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Did 'transitory' inflation change the speed of interest rate adjustments? Evidence from developed economies

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Abstract

This study examines the evolution of central bank reaction functions in response to the inflation surge that followed the Covid-19 pandemic, with particular focus on interest rate smoothing behaviour. Using a Bayesian estimation of a New Keynesian model, we analyse monetary policy between 2000 and 2025 in 14 developed economies: Australia, Canada, Switzerland, the Czech Republic, the euro area, the United Kingdom, Hungary, Japan, New Zealand, Norway, Poland, Romania, Sweden, and the United States. Our research focuses on time-varying parameters governing interest rate smoothing behaviour. We identify pronounced shifts during two critical phases: the monetary tightening cycle of 2022–2023 and the subsequent easing phase beginning in 2024. Our results indicate that several central banks deviated from their historical policy behaviour, opting for more abrupt adjustments. Furthermore, during the easing phase, we observe a striking convergence across nearly all economies in the sample, with central banks reducing policy rates more rapidly than implied by their historical reaction functions.

Keywords: monetary policy, central banks, Taylor rule, interest rate smoothing, policy inertia, reaction function

JEL: E43, E52, E58, E31, C32

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1. Introduction

The inflation shock that followed the Covid-19 pandemic represents one of the most significant challenges for monetary policy in modern central banking. After more than a decade of low inflation, accommodative interest rates, and subdued wage growth, central banks were confronted with a sharp increase in prices that turned out to be larger and more persistent than initially anticipated. What was widely perceived as a transitory phenomenon in early 2021 evolved into a broad-based, multi-year rise in consumer prices, prompting monetary authorities to reassess prevailing frameworks for shock responses and to revisit questions related to policy timing, credibility, and flexibility.

We analyse changes in central bank reaction functions using a Bayesian framework across 14 advanced and emerging economies. Our study includes Australia, Canada, Switzerland, the Czech Republic, the euro area, the United Kingdom, Hungary, Japan, New Zealand, Norway, Poland, Romania, Sweden, and the United States. The objective is to trace the evolution of the interest rate smoothing parameter within the Taylor-rule framework before, during, and after the recent inflation surge. We examine the extent to which monetary authorities, confronted with a common external shock but operating under heterogeneous institutional and structural conditions, deviated from their historically entrenched practice of policy inertia.

We examine whether the long-standing pattern of interest rate smoothing, typically reflected in a high autoregressive coefficient (ρ) in Taylor-type rules, weakened during two distinct phases: (i) the monetary tightening cycle of 2022–2024 and (ii) the easing phase that began in 2023 as inflationary pressures subsided. Our findings indicate that a solid number of central banks exhibited deviations from their reaction functions. In both cases, policy rates were increased at a pace difficult to reconcile with historical patterns, suggesting a substantial break from the standard gradualistic approach. These adjustments were marked by more abrupt changes in the reaction function compared to the smoother transitions observed in more stable times.

The delay of the monetary tightening cycle may have long-lasting effects on monetary authorities worldwide. The monetary easing phase is faster compared to historical standards. We see a convergence in policy frameworks evident in the parallel shift from tightening to easing once disinflation sets in. A potential adverse consequence of a rapid shift toward monetary easing is an increased risk of economic overheating and a renewed resurgence of inflation.

The remainder of the paper is organized as follows. Section 2 reviews the theoretical foundations of monetary-policy inertia and surveys recent empirical contributions on crisis responses. Section 3 describes the data and empirical strategy employed to estimate time-varying reaction-function parameters. Section 4 presents the results, highlighting cross-country differences during the tightening phase and the striking synchronization observed during the easing cycle. Section 5 concludes with implications for the design of future monetary frameworks and for the credibility of inflation-targeting regimes in emerging Europe.

2. Literature review

This section reviews the existing literature and seeks to explain the rationale behind central bankers' expectations concerning the nature of the global inflation surge observed between 2021 and 2022.

In the early stages of the inflation increase, central banks like the Federal Reserve (Fed) or the European Central Bank (ECB), expected the rise in prices to be temporary. They communicated it through the label 'transitory'. However, consumer price indices accelerated at rates not seen in decades, reigniting both public and scholarly debates over the appropriate monetary policy response. Finally, it took more than three years for inflation to be consistent or close to the central banks' target.

To understand the rationale behind this policy response, it is crucial to consider the concept of the central bank reaction function, an analytical tool that describes how monetary authorities adjust short-term interest rates in response to deviations in inflation and output from their target levels. The most widely used specification is the Taylor rule (Taylor 1993), which prescribes systematic increases in interest rates in response to elevated inflation and a positive output gap. However, frameworks derived from New Keynesian models emphasize the forward-looking nature of monetary policy, underscoring the role of inflation expectations and anticipated economic conditions in guiding interest rate decisions (Clarida, Galí, Gertler 1999; Woodford 2011). Under conditions of heightened uncertainty, such forward-looking elements become even more critical in shaping central bank behaviour.

High volatility in expectations requires monetary policymakers to respond to trends rather than noise. Such a requirement justified a process of interest rate smoothing – one of the most frequently observed features of monetary policy reaction functions. Empirical studies consistently find that central banks adjust policy rates gradually, often incorporating lagged interest rates into monetary policy rules. This phenomenon is commonly interpreted as reflecting deliberate policy inertia rather than purely mechanical adjustment costs. Such an approach reduces the risk of large policy mistakes and allows policymakers to update information as new data becomes available (Rudebusch 2002). It also allows for responses to risks that are not visible in, for example, inflation and output gap data (Gerlach-Kristen 2004). This policy also helps to manage expectations and influence long-term interest rate (English, Nelson, Sack 2003). However, every action (even inaction) has its costs. Early contributions (Cecchetti 2000; Clark, Goodhart, Huang 1999) emphasize that overly cautious policy responses may reduce the effectiveness of monetary policy, particularly during periods characterized by large or persistent shocks.

This dilemma became significant when assessing inflation during the pandemic crisis. In early 2021, this forward-looking approach helped to justify the non-reactive approach to rising prices. First, literature suggested that inflation expectations, widely acknowledged as a key driver of current inflation in the New Keynesian Phillips Curve (NKPC), remained firmly anchored (Christiano, Eichenbaum, Evans 2005; Clarida, Galí, Gertler 1999; Smets, Wouters 2007). Central banks interpreted this as a signal that inflationary dynamics were unlikely to become self-sustaining.

