WHY HAVE POLICY RATES BEEN SO PERSISTENTLY LOW IN THE EURO AREA?

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Short-term money market interest rates in the euro area have been negative since 2014. Those market rates are determined by the interest rates set by the European Central Bank (ECB), as shown in Chart 1. In the environment of excess liquidity that emerged after the global financial crisis (GFC), the deposit facility rate (DFR), the interest rate on overnight deposits that banks hold with the ECB, has acted as a floor for short-term money market rates. The deposit facility rate has been negative since June 2014 and currently stands at –50 bps. Accordingly, money market rates in the euro area have been negative for the last seven years.

Why have policy-controlled interest rates been so persistently low? And why haven't they returned to the average pre-crisis level of 3 to 4%? In this essay we argue that persistent disinflationary developments following the GFC in a low equilibrium real interest rate environment have limited the ECB's ability to lower policy rates sufficiently due to the effective lower bound (ELB). Together with the uncertainty and perceived asymmetry in the ECB's inflation target and the initially timid response with unconventional policy measures, such as forward guidance and large-scale asset purchases, this has contributed to less-anchored inflation expectations, which in turn has prolonged the disinflation period and the time spent at the ELB. The new ECB strategy announced on 8 July 2021 recognizes the implications of the ELB for the monetary policy reaction function. It clarifies that price

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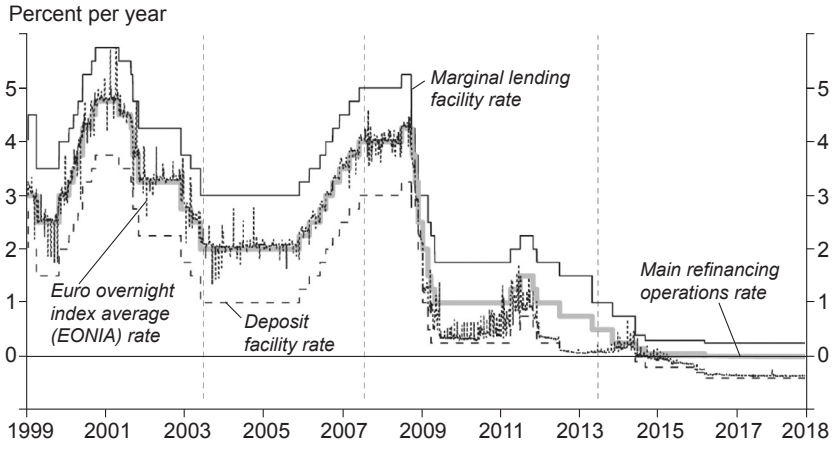
Chart 1
The ECB's Policy Interest Rates and the Overnight Money Market Rate, 1999-2018



Source: ECB.

stability can best be maintained by aiming for a simple, symmetric 2% inflation target. It recognizes that when near the ELB, policy measures need to be especially forceful and persistent to avoid disinflation becoming entrenched and that alternative policy measures, such as large-scale asset purchases, long-term refinancing operations and forward guidance on interest rates, are key to implementing such a forceful and persistent response. It also acknowledges that other policies, such as fiscal policy, can play a useful stabilization role when policy-controlled interest rates are close to the ELB. These lessons have already been applied in response to the pandemic crisis. Fiscal and monetary policy have worked hand in hand to help households and firms bridge the pandemic crisis. As a result, the euro area economy has recovered strongly, scarring effects have so far been minimized, and headline inflation has rebounded strongly due to the surge in energy prices, but also because demand outpaces constrained supply in some sectors. This holds out hope that as the output gap closes and inflation sustainably stabilizes at 2%, in line with the ECB's forward guidance, interest rates will rise again, though likely towards lower positive steady state levels than before the GFC, since the equilibrium real rate is expected to remain low for years to come.

In Section 2 we review the typical interest rate reaction function of the ECB in light of its monetary policy strategy. It explains why interest rates got stuck close to the ELB while the nominal growth environment continued to underperform. In Section 3 we document the fall in the

equilibrium real interest rate, r*, and its implications for macroeconomic performance and state-contingent monetary policies at the ELB. Section 4 concludes.

