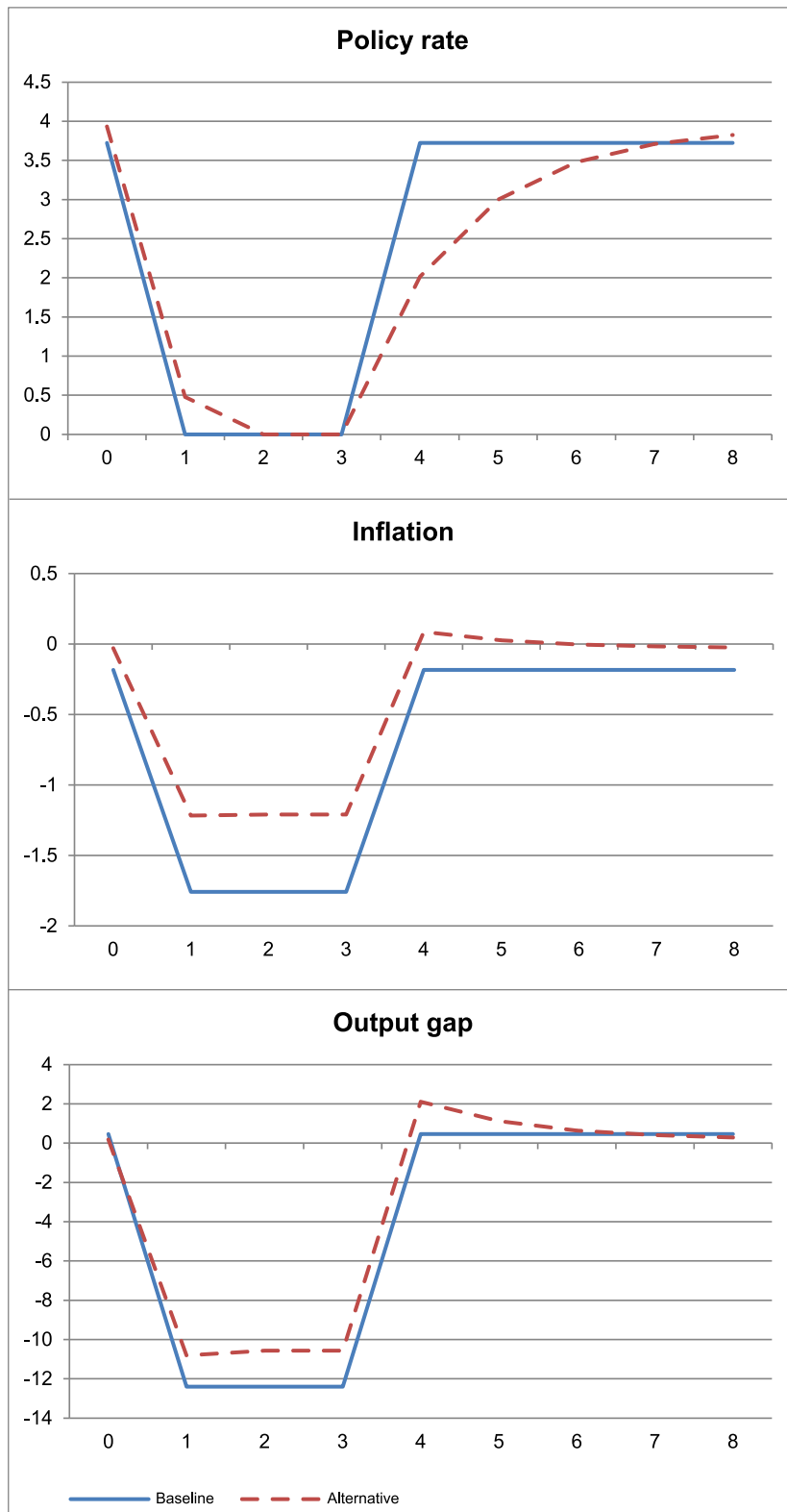
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The lower bound on nominal interest rates makes it desirable for monetary policy to aim for gradual adjustments of the policy rate in addition to the stabilisation of inflation and the output gap.

In a situation where the economy is in recession, inflation is below target, and the policy rate has been brought down to its effective lower bound (ELB), stabilising the economy becomes more challenging. The recent episode of subdued inflation rates and low nominal interest rates in many advanced economies has stimulated new research on how current monetary policy frameworks and strategies could be adjusted to better cope with large economic downturns in the future. For instance, several studies have emphasised the potential benefits of price-level targeting and nominal GDP-level targeting.^[2] This article focuses on an alternative remedy, summarising recent work by Nakata and Schmidt (2016) on how a monetary policy strategy that entails slow policy-rate adjustments in response to changes in economic conditions can mitigate the adverse consequences of the ELB for macroeconomic stabilisation.

Nakata and Schmidt (2016) use a standard New Keynesian model of the economy. Two scenarios are compared – a baseline scenario and an alternative scenario. In the baseline scenario, the objective of the central bank consists in stabilising inflation and the output gap. Each period, the central bank sets the policy rate so as to bring the inflation rate as close as possible to its target and to close the output gap. In the alternative scenario, the central bank's objective function includes an interest-rate gradualism objective, in addition to the inflation and output gap stabilisation objectives. That is, the central bank aims to stabilise inflation and the output gap, but in so doing, it prefers to adjust the policy rate in small steps.^[3] Hence, when inflation and/or the output gap deviate from target, the central bank has to trade-off its interest-rate gradualism objective against its inflation and output gap stabilisation objectives. Importantly, in both scenarios, the policy rate cannot fall below the ELB. Furthermore, it is assumed that the private sector only believes central bank announcements about future interest rate policy – in central bank parlance often referred to as “forward guidance” – if there is no incentive for the central bank to renege on the announcement later on. That is, central bank policies and announcements have to be consistent with the objective function, where the latter is accepted as a given by the central bank. Chart 1 shows the paths, over eight quarters, of the policy rate, the inflation rate and the output gap for a model-based simulation of a large recession with a binding ELB constraint. The recession is caused by a contractionary demand shock that hits the economy at the beginning of Period 1 and lasts for three quarters.