Second, empirical models consistently demonstrated that inflation exhibits a small degree of inertia, with past inflation influencing current outcomes (Fuhrer 1997; Rudd, Whelan 2005; Sbordone 2002). This backward-looking component implied that even if prices temporarily increased due to external factors, inflation would subside gradually as those effects waned. Moreover, the literature on interest rate smoothing suggests that under greater uncertainty regarding the parameters of the Phillips curve, a more gradual and stable monetary policy tends to perform better (Levin, Williams 2003).

Third, the link between inflation and real economic activity had weakened significantly in the two decades preceding the pandemic, a phenomenon widely described as the flattening of the Phillips curve (Blanchard 2016; Coibion, Gorodnichenko 2015). With this reduced sensitivity, many economists argued that temporary output fluctuations or cost shocks would have a limited and short-lived effect on inflation.

However, the decision not to tighten monetary policy during that period cannot be fully explained by theoretical frameworks. An analysis of the monetary policy timelines of the Fed and the ECB reveals that, despite mounting inflationary pressures, both institutions maintained a largely non-reactive stance for the majority of 2021, lasting over six months. A detailed chronology of these policy decisions is presented in Table 1.

Was such a deviation unnatural? Not exactly. Central banks often deviate from mechanical rules and instead pursue judgment-based, state-contingent strategies that account for nature and the expected persistence of shocks. Departures from standard monetary policy reaction functions during periods of crisis can be interpreted both as a sign of policy flexibility and as a potential source of credibility risk. On the one hand, strict adherence to estimated reaction functions, such as the Taylor rule, may be suboptimal during extraordinary macroeconomic disturbances. Crisis episodes are often characterized by structural breaks, heightened uncertainty, and nonlinear economic dynamics that are not fully captured by standard policy frameworks. In such circumstances, discretionary deviations may allow central banks to respond more effectively to financial instability, liquidity shortages, or sudden demand collapses.

Therefore, it is worth presenting the broader context behind these events. Work by Andre et al. (2022; 2026) identifies three dominant explanations that circulated among economists and policymakers to account for the rise in global inflation following the Covid-19 pandemic. These explanations, while analytically distinct, often coexisted in public discourse and shared one critical feature: they framed the observed inflation as temporary. The first line of reasoning emphasized supply-side disruptions as the primary driver. Global production and logistics networks experienced unprecedented strain due to pandemic-related shutdowns, port bottlenecks, semiconductor shortages, and spikes in transportation costs. In parallel, energy prices, especially oil and gas, rose sharply amid geopolitical tensions and supply constraints. Empirical studies confirm that such shocks tend to have strong, but short-lived, effects on inflation, particularly in advanced economies (Adekoya, Oliyide 2020; Santacreu, LaBelle 2022; Zakaria, Khiam, Mahmood 2021).

The second explanation pointed to the demand-side dynamics that followed the lifting of pandemic restrictions (pent-up demand). During lockdowns, household consumption plummeted, and precautionary savings increased. Once restrictions eased, a sharp rebound in spending followed, leading to temporary demand pressures in sectors with constrained supply (Auerbach, Gorodnichenko, Murphy 2020; Shapiro 2020). This pattern of intertemporal substitution was viewed as self-limiting in the absence of sustained wage growth or credit-driven overheating.

The third perspective emphasized the role of expansive fiscal policy, implemented at an unprecedented scale to counter the economic fallout of the pandemic. Large-scale direct transfers, stimulus checks, and furlough schemes significantly boosted household disposable income in many advanced economies, raising aggregate consumption. Some researchers argued that this fiscally induced demand shock was not adequately accounted for in pre-crisis policy frameworks and may have contributed to unexpected inflationary pressure (Laumer, Philipps 2024). However, fiscal multipliers are known to vary depending on economic context. Studies show that government spending is more inflationary during periods of high resource utilization and low debt than in high-debt or recessionary environments (Atems 2019; Bańkowski et al. 2023). Given the slack in labour markets and the still--fragile recovery in early 2021, many economists expected the fiscal impulse to fade over time, reducing its long-term effect on inflation.

All in all, both the theoretical logic of modern monetary policy and the prevailing diagnosis of inflation's underlying causes pointed to modest reactions. The characterization of inflation as 'transitory' became a broad-based consensus supported by economic models, empirical regularities, and institutional judgment. However, as inflation persisted well into 2022, this consensus began to unravel, prompting a rapid reassessment of risks, expectations, and the central banks' own policy stance.

The present study contributes to this literature by examining whether the degree of policy smoothing structurally changed during the post-pandemic inflation period and how these changes interact with inflation dynamics within a New Keynesian framework.

3. Methodology

This section describes our approach to assessing monetary policy decisions within the New Keynesian macroeconomics. We attempt to use the model with three equations: the NKPC, the IS curve, and a Taylor rule with time-varying interest rate smoothing. We attempt to check the behaviour of smoothing preferences.

The first equation of the system is the NKPC. Such a model usually assumes a price setting under monopolistic competition. It postulates that firms adjust their prices infrequently, leading current inflation to depend on both forward-looking expectations and real marginal costs, often proxied by the output gap. A typical hybrid specification, which incorporates elements of backward-looking behaviour to better fit empirical data, takes the form presented in Equation (1):

$$\pi_t = \gamma_f \cdot \pi^e_{t+1} + \gamma_b \pi_{t-1} + \kappa \cdot mc_t + e_{1,t} \tag{1}$$

where:

π_t – the current inflation rate,
π^e_{t+1} – the expected future inflation,
π_{t-1} – the lagged inflation,
mc_t – the real marginal cost or a measure of economic slack,
γ_f – the degree of forward-looking behaviour in price setting,
γ_b – the degree of inflation persistence and backward-looking inflation expectations.
κ – the sensitivity of inflation to marginal costs.

Empirical research has shown that including both expectations and lagged terms improves the explanatory power of inflation equations (Christiano, Eichenbaum, Evans 2005; Galí, Gertler 1999; Smets, Wouters 2007).

The second equation is the IS curve, which encapsulates the intertemporal optimization behaviour of households. It reflects how the output gap responds to fluctuations in the real interest rate, which influences consumption and investment decisions. The dynamic form of the IS curve is presented in Equation (2):

$$x_t = \gamma_f \cdot x^e_{t+1} - \frac{1}{\sigma} \cdot \left(i_t - \pi^e_{t+1} - r^N_t \right) + e_{2,t} \tag{2}$$

where:

x_t – the output gap,
i_t – the nominal interest rate,
π^e_{t+1} – the expected inflation rate,
r^N_t – the natural rate of interest, representing the real rate consistent with output at potential and stable inflation,
σ – the elasticity of intertemporal substitution.