THE ECB'S MONETARY POLICY STRATEGY: A REACTION FUNCTION APPROACH

To answer the question of why policy-controlled interest rates are so low, it is natural to start from the ECB's monetary policy strategy. The ECB's primary objective as laid down in the Treaty on European Union is to maintain price stability. Until recently, the ECB defined price stability as "a year-on-year increase in the Harmonised Index of Consumer Prices (HICP) for the euro area of below 2%". Within that definition of price stability, the ECB aimed to keep inflation at "below, but close to 2%" (ECB, 2003). While this double-key formulation of the price stability objective was effective in maintaining long-term inflation expectations close to 2% in the inflationary environment of the first decade of the EMU, the ambiguity around the precise inflation target and its perceived asymmetric nature made it less effective when disinflationary forces prevailed following the GFC in 2008 and the sovereign debt crisis in 2010-2011. In the new ECB monetary policy strategy, the formulation has therefore been replaced by a simpler and explicitly symmetric 2% inflation target (ECB, 2021).

The primary monetary policy instrument is the set of ECB policy rates depicted in Chart 1 (*supra)*. The ECB sets these policy-controlled interest rates to ensure that inflation stabilizes at its 2% target in the medium term. The medium-term orientation of monetary policy strategy accounts for the fact that changes in interest rates affect the economy and inflation only with long and uncertain lags. As a result, the ECB cannot control short-term deviations of inflation from the 2% target, but needs to take a forward-looking approach aiming at stabilizing inflation at 2% in the medium-term. This is done by adjusting its monetary policy instruments in response to the changing economic and inflation outlook.

One way of capturing the ECB's reaction function is through the lens of the simple first-difference policy rule proposed by Orphanides (2003). This rule links the change in the main policy rate of the ECB to deviations of the one-year-ahead inflation forecast from the ECB's inflation target ($\pi^{f}_{t+1} - \pi^{*}$) and deviations of the one-year-ahead real GDP growth forecast from potential output growth ($g^{f}_{t+1} - g^{*}$):

$$\Delta R_t = 0{,}5(\pi^{f}_{t+1} - \pi^{*}) + 0{,}5(g^{f}_{t+1} - g^{*})$$

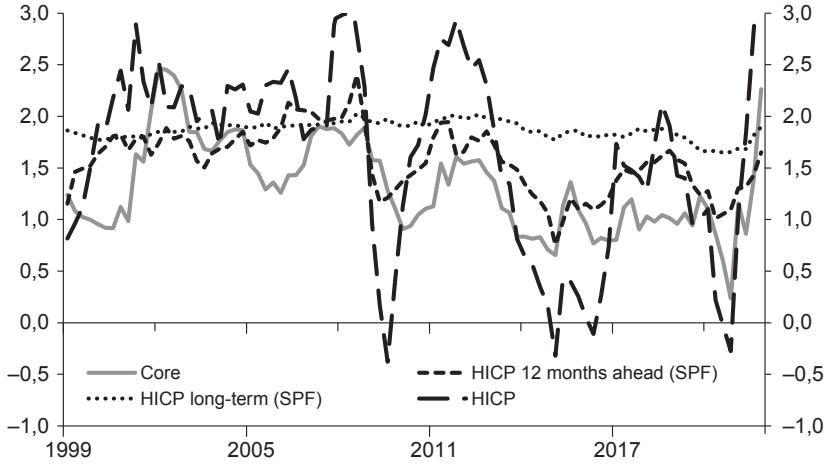
Hartmann and Smets (2019) show that the Orphanides rule has corresponded remarkably well to the ECB's interest rate decisions over the past 20 years. The increase in policy rates in 1999 and 2000 and the subsequent fall, the pause in 2004-2005, the rise starting in 2006, the sharp and large fall in 2008 and 2009, and the slight increase in 2011, as well as the fall in 2012, are all captured fairly well by this simple interest rate reaction function. Not surprisingly, the correspondence was less striking in July 2012, when interest rates reached 0% and only relatively small further reductions into negative territory were deemed feasible due to the effective lower bound.