Chart 1: Model-based simulation of a large recession



Notes: The horizontal axes show time measured in quarters. The policy rate is expressed in annualised percentages. Inflation is expressed in annualised percentage point deviations from target. The output gap is expressed in percentages. Without loss of generality, the lower bound is set at zero.

In the baseline scenario, represented by the solid blue lines, at the onset of the contractionary demand shock the central bank immediately lowers the policy rate to the ELB. This reduction in the policy rate is, however, insufficient to prevent a severe decline in the inflation rate and the output gap. When the shock recedes after three quarters, the central bank immediately raises the policy rate to its long-run level and stabilises inflation and the output gap close to their targets.^[4] In the alternative scenario, represented by the dashed red lines, the central bank, because it wants to adjust interest rates only gradually, lowers the policy rate more slowly in response to the shock. However, as a consequence of the severe downward pressure on the economy the initial policy rate reduction is still relatively large, and the ELB constraint is hit in the second quarter. Inflation and the output gap decline by less than in the baseline scenario. Key for the improvement of stabilisation outcomes is the policy-rate path implemented once the shock recedes. Due to the interest-rate gradualism objective, the central bank raises the policy rate more slowly than in the baseline scenario. In so doing, it trades off its gradualism objective against its inflation and output gap stabilisation objectives. The slower increase in the policy rate generates a temporary overshooting of the inflation rate and the output gap above their long-run targets. Crucially, this overshooting is already anticipated by the private sector when the demand shock hits the economy, leading to an increase in inflation and output gap expectations relative to the baseline scenario. Since households and firms in the model are forward-looking, expectations about the future play a role in private sector decision-making. In particular, expectations of higher future inflation and economic activity increase private spending and mitigate the declines in inflation and the output gap.

In the light of these results, the central bank in the baseline scenario would of course also like to raise the private sector's inflation expectations by promising to adjust the policy rate only gradually once the shock disappears. However, without the interest-rate gradualism objective, the central bank would have an incentive to renege on such a promise later in order to avoid the inflation and output gap overshooting. In the model, this incentive is perfectly understood by households and firms. Without the interest-rate gradualism objective, a central bank announcement that the policy rate will temporarily be kept low after the shock disappears would therefore not be credible, and there would be no effect on private sector decision-making.

Finally, when designing monetary policy, it is important to note that for interest-rate gradualism to have the desired effects on the overall stabilisation performance of a central bank, the weight that the central bank objective function gives to the interest-rate gradualism objective – relative to the inflation and output gap objectives – has to be considered carefully.^[5] While the interest-rate gradualism approach improves macroeconomic stabilisation in the case of some shocks, including large contractionary demand shocks of the type considered in Chart 1, other shocks may require a more sharp adjustment in the policy rate. A monetary policy strategy that performs well at overall macroeconomic stabilisation must therefore strike a balance between the benefits and costs associated with the interest-rate gradualism approach.

In conclusion, Nakata and Schmidt (2016) provide a novel rationale for interest-rate gradualism.^[6] In a liquidity trap, a central bank with a gradualist approach keeps the policy rate low for longer than is warranted by the dynamics of output and inflation alone. This low-for-longer policy creates a transitory increase in future output and inflation, using the expectations channel to dampen the declines in inflation and real activity which occur during a liquidity trap.

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^[2] See, for example, Eggertsson and Woodford (2003), Woodford (2012), Bernanke (2017) and Billi (2017).

^[3] In the model, the objective function that the central bank is supposed to minimise is specified as follows: $E_0 \sum_{t=0}^{\infty} \alpha_{\pi} \pi_t^2 + \alpha_y y_t^2 + \alpha_i (i_t - i_{t-1})^2$, where π_t is the inflation rate between quarter t-1 and t, y_t is the output gap and i_t is the policy rate between quarter t and t+1. Parameters $\alpha_{\pi}, \alpha_y, \alpha_i \geq 0$ are the relative weights of the three objectives. In the baseline scenario, the weight on the interest-rate gradualism term is zero.

^[4] The possibility that the policy rate may have to return to the ELB in the future – so-called ELB risk – also complicates the stabilisation of inflation and the output gap in times where the ELB constraint is not binding. In particular, ELB risk creates a trade-off between inflation and output gap stabilisation away from the ELB, leading to a systematic undershooting of the central bank's inflation objective. The quantitative magnitude of the undershooting, in turn, depends on the severity of the decline in inflation and the output gap when the ELB constraint is binding. For more details, see Hills, Nakata and Schmidt (2016), and Schmidt (2016).

^[5] One way to think about the institutional framework is that the government designs the monetary policy objective function and delegates it to an otherwise independent central bank. The insight that delegating policy to an institution with an objective function that is not societal can help to solve time-inconsistency problems and thereby improve macroeconomic stabilisation dates back at least to the work of Rogoff (1985).

^[6] Discussions of other rationales for interest-rate gradualism can be found in, for example, Sack (1998) and Woodford (2003).

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