When the real interest rate $(i_t - \pi^e_{t+1})$ exceed r^N_t, households are incentivized to defer consumption, reducing output below potential. The output gap usually is driven by forward-looking inflation expectations (Clarida, Galí, Gertler 1999; Woodford 2011).

Finally, monetary policy is conducted in line with the Taylor rule. The first version introduced by John Taylor (1993) links the short-term interest rates to deviations of inflation from its target and of output from its potential in line with Equation (3):

$$i_t = r^* + \pi_t + \alpha\left(\pi_t - \pi^*\right) + \beta\left(y_t - y^*\right) \tag{3}$$

where:

i_t – the nominal policy rate,
r^* – the equilibrium real interest rate,
π_t – the observed inflation rate,
π^* – the central bank's inflation target,
$y_t - y^*$ – the output gap,
α, β – the responsiveness of monetary policy to inflation and output fluctuations.

Original calibration set $\alpha = \beta = 0.5$, $r^* = 2\%$, and implies a nominal policy rate of 4% when the economy is at its target.

The original specification has spawned several variations. Several studies attempt to match the information available at the decision date (McCallum 2000; Orphanides 2001, 2003). To sidestep the uncertainty surrounding potential output, some authors use the unemployment gap, invoking Okun's law (Orphanides, Williams 2007; Taylor 1999). Finally, forward looking components in the rule is frequently replaced with contemporaneous inflation expectations and output gaps, usually identified with instrumental variables or GMM techniques (Baranowski 2008; Garcia-Iglesias 2007). Most studies employ hybrid rules that blend backward- and forward-looking, reflecting the mixed information sets central banks confront in real time.

The modern Taylor rule also includes an autoregressive term to account for interest-rate-smoothing (Castelnuovo 2007; Clarida, Galí, Gertler 1999; Levin, Williams 2003; Rudebusch, Sack, Swanson 2007; Woodford 2011). Such a formulation assumes that central banks limit market volatility to preserve credibility. This behaviour is captured by augmenting *t* original Taylor rule with the component presented in Equation (4):

$$i_t = \rho i_{t-1} + (1-\rho) \cdot \alpha\left(\pi_t - \pi^*\right) + \beta\left(y_t - y^*\right) \tag{4}$$

where:

ρ – the degree of smoothing.

A higher value of ρ implies greater inertia in interest rate changes, as policymakers place more weight on the previous period's interest rate. Estimates from various studies consistently find ρ to lie between 0.7 and 0.9 for most advanced and emerging economies, suggesting that policy inertia is a systematic and empirically relevant feature of monetary conduct.

This smoothing behaviour has important macroeconomic implications. On the one hand, gradualism contributes to financial market stability and reduces volatility in long-term interest rates by anchoring expectations. On the other hand, it may delay the policy response needed to counteract inflationary pressures or output fluctuations, especially when inflation deviates persistently from the target. These trade-offs were brought into sharp focus during the post-pandemic inflation shock, when central banks were forced to navigate a highly uncertain macroeconomic environment while managing public expectations (Giannone, Primiceri 2024). To account for such phenomena, we allow for fluctuations in the interest rate smoothing preference parameter. Its evolution follows an autoregressive process presented in Equation (5):

$$\rho_t = \delta_\rho \cdot \rho_{t-1} + u_t \tag{5}$$

Our analysis adopts the simplified three-equation representation of the New Keynesian model as proposed by Clarida, Galí, and Gertler (1999). This formulation integrates the time-varying Taylor rule into the following system:

$$\begin{aligned} \pi_t &= \gamma_f \cdot \pi^e_{t+1} + \left(1-\gamma_f\right)\pi_{t-1} + \kappa \cdot mc_t + e_{1,t} \\ x_t &= \gamma_f \cdot x^e_{t+1} - \frac{1}{\sigma}\cdot\left(i_t - \pi^e_{t+1} - r^N_t\right) + e_{2,t} \\ i_t &= \rho_t \cdot i_{t-1} + \left(1-\rho_t\right)\cdot\left(\delta_\pi \cdot \pi_t + \delta_x \cdot x_t\right) + e_{3,t} \end{aligned} \tag{6}$$

In this system, inflation π_t depends on forward- and backward-looking components with the sum of parameters equal to one. Finally, the third equation includes the time varying parameter ρ_t, which captures the changing degree of policy inertia. This formulation offers a coherent and parsimonious way to estimate central banks' reaction functions using observed macroeconomic data and maintains theoretical consistency with the key New Keynesian DSGE models (Christiano, Eichenbaum, Evans 2005; Galí 2015; Smets, Wouters 2007). The time-varying structural parameters regarding smoothing enable identification of shifts in the response function.

The disturbance terms in the model equations are specified as AR(1) processes, allowing for persistent structural shocks. In particular, the error term in the Phillips curve captures supply-side or markup shocks affecting inflation dynamics; the disturbance in the Taylor rule represents monetary policy shocks reflecting deviations from systematic policy behaviour; and the error term in the IS curve corresponds to demand shocks driving fluctuations in real economic activity.

Finally, as a robustness check, we estimate several alternative model specifications. In particular, one specification adopts a forward-looking monetary policy rule in which central banks respond not to contemporaneous inflation and the output gap, but to their expected future values (Batini, Haldane 1999). In frequentist econometric approaches, forward-looking monetary policy rules are typically proxied using available consensus forecasts (Knotek et al. 2016; Nikolsko-Rzhevskyy 2011). By contrast,

the Bayesian framework allows us to assume rational expectations on the part of policymakers, whereby current expectations are inferred from future realizations of the relevant variables, subject to estimated observation errors. In such a setup, the third equation of the model has the following form:

$$i_t = \rho_t \cdot i_{t-1} + (1-\rho_t) \cdot \left(\delta_\pi \cdot \pi^e_{t+4} + \delta_x \cdot x^e_{t+4}\right) + e_{3,t} \tag{7}$$

Finally, we allow all three Taylor-rule parameters to vary over time by introducing autoregressive processes for responses to inflation and the output gap. It should be emphasized that this specification may be associated with weaker identification, reflected in a reduced effective sample size during posterior sampling.