Hartmann and Smets (2019) show that the good fit of the Orphanides rule holds whether one uses one-year ahead private forecasts from the ECB's Survey of Professional Forecasters (SPF) or the ECB's own macroeconomic projections. They find that one cannot reject the hypothesis that the coefficients are equal to 0.5 on both the inflation forecast and the growth forecast, so the Orphanides rule can be approximated by an expected simple near-term nominal growth rule with a coefficient of 0.5. Hartmann and Smets (2019) also investigated which forecast horizon best explains ECB interest rate decisions and found the one-year ahead forecasts superior to more backward-looking or more forward-looking horizons. This near-term horizon provides a good balance between being anchored in observed data, which enhances verifiability and robustness, and being forward-looking enough to account for transitory shocks and possible measurement error. Finally, Hartmann and Smets (2019) conjecture that there is little else of significance to explain the ECB's interest rate decisions in the past. In other words, the one-year-ahead growth and inflation forecasts appear to be sufficiently good statistics for the wealth of economic, monetary and financial data the ECB analyses to assess the inflation outlook.

We can now use these statistics to explain why policy rates have remained in negative territory and close to the effective lower bound over the last seven years. Chart 2 (below) plots headline and core HICP inflation over the EMU period together with the one-year and five-year ahead SPF inflation forecasts. It shows that since 2013, when short-term money market rates hit the zero-lower bound, the one-year ahead inflation forecast has been persistently below the inflation target of close to 2%. The same has held for core inflation until very recently. The low inflation environment also had an impact on longer-term inflation expectations, as the five-year ahead SPF inflation forecast slipped below 2% by 2013, reaching a minimum of 1.65% shortly after the outbreak of the Covid-2019 pandemic crisis. Similarly, Chart 3 (below) plots real GDP growth together with the one-year and five-year

ahead SPF growth forecasts. The latter can be interpreted as an estimate of the long-term growth potential of the euro area economy. Chart 3 shows that the one-year ahead growth forecast stayed below the potential growth rate until the second half of 2017 and 2018. The positive deviation of growth above its long-run potential in this period was, however, not enough to compensate for the shortfall in the inflation forecast. The Covid-2019 crisis made short-term growth forecasts very erratic and less useful as a sufficient statistic, since the lockdown measures first unexpectedly shut down large parts of the economy and then led to large positive growth forecasts, as it was expected that containment measures would be eased.

Chart 2
Headline and Core Inflation and SPF Forecasts



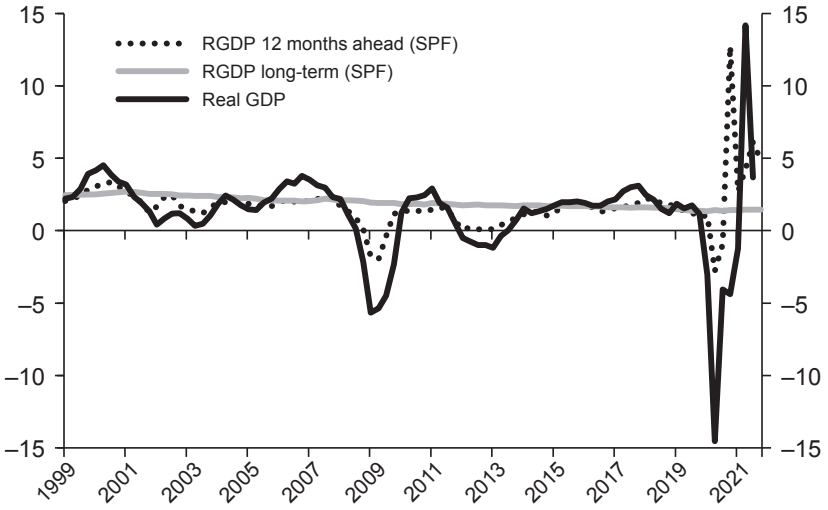
Notes: latest observation: 2021-Q4.

Sources: ECB; SPF.

The subdued growth and inflation outlook since 2013 has required a further easing of monetary policy during a time when money market rates were already bouncing against the zero-lower bound. While the ECB ventured into negative territory as of June 2014, it did so only in smaller steps of 10 bps (base points), reflecting the proximity of an effective lower bound on nominal interest rates (Chart 1 *supra*). At the same time, the ECB took other unconventional policy measures, such as forward guidance on the future path of interest rates, large-scale asset purchases and targeted long-term refinancing operations (TLTROs) to further ease financial conditions and address the disinflationary environment.[1] As a result, the ECB's balance sheet substantially increased during this period. The intensity of these measures varied, however,

with the evolution of the nominal growth outlook. For example, the ECB decided to stop net asset purchases in 2018 when the gap between the expected nominal growth rate and its long-term trend narrowed.

Chart 3
Euro Area Real GDP Growth and One-Year and Five-Year Ahead SPF Growth Forecasts
(year-on-year, %)



Notes: latest observation: 2021-Q4.

Sources: ECB; SPF.

So, the simple answer to the question of why policy rates have remained so low since 2013 is that the inflation outlook has remained persistently low. However, this raises a new question: Why was the decline in nominal interest rates to negative values not sufficient to push up nominal spending and eventually allow nominal interest rates to rise again towards the average levels of the pre-global financial crisis period? This is addressed in the next section.

THE FALL IN R, THE ELB AND PERSISTENTLY LOW INFLATION*

The evidence analyzed during the ECB's monetary policy strategy review (ECB, 2021; Koester *et al.*, 2021) suggests that a combination of interconnected factors is required in order to explain persistently low inflation since 2013. Of direct relevance is the fact that structural developments have lowered the equilibrium real rate of interest – the interest rate consistent with inflation at its target and the economy

operating at its potential – in the euro area and globally. In line with the Fischer equation, a fall in the equilibrium real interest rate reduces the steady-state or long-term nominal interest rate for a given inflation target. In combination with an effective lower bound on the nominal interest rate, this reduces the space available for monetary easing by conventional interest rate policy in the face of disinflationary shocks. It increases the incidence and duration of episodes in which nominal policy-controlled interest rates are close to the effective lower bound, requiring the deployment of additional policy instruments as discussed above.

During the first decade of the EMU, inflation shocks were predominantly to the upside. Since the GFC, there has been a shift towards disinflationary shocks. Cyclical drivers, notably the disinflationary impact of the 2009 and 2012 twin recessions and the emergence of a large output gap and high unemployment, have interacted with ongoing disinflationary structural trends such as globalization, digitalisation and demographic factors, in a context in which the effective lower bound means that those disinflationary shocks cannot easily and sufficiently be offset by interest rate policy. The proximity to the effective lower bound and uncertainty about the effectiveness and side effects of other instruments have restricted the scale and speed of the monetary policy response to those disinflationary shocks, contributing to the persistence of inflation rates below the inflation target. This in turn contributed to lower medium-term inflation expectations, further reinforcing the persistence of the low inflation environment. Moreover, possible ambiguity about the level of the inflation target under the ECB's double-key formulation of the price stability objective and a perception of the objective as being asymmetric may also have contributed to the persistence of low inflation by insufficiently anchoring inflation expectations. Finally, fiscal policies, on the back of debt sustainability concerns, were a drag on growth and inflation in the wake of the sovereign debt crisis.

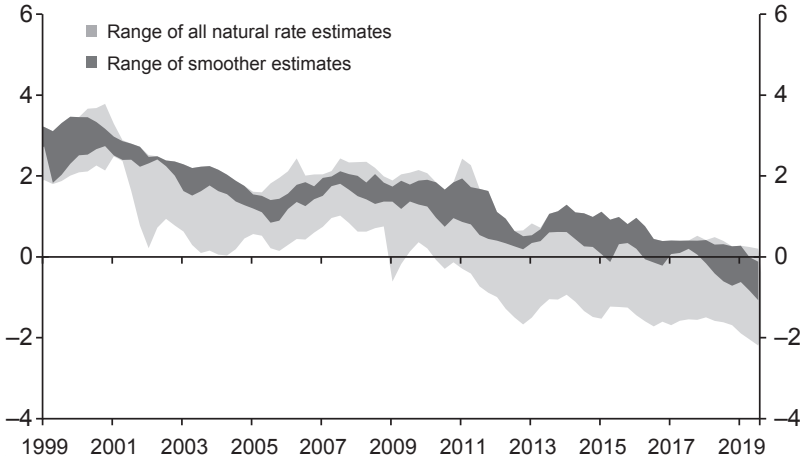
Chart 4 (below) shows various estimates of r* for the euro area from Brand *et al.* (2018). While the uncertainty around the level of r* is large, all estimates point to a significant fall of about three percentage points (pp) since the start of the EMU. Brand *et al* (2018) also survey the determinants of the fall in r*, focusing on the euro area. They come to the overall conclusion that three main factors can explain the fall in r*. The first factor is the fall in the growth rate of potential output. Indeed, as shown in Chart 3 (*supra*), long-term real growth expectations of the euro area economy have fallen by 1 pp (percentage point) from 2.5% (or higher) at the beginning of the EMU to 1.5% (or lower) most recently. Since the growth rate of the economy is lower, less investment is needed

to maintain the appropriate degree of capital accumulation, putting downward pressure on the equilibrium real interest rate. This effect may have been further exacerbated by the increasing importance of intangible investment. The slowdown in potential growth can explain about one third of the drop in r* in the euro area.