3.1. Priors

The system is estimated using a Bayesian structural model implemented in the Stan probabilistic programming framework. The prior distributions for the Taylor rule parameters are chosen to reflect standard assumptions in monetary policy literature. The inflation coefficient δ_π is assigned with a normal prior with mean 1.5 and standard deviation 0.3, consistent with the empirical findings from, for example, Smets and Wouters (2007). The output gap coefficient, lows a normal distribution with mean 0.5 and standard deviation 0.25. The interest rate smoothing parameter is modelled via a latent variable transformed through a logistic function to constrain it within the (0.7–0.95) interval.

The remaining structural parameters, standard informative priors are applied. The discount factor β follows Beta distribution with mean and standard deviation at 1.5. At the stage of estimating more advanced models, such as those incorporating forward-looking monetary policy or three time-varying parameter (TVP) processes, we employed more informative priors derived from a normal distribution with a mean of 0.5 and a standard deviation of 0.2. The slope of the Phillips curve κ has a normal prior with mean 0.05 and standard deviation 0.02. The inverse of the intertemporal elasticity of substitution, is assigned a normal prior with mean 1.0 and standard deviation 0.3.

The standard deviations of the structural shocks, monetary policy, demand, and cost-push shocks, are all given inverse gamma priors with shape and scale parameters set to (2, 0.01). This is a common, weakly informative choice that ensures positivity while allowing for moderate uncertainty and heavy tails. If shocks based on the inverse Gamma distribution resulted in unsatisfactory R-hat statistics, we instead employed a truncated normal distribution.

We repeat the analysis for 14 economies: Australia, Canada, Switzerland, the Czech Republic, the euro area, the United Kingdom, Hungary, Japan, New Zealand, Norway, Poland, Romania, Sweden, and the United States. Each set of parameters was estimated independently.

3.2. Data used for the estimation

This subsection describes the dataset used in the empirical estimation. For European Union countries, we rely on data from Eurostat, while for other developed economies we use datasets from the OECD. Each model is estimated using three time series: the policy interest rate, quarterly inflation changes, and the output gap.

The interest rate series is constructed from a de-annualized monthly interbank rate, which closely tracks the prevailing level of the policy rate and contains no explicit expectations component regarding future policy decisions. Inflation is measured using two alternative indicators: the headline HICP/CPI index and a core inflation measure that excludes food and energy prices. Finally, the output gap is computed using the Hodrick-Prescott filter applied to real GDP, with the smoothing parameter set to $\lambda = 1600$.

Estimation of the model is conducted independently for each economy. In total, this involves performing 28 regressions in the standard model specification (14 where inflation is represented by the CPI index and 14 where core inflation is used). The process is then repeated with 28 equations incorporating a forward-looking rule and another 28 equations with three time-varying parameters' processes. However, in the case of the latter specification, correct identifications were difficult to obtain, which is why we present them only for the more stable blocks (the US and the Eurozone in the Appendix).

4. Results

This section describes the results of our estimation. To identify changes in the monetary policy response function after an inflation surge and subsequent disinflation, we examine the evolution of the interest rate smoothing parameter ρ, which governs the degree of inertia in monetary policy.

Our estimation indicates that central banks generally display passive policy behaviour. The results point to consistently high interest rate smoothing across most jurisdictions during normal periods, with estimates clustering between 0.95 and 0.98, depending on the policy rule. Our research highlights that the estimation results are similar both in the case of the classic Taylor rule and the very forward-looking condition with a response to inflation forecast four quarters ahead. Notably, these policy characteristics remain relatively stable over time, regardless of changes in the composition of the Monetary Policy Council; the estimated parameters at the beginning of the decade closely resemble those at its end. Within the Central and Eastern European region, Romania emerges as the most responsive to current economic conditions. It should be noted that this is the least developed of the economies surveyed. These findings are summarized in Table 2.

More pronounced changes of the parameter are visible during periods of economic stress, notably the 2008–2009 global financial crisis and the 2021–2023 inflation shock. We observe temporary drops in ρ, suggesting a strategic shift away from gradualism toward more immediate rate adjustments. The Appendix presents the estimated values of ρ from 2000 to 2025 separate for each country.

The estimation reveals an interesting pattern: in countries where monetary authorities typically respond more swiftly to incoming data, such as the United States, Australia, and Canada, periods of sharp policy easing or tightening are often preceded by a temporary increase in interest rate inertia. This finding suggests that, during moments of heightened uncertainty, central banks tend to adopt a wait-and-see approach, delaying the initiation of a new policy cycle slightly to avoid premature or misguided actions. Such behaviour, however, has important consequences. In our opinion monetary policy exhibits here Minsky-style moments, where the central bank is forced to compensate for earlier inertia through abrupt shifts in its reaction function. This pattern was also particularly evident in 2022.

Table 3 quantifies the changes in ρ between the pre-inflation baseline (2019) and the minimum values reached during the tightening cycle (2022–2023). Our models indicate a decline in the coefficient in all the economies surveyed except Romania. In five of the countries surveyed, the differences amount to several points. These adjustments point to a departure from standard reaction due to rising inflation risks, weaker inflation expectation anchoring, and the limited institutional tolerance for prolonged overshooting. Models assuming highly forward-looking rules and rational expectations indicate smaller changes in behaviour than backward-looking ones.

The shock associated with the Covid-19 pandemic appears to have generated considerably smaller differences in central bank responses than the Global Financial Crisis of 2009. Most of the central banks reverted to their usual levels of inertia following crisis periods, and the magnitude a timing of these deviations varied. It is worth noting that the behaviour is slightly correlated with interest rates. Central banks in Central and Eastern Europe, particularly tended to adjust more aggressively and earlier than, for example, Riksbank. Nonetheless, the structure and direction of their responses remained broadly consistent with the historical approach.

The shock resulting from a sharp shift in the reaction function in 2022 altered policymakers' behaviour in subsequent cycles of monetary easing or tightening. The easing cycle that began in 2023 was marked by notable convergence amongst the central banks. All the sampled central banks initiated rate cuts with relatively synchronized timing, accompanied by modest but widespread reductions in ρ. This suggests that easing was not only a response to disinflation and slowing growth, but also driven by shared behavioural concerns, such as elevated deficits and increasing pressure to contain sovereign borrowing costs.

Table 4 shows a remarkably uniform response during the easing cycle. Between early 2024 and 2025, all central banks reduced their smoothing parameters, typically by 0.03 to 0.04 points. Hungary is the only case where ρ increased marginally, perhaps signalling a cautious stance after a highly aggressive earlier cycle. In the case of the model with very high forward expectations, we also observe an increase in the smoothing parameters in the Eurozone.

The overall trend nevertheless points to a synchronized easing strategy. Although macroeconomic convergence, especially ongoing disinflation, has enabled such coordination, a rapid and simultaneous move toward monetary easing may increase the risk of economic overheating and trigger a premature resurgence of inflation.

However, these results should be interpreted with caution due to significant uncertainty surrounding the measurement of the output gap, particularly toward the end of the sample period. Estimates of economic slack are especially prone to revision in real time, which may affect the reliability of the inferred reaction function parameters.

One should also remember that Bayesian estimations are associated with important identification challenges. In particular, time varying parameters are only weakly identified by macroeconomic data, meaning that the likelihood function tends to be relatively flat over a wide range of values. This problem is especially pronounced for parameters related to forward-looking components, such as the coefficient on expected inflation in the NKPC or the degree of interest rate smoothing in the Taylor rule. This phenomenon implies that posterior distributions may be driven by the assumed prior distributions. The issue is particularly relevant in more complicated DSGE frameworks (e.g. Podkaminer 2021; Stiglitz 2018), where multiple structural parameters can affect observable variables in similar ways, further

complicating identification and increasing the sensitivity of results to model specification and prior choices. An interesting, though controversial, critique by McDonald and Shalizi (2022) shows that not all parameters of widely used DSGE models – such as the Smets-Wouters model – can be perfectly identified, even when very long simulated datasets are generated from a data-generating process fully consistent with the underlying economic theory.

5. Conclusions

This study investigates how central banks adjusted their reaction functions in response to the post--pandemic inflation surge. Using a Bayesian estimation of a simple New Keynesian model with time--varying interest rate smoothing, we examine the extent to which monetary authorities deviated from their historically gradual approach to interest rate setting, particularly during two key phases: the tightening cycle of 2022–2023 and the subsequent easing phase beginning in 2024.

Our empirical strategy focusses on estimating the time-varying interest rate smoothing parameter within the Taylor rule framework. The findings indicate that the widespread adoption of the 'transitory' inflation narrative during the early stages of the inflation shock contributed to delayed policy tightening and ultimately necessitated more abrupt monetary adjustments once inflation pressures proved persistent. The analysis shows that central banks implemented mote aggressive tightening compared to its historical reaction function.

Our models also highlight that the recent easing phase reveals an unexpected level of alignment in monetary policy decisions across the countries analyzed. This convergence appears to reflect the rising impact of common external factors. However, such coordinated and rapid loosening of policy may elevate the risk of overheating and trigger a renewed build-up of inflationary pressures. Additionally, a diminished role of policy inertia could weaken the credibility of inflation-targeting regimes.

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Appendix

Table 1
Monetary policy actions of the Fed and ECB, 2021–2025

Policy stance	Date	Key event/statement	Institution	Source
Inflation seen as transitory	April 2021	FOMC: "inflation has risen, largely reflecting transitory factors"	Fed	(FED 2021a)
	July 2021	New symmetric 2% inflation target with tolerance for temporary overshooting	ECB	(ECB 2021b)
	August–October 2021	Continued use of 'transitory' language despite rising inflation	Fed	(FED 2021b, 2021c)
	October–December 2021	ECB continues to call inflation temporary despite 4.5% + HICP	ECB	(ECB 2021a, 2021c)
Shift in assessment	November 2021	Powell: "time to retire the word transitory"; tapering acceleration signalled	Fed	(Powell 2021)
	December 2021	'Transitory' removed from FOMC statement; taper accelerated	Fed	(FED 2021d)
Beginning of tightening	January 2022	Fed signals rate hikes and balance sheet reduction	Fed	(FED 2022b)
	March 2022	First rate hike since 2018 (+25 bps); taper ends	Fed	(FED 2022a)
	July 2022	First ECB rate hike in 11 years (+50 bps); persistence of inflation acknowledged	ECB	(ECB 2022a)
Active tightening	September–December 2022	Both central banks deliver large rate hikes (Fed: 75 bps, ECB: similar)	Fed, ECB	(FED 2022c, 2022d, 2022e; ECB 2022b, 2022c, 2022d)
	March 2023	Philip Lane: inflation persistence underestimated; supply shocks not as short-lived	ECB	(Lane 2023, p. 2)
	July 2023	Final hike (5.25–5.50%); inflation decline; cautious tone continues	Fed	(FED 2023)
	Spring 2024	Focus on inflation expectations and credibility of monetary policy	ECB	(Lagarde 2024)
Start of easing	June 2024	First rate cut (-25 bps); inflation outlook improves markedly	ECB	(ECB 2024)
	May–June 2025	ECB continues rate cuts; Fed keeps rates on hold; inflation near targets	Fed, ECB	(ECB 2025; FED 2025)

Source: own study.

Table 2
Interest rate smoothing parameter (ρ) in selected countries

Propensity to ease interest rates							
Standard specification – CPI in monetary policy rule							
	AUS	**CAN**	**CHE**	**CZE**	**EA**	**GBR**	**HUN**
Average 2010–2014	0.96	0.96	0.98	0.98	0.97	0.96	0.95
Average 2015–2019	0.97	0.97	0.98	0.98	0.98	0.98	0.95
	JPN	**NOR**	**POL**	**ROU**	**SWE**	**USA**	
Average 2010–2014	0.99	0.97	0.96	0.79	0.97	0.97	
Average 2015–2019	0.99	0.97	0.96	0.79	0.98	0.97	
Forward looking specification – CPI in monetary policy rule							
	AUS	**CAN**	**CHE**	**CZE**	**EA**	**GBR**	**HUN**
Average 2010–2014	0.98	0.98	0.98	0.97	0.96	0.97	0.97
Average 2015–2019	0.98	0.98	0.98	0.97	0.99	0.98	0.97
	JPN	**NOR**	**POL**	**ROU**	**SWE**	**USA**	
Average 2010–2014	0.99	0.98	0.96	0.79	0.96	0.98	
Average 2015–2019	0.99	0.98	0.96	0.80	0.98	0.98	

Source: own calculations based on combined data from Federal Reserve Economic Data and Eurostat.