A second significant factor is the ageing population. Since the start of the EMU, life expectancy at birth has increased by four to five years for both men and women, while the old-age dependency ratio (i.e. the share of old-age to working-age population) has increased by almost 10 pp. Lower mortality rates mean that individuals expect to live longer so that *ceteris paribus*, depending on the benefits put in place by pension schemes and assuming foresight, individuals increase their savings in anticipation of a longer retirement period. This may be partly offset if the age composition of the population shifts towards relatively older individuals who are dissaving. Overall, overlapping generation models that incorporate such ageing effects suggest that the ageing population may have contributed between 80 to 100 bps to the drop in r* (e.g. Bielecki *et al.*, 2018). A third important factor has been the rise in risk aversion and the greater demand for safe assets, particularly following the GFC, which has resulted in an increasing gap between interest rates on safe assets, such as government bonds, and the rate of return on risky assets and capital.

These results are broadly confirmed by Marx *et al.* (2021), who perform a comprehensive model-based analysis for the fall in r* in the United States and the euro area during the period from the 1980s to the 2010s. For our purpose four findings are worth highlighting. First, the drop in productivity growth and ageing together account for about a 2 pp drop in the level of real rates and the return on capital. Second and interestingly, the model finds that leverage has pushed interest rates up by as much as 2 pp in the U.S. and 3 pp in the euro area. This finding is consistent with the observed increases in public and private debts over the last forty years, but is shown to be less relevant over the past two decades in the euro area. Third, they show that a large increase in the risk aversion of investors is necessary to make sense of the divergence between the risk-free rate and the return on capital. They refer to Guiso *et al.* (2018) for evidence that the trauma effect of the 2008 crisis has increased the risk aversion of a large percentage of investors. Finally, they also point to a drop in the variance of inflation and an increase in the correlation between real and nominal shocks to explain as much as 2 to 3 pp in the drop of the euro area riskless rate from the 1980s to the 2000s. However, the effect of this "hedging" mechanism has declined since 2010, together with the correlation between productivity and inflation shocks.

Chart 4
Estimates of Euro Area Longer-Run Equilibrium Real Interest Rate, r*
(% per annum)



Notes: ranges span point estimates across models to reflect model uncertainty and no other source of r* uncertainty. The dark shaded area highlights smoother r* estimates that are statistically less affected by cyclical movements in the real rate of interest. Latest observation: 2019Q4.

Source: for references to the underlying studies, see Brand *et al.* (2018).

The above-mentioned studies focus on domestic factors in the drop of the euro area equilibrium real interest. In a largely globalized capital market, the equilibrium real interest rate will of course also be driven by global factors, as shown by Del Negro *et al.* (2019). This may bring other determinants into the picture, such as the rise in inequality in the US as highlighted by Mian *et al.* (2021), or the global savings glut, as emphasized by Bernanke (2005). These factors are, however, unlikely to explain the drop in r* in the new millennium.

As mentioned above, a fall in r* pushes the equilibrium nominal interest rate down and thereby increases the probability of hitting the ELB in response to disinflationary shocks. This risks inducing a disinflationary bias in the economy, unless the central bank can neutralize the ELB by using alternative monetary policy measures. One of those measures is to promise to keep interest rates low for longer through interest rate forward guidance, reinforcing the low interest rate environment.