Table 3
Smoothing parameter (ρ) during the monetary tightening (2022–2024)

Propensity to ease interest rates							
Standard specification – CPI in monetary policy rule							
	AUS	**CAN**	**CHE**	**CZE**	**EA**	**GBR**	**HUN**
Beginning of 2019	0.977	0.965	0.980	0.980	0.987	0.985	0.947
Min 2022–2023	0.943	0.964	0.979	0.962	0.959	0.976	0.928
Difference (· 100)	-3.35	-0.18	-0.08	-1.75	-2.80	-0.87	-1.92
	JPN	**NOR**	**POL**	**ROU**	**SWE**	**USA**	
Beginning of 2019	0.988	0.973	0.956	0.791	0.985	0.969	
Min 2022–2023	0.971	0.973	0.951	0.792	0.980	0.968	
Difference (· 100)	-1.75	-0.01	-0.50	0.05	-0.48	-0.02	
Forward looking specification – CPI in monetary policy rule							
	AUS	**CAN**	**CHE**	**CZE**	**EA**	**GBR**	**HUN**
Beginning of 2019	0.977	0.977	0.982	0.973	0.987	0.981	0.975
Min 2022–2023	0.977	0.975	0.981	0.965	0.872	0.979	0.974
Difference (· 100)	-0.06	-0.13	-0.06	-0.79	-11.57	-0.20	-0.06
	JPN	**NOR**	**POL**	**ROU**	**SWE**	**USA**	
Beginning of 2019	0.988	0.978	0.960	0.795	0.982	0.977	
Min 2022–2023	0.986	0.978	0.958	0.795	0.980	0.976	
Difference (· 100)	-0.13	-0.02	-0.23	-0.04	-0.19	-0.13	

Source: own calculations based on combined data from Federal Reserve Economic Data and Eurostat.

Table 4
Smoothing parameter (ρ) during the easing phase (2024–2025)

Propensity to ease interest rates							
Standard specification – CPI in monetary policy rule							
	AUS	**CAN**	**CHE**	**CZE**	**EA**	**GBR**	**HUN**
Beginning of 2024	0.961	0.963	0.979	0.976	0.973	0.976	0.928
Min 2025	0.957	0.963	0.979	0.968	0.965	0.974	0.931
Difference (· 100)	-0.38	-0.06	-0.03	-0.80	-0.85	-0.22	0.29
	JPN	**NOR**	**POL**	**ROU**	**SWE**	**USA**	
Beginning of 2024	0.971	0.973	0.952	0.792	0.979	0.968	
Min 2025	0.969	0.973	0.949	0.791	0.971	0.968	
Difference (· 100)	-0.22	-0.02	-0.25	-0.05	-0.79	-0.05	
Forward looking specification – CPI in monetary policy rule							
	AUS	**CAN**	**CHE**	**CZE**	**EA**	**GBR**	**HUN**
Beginning of 2024	0.977	0.975	0.981	0.966	0.915	0.979	0.974
Min 2025	0.976	0.975	0.981	0.962	0.919	0.978	0.974
Difference (· 100)	-0.02	-0.03	-0.03	-0.36	0.39	-0.17	-0.01
	JPN	**NOR**	**POL**	**ROU**	**SWE**	**USA**	
Beginning of 2024	0.988	0.978	0.958	0.795	0.980	0.976	
Min 2025	0.987	0.978	0.957	0.795	0.975	0.975	
Difference (· 100)	-0.03	-0.02	-0.10	-0.03	-0.45	-0.04	

Source: own calculations based on combined data from Federal Reserve Economic Data and Eurostat.

Model parameters

This appendix presents the parameters of the models discussed in Sections 3 and 4. The main elements of the distributions estimated using Bayesian methods are presented in Tables 5–8.

Table 5
Estimated parameters of Bayesian structural model

Parameter	AUS	CAN	CHE	CZE	EA	GBR	HUN
β	0.51 (0.07) [0.40–0.62] 2282 1.00	0.51 (0.05) [0.42–0.60] 2129 1.00	0.52 (0.11) [0.34–0.70] 1051 1.00	0.50 (0.06) [0.39–0.61] 2257 1.00	0.50 (0.06) [0.40–0.61] 1630 1.00	0.51 (0.10) [0.35–0.68] 454 1.01	0.50 (0.06) [0.41–0.59] 1649 1.00
κ	0.06 (0.02) [0.03–0.09] 1862 1.00	0.04 (0.02) [0.02–0.07] 1586 1.01	0.05 (0.02) [0.02–0.08] 2257 1.00	0.05 (0.02) [0.02–0.08] 2140 1.00	0.02 (0.01) [0.00–0.05] 1781 1.01	0.03 (0.01) [0.01–0.06] 1471 1.00	0.05 (0.02) [0.02–0.08] 1457 1.00
σ	2.12 (0.20) [1.78–2.46] 2703 1.00	1.79 (0.21) [1.46–2.14] 2976 1.00	1.77 (0.22) [1.43–2.13] 2966 1.00	2.16 (0.19) [1.85–2.48] 2766 1.00	1.61 (0.22) [1.28–1.97] 940 1.01	1.51 (0.22) [1.17–1.89] 2373 1.00	1.99 (0.20) [1.67–2.33] 3355 1.00
δ_π	1.30 (0.17) [1.05–1.60] 1357 1.00	1.24 (0.18) [1.02–1.59] 750 1.02	1.26 (0.19) [1.02–1.62] 1734 1.00	1.65 (0.11) [1.48–1.85] 2678 1.00	1.12 (0.11) [1.01–1.34] 2845 1.00	1.22 (0.17) [1.02–1.57] 1904 1.00	1.05 (0.24) [0.69–1.47] 418 1.04
δ_x	0.60 (0.17) [0.32–0.88] 1469 1.00	0.54 (0.14) [0.32–0.79] 1000 1.01	0.39 (0.17) [0.12–0.68] 1307 1.00	0.86 (0.16) [0.59–1.13] 2339 1.00	0.87 (0.12) [0.68–1.07] 2418 1.01	0.48 (0.12) [0.29–0.68] 2052 1.00	0.36 (0.17) [0.09–0.66] 1548 1.01
Parameter	**JPN**	**NOR**	**NZL**	**POL**	**ROU**	**SWE**	**USA**
β	0.49 (0.09) [0.35–0.64] 1735 1.00	0.51 (0.08) [0.38–0.64] 2148 1.00	0.50 (0.07) [0.39–0.61] 1967 1.00	0.50 (0.06) [0.40–0.59] 2001 1.00	0.50 (0.06) [0.40–0.60] 1979 1.00	0.50 (0.08) [0.38–0.64] 1774 1.00	0.51 (0.05) [0.42–0.59] 2283 1.00
κ	0.04 (0.02) [0.01–0.07] 1268 1.00	0.05 (0.02) [0.02–0.08] 1850 1.00	0.05 (0.02) [0.02–0.08] 1822 1.00	0.05 (0.02) [0.02–0.08] 1066 1.00	0.05 (0.02) [0.02–0.08] 1406 1.00	0.04 (0.02) [0.01–0.07] 1490 1.00	0.05 (0.02) [0.02–0.08] 2154 1.00
σ	1.33 (0.22) [0.98–1.71] 2686 1.00	2.03 (0.20) [1.71–2.37] 3136 1.00	1.75 (0.21) [1.41–2.10] 2640 1.00	2.20 (0.21) [1.85–2.55] 1483 1.00	3.05 (0.20) [2.72–3.37] 2483 1.00	1.78 (0.21) [1.45–2.13] 2766 1.00	2.00 (0.20) [1.66–2.34] 3184 1.00
δ_π	1.08 (0.08) [1.01–1.23] 1943 1.00	1.28 (0.20) [1.03–1.67] 1375 1.01	1.35 (0.22) [1.04–1.76] 1598 1.01	1.18 (0.21) [0.84–1.52] 1189 1.01	1.17 (0.21) [0.84–1.54] 1764 1.00	1.11 (0.10) [1.01–1.31] 1915 1.00	1.22 (0.17) [1.01–1.55] 1582 1.00
δ_x	0.22 (0.08) [0.09–0.35] 2087 1.01	0.52 (0.18) [0.23–0.82] 2118 1.00	0.58 (0.19) [0.27–0.92] 587 1.04	0.62 (0.18) [0.33–0.92] 1834 1.02	0.46 (0.19) [0.15–0.79] 1181 1.00	0.91 (0.17) [0.58–1.16] 2000 1.04	0.67 (0.16) [0.41–0.94] 2750 1.00

Notes:
The first row reports the posterior mean of each parameter along with its standard deviation. The second row presents the 5^{th}–95^{th} percentile credible interval. The final row reports the effective sample size (ESS) and the $\hat{R}$ convergence statistics.

Table 6
Estimated parameters of Bayesian structural model with core inflation

Parameter	AUS	CAN	CHE	CZE	EA	GBR	HUN
β	0.52 (0.07) [0.40–0.64] 1641 1.00	0.50 (0.07) [0.39–0.61] 2094 1.00	0.52 (0.13) [0.34–0.74] 1984 1.00	0.50 (0.06) [0.39–0.61] 2209 1.00	0.48 (0.08) [0.35–0.62] 1757 1.00	0.53 (0.11) [0.35–0.72] 1860 1.00	0.49 (0.06) [0.39–0.59] 1919 1.00
κ	0.06 (0.02) [0.02–0.09] 1594 1.00	0.03 (0.01) [0.01–0.06] 1143 1.00	0.05 (0.02) [0.02–0.08] 1750 1.00	0.04 (0.02) [0.01–0.07] 1708 1.00	0.02 (0.01) [0.00–0.05] 1796 1.00	0.03 (0.01) [0.01–0.06] 1749 1.00	0.04 (0.02) [0.01–0.07] 1399 1.00
σ	2.09 (0.21) [1.77–2.46] 2432 1.00	1.60 (0.21) [1.26–1.96] 2267 1.00	1.70 (0.21) [1.36–2.05] 2895 1.00	2.03 (0.22) [1.67–2.38] 1967 1.05	1.47 (0.21) [1.14–1.83] 3065 1.00	1.49 (0.21) [1.16–1.85] 2501 1.00	1.97 (0.25) [1.57–2.38] 1023 1.04
δ_π	1.35 (0.18) [1.07–1.65] 1317 1.01	1.29 (0.19) [1.04–1.64] 693 1.01	1.20 (0.16) [1.02–1.52] 1276 1.00	1.30 (0.28) [0.86–1.77] 1878 1.00	1.30 (0.24) [0.93–1.70] 1721 1.00	1.24 (0.18) [1.02–1.58] 1915 1.01	1.41 (0.25) [1.01–1.84] 2598 1.00
δ_x	0.71 (0.17) [0.42–0.98] 1040 1.00	0.47 (0.16) [0.23–0.75] 331 1.04	0.43 (0.18) [0.15–0.73] 1800 1.00	0.56 (0.17) [0.30–0.84] 1574 1.00	0.69 (0.11) [0.52–0.89] 2324 1.00	0.50 (0.12) [0.32–0.71] 1170 1.00	0.37 (0.16) [0.12–0.65] 1665 1.00
Parameter	**JPN**	**NOR**	**NZL**	**POL**	**ROU**	**SWE**	**USA**
β	0.48 (0.10) [0.34–0.64] 2079 1.00	0.50 (0.10) [0.34–0.67] 1710 1.00	0.50 (0.07) [0.39–0.61] 1278 1.00	0.50 (0.07) [0.37–0.62] 2089 1.00	0.48 (0.06) [0.38–0.59] 1779 1.01	0.46 (0.08) [0.33–0.61] 1333 1.00	0.51 (0.06) [0.40–0.61] 1515 1.00
κ	0.04 (0.02) [0.01–0.07] 1639 1.00	0.04 (0.02) [0.01–0.08] 1718 1.00	0.04 (0.02) [0.02–0.07] 1603 1.00	0.04 (0.02) [0.01–0.07] 1807 1.00	0.04 (0.02) [0.01–0.08] 39 1.01	0.04 (0.02) [0.01–0.07] 784 1.00	0.05 (0.01) [0.02–0.07] 1957 1.00
σ	1.27 (0.23) [0.92–1.67] 2479 1.00	1.84 (0.20) [1.51–2.17] 3018 1.00	1.75 (0.21) [1.42–2.10] 3030 1.00	1.96 (0.24) [1.58–2.36] 981 1.05	2.59 (0.20) [2.28–2.92] 1921 1.01	1.73 (0.20) [1.41–2.06] 2716 1.00	1.77 (0.21) [1.43–2.12] 2845 1.00
δ_π	1.09 (0.08) [1.00–1.25] 1813 1.00	1.29 (0.21) [1.03–1.69] 1555 1.01	1.37 (0.23) [1.05–1.80] 1242 1.02	1.27 (0.19) [0.97–1.60] 1490 1.01	1.46 (0.29) [0.99–1.94] 2238 1.01	1.21 (0.17) [1.01–1.53] 1416 1.00	1.28 (0.20) [1.02–1.66] 1094 1.02
δ_x	0.26 (0.08) [0.13-0.39] 1695 1.01	0.53 (0.18) [0.25–0.82] 1427 1.00	0.54 (0.18) [0.26–0.85] 560 1.02	0.58 (0.16) [0.33–0.84] 1919 1.01	0.47 (0.20) [0.13–0.79] 32 1.03	0.84 (0.13) [0.63–1.07] 1430 1.00	0.57 (0.15) [0.34–0.82] 1076 1.03