Coenen *et al.* (2021) analyze the implications of a lower r* for macroeconomic stabilization using the New Area Wide Model-II (NAWM-II), a large-scale DSGE (dynamic stochastic general equilibrium) model of the euro area economy. Model-based stochastic simulations provide a rich laboratory for studying the efficacy of state-

dependent forward guidance, state-dependent asset purchases and state-dependent fiscal stimulus when episodes during which nominal rates are stuck at their effective lower bound are much more frequent. The findings suggest that, if left unaddressed, the lower bound can cause substantial macroeconomic distortions. They confirm that in the current environment, with historically low nominal and real interest rates, the ELB can amplify the impact of adverse shocks on inflation and GDP growth, leading to elevated deflation and recession risks and noticeable downward biases in the respective predictive distributions. The larger the detrimental effects due to the lower bound, the lower the equilibrium real interest rate: as the equilibrium real rate falls from 2% to 0%, the frequency of lower-bound episodes rises from 10.3% to 24.0%, and the Root Mean Squared Deviations (RMSDs) for inflation and the output gap increase from 2.9% and 6.0% to 4.2% and 8.6%, respectively. These inflated RMSDs reflect both sizeable shortfalls in the means of the respective steady-state distributions (i.e. a disinflationary bias), as well as markedly higher standard deviations, and can help explain the persistent low inflation environment in the euro area since the GFC.

Regarding the stabilization effects of the different state-dependent policies, forward guidance on interest rates, if fully credible, is found to be most powerful and can largely undo the distortions due to the lower bound. Such strong forward guidance may not be realistic, though, given also the "forward-guidance puzzle" of New Keynesian dynamic stochastic general equilibrium (DSGE) models (Del Negro *et al.*, 2019), which concerns the often implausibly major effects of forward guidance within this class of models. But a combination of a weaker form of forward guidance with limited credibility, large-scale asset purchases, as well as fiscal stimulus, is almost equally effective, especially when asset purchases can enhance the credibility of the forward-guidance policy through a signaling effect. In the long run, with a permanently lower equilibrium real interest rate and recurrent long-lived lower-bound episodes, a combination of all three policies is needed to materially reduce the lower-bound distortions. For an equilibrium real rate equal to zero, the combination of policies results in a marked reduction in the average RMSD for inflation and in the output gap from 6.4% to 4.6%, even though noticeable shortfalls in the respective means persist. In accordance with the "low-for-longer" prescription of the forward-guidance policy, the time the short-term nominal rate stays at the lower bound rises from 24% to about 31% and the average duration of lower-bound episodes increases from around 9.5 to 17.5 quarters. The average amount of assets purchased is reasonable, as is the average size of the fiscal stimulus, but the

ultimate amount of asset purchases needed can still be substantial in extreme circumstances, with asset holdings exceeding 45% of annual GDP even when fiscal stimulus of more than 3% of GDP helps to keep them contained.

CONCLUSION

Why have policy rates been so persistently low in the euro area? In line with the findings of the ECB's monetary policy strategy review, we have argued that the global low equilibrium real interest rate environment and the presence of an effective lower bound on nominal interest rates have limited the ability of conventional interest rate policy to respond to disinflationary demand and supply shocks following the sovereign debt crisis. Together with the initially timid use of alternative policy measures, this has led to a persistent low inflation environment with less-anchored inflation expectations and policy rates stuck at the lower bound. The new ECB monetary policy strategy recognizes the importance of taking into account the implications of the ELB in its reaction function. When the economy is close to the lower bound, effective monetary policy requires especially forceful and persistent monetary policy measures to avoid negative deviations from the inflation target becoming entrenched. The more persistent use of accommodative monetary policy may also imply a transitory period in which inflation is moderately above target. In September 2021, the ECB translated the need for persistence in a revised formulation of its forward guidance. The first signs of the impact of the new strategy are encouraging, since both the one-year and five-year ahead SPF inflation forecasts have moved closer to the 2% inflation target. This supports the expectation that, in line with ECB forward guidance, eventually policy-controlled interest rates may leave negative territory and converge at their new steady state. However, the level of that steady state remains uncertain. Current estimates of r* between 0% and –1% and an inflation target of 2% suggest a moderately positive level between 1% and 2%. A number of factors, such as the positive impact of accelerated digitalization on euro area productivity growth and the rise in public and private investment driven by the Next Generation EU plan may put upward pressure on r*. But if higher private debt in the post-pandemic period leads to more inequality and higher savings and if the pandemic crisis and climate change are associated with higher risk aversion, r* may fall further. Fortunately, the Orphanides rule discussed in section 2 does not rely on estimates of r*, and policy-controlled interest rates will naturally evolve to the level consistent with stabilization of nominal growth around a level consistent with potential growth and the 2% inflation target.

NOTE

1. See Hartmann and Smets (2019) and Rostagno *et al* (2022) for a detailed description of ECB monetary policy in this period.

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