Notes:
The first row reports the posterior mean of each parameter along with its standard deviation. The second row presents the 5^{th}–95^{th} percentile credible interval. The final row reports the effective sample size (ESS) and the $\hat{R}$ convergence statistics.

Table 7
Estimated parameters of Bayesian model with forward looking expectations

Parameter	AUS	CAN	CHE	CZE	EA	GBR	HUN
β	0.51 (0.07) [0.40–0.63] 1962 1.00	0.51 (0.06) [0.41–0.60] 2162 1.00	0.52 (0.11) [0.35–0.71] 1714 1.00	0.50 (0.07) [0.39–0.61] 846 1.00	0.51 (0.07) [0.40–0.61] 1573 1.00	0.52 (0.10) [0.37–0.69] 1688 1.00	0.50 (0.06) [0.39–0.59] 172 1.01
κ	06 (0.02) [0.03–0.09] 1538 1.00	0.04 (0.02) [0.02–0.07] 273 1.00	0.05 (0.02) [0.02–0.08] 1897 1.00	0.05 (0.02) [0.02–0.08] 1989 1.00	0.03 (0.01) [0.00–0.05] 1797 1.00	0.03 (0.02) [0.01–0.06] 1257 1.00	0.05 (0.02) [0.02–0.08] 1602 1.00
σ	(0.20) [1.77–2.43] 2782 1.00	1.77 (0.21) [1.44–2.12] 2940 1.00	1.76 (0.21) [1.44–2.12] 2893 1.00	2.16 (0.20) [1.83–2.49] 2992 1.00	1.60 (0.22) [1.26–1.97] 2721 1.00	1.51 (0.22) [1.17–1.88] 2948 1.00	1.98 (0.20) [1.66–2.32] 2198 1.00
δ_π	1.28 (0.20) [1.02–1.66] 2070 1.00	1.28 (0.20) [1.02–1.66] 346 1.01	1.23 (0.18) [1.02–1.57] 2117 1.00	1.38 (0.42) [0.75–2.06] 2000 1.46	1.43 (0.19) [1.14–1.75] 2116 1.00	1.31 (0.21) [1.03–1.70] 2342 1.00	1.25 (0.19) [1.02–1.63] 1728 1.01
δ_x	0.42 (0.18) [0.13–0.73] 1635 1.00	0.37 (0.16) [0.12–0.64] 1822 1.00	0.47 (0.17) [0.19–0.76] 1253 1.01	0.38 (0.18) [0.09–0.69] 1496 1.03	0.23 (0.11) [0.06–0.44] 416 1.01	0.31 (0.17) [0.07–0.62] 267 1.04	0.45 (0.19) [0.14–0.76] 1935 1.00
Parameter	**JPN**	**NOR**	**NZL**	**POL**	**ROU**	**SWE**	**USA**
β	0.50 (0.09) [0.35–0.65] 1742 1.00	0.50 (0.07) [0.38–0.63] 1630 1.00	0.50 (0.07) [0.38–0.61] 2177 1.00	0.50 (0.06) [0.40–0.60] 857 1.00	0.50 (0.06) [0.40–0.60] 2042 1.00	0.49 (0.08) [0.36–0.63] 1671 1.01	0.51 (0.05) [0.42–0.59] 2148 1.00
κ	0.04 (0.02) [0.01–0.07] 2105 1.00	0.05 (0.02) [0.02–0.08] 1698 1.00	0.05 (0.02) [0.02–0.07] 1929 1.00	0.05 (0.02) [0.02–0.08] 1617 1.00	0.05 (0.02) [0.02–0.08] 1664 1.00	0.04 (0.02) [0.01–0.07] 1907 1.00	0.05 (0.02) [0.02–0.08] 1904 1.00
σ	1.34 (0.23) [0.97–1.74] 2474 1.00	2.02 (0.21) [1.69–2.36] 3123 1.00	1.74 (0.21) [1.40–2.11] 3051 1.00	2.17 (0.22) [1.81–2.53] 1517 1.00	3.03 (0.20) [2.70–3.36] 2915 1.00	1.76 (0.21) [1.43–2.11] 3081 1.00	1.99 (0.21) [1.66–2.35] 2847 1.00
δ_π	1.09 (0.08) [1.01–1.24] 2021 1.00	1.28 (0.20) [1.02–1.65] 2337 1.00	1.39 (0.23) [1.06–1.81] 1908 1.01	1.23 (0.28) [0.79–1.71] 951 1.01	1.70 (0.30) [1.18–2.18] 2449 1.01	1.33 (0.28) [0.83–1.78] 1713 1.11	1.25 (0.18) [1.02–1.60] 2262 1.00
δ_x	0.13 (0.07) [0.02–0.26] 1850 1.00	0.41 (0.17) [0.13–0.71] 1696 1.00	0.26 (0.15) [0.04–0.54] 2009 1.01	0.37 (0.17) [0.10–0.68] 2006 1.00	0.47 (0.20) [0.15–0.81] 1418 1.00	0.27 (0.16) [0.04–0.57] 102 1.10	0.51 (0.18) [0.21–0.81] 2141 1.00

Notes:
The first row reports the posterior mean of each parameter along with its standard deviation. The second row presents the 5^{th}–95^{th} percentile credible interval. The final row reports the effective sample size (ESS) and the $\hat{R}$ convergence statistics.

Table 8
Estimated parameters of Bayesian model with forward-looking expectations and monetary policy response to core inflation

Parameter	AUS	CAN	CHE	CZ	EA	GBR	HU
β	0.52 (0.07) [0.41–0.64] 2201 1.01	0.49 (0.07) [0.38–0.60] 2002 1.00	0.53 (0.13) [0.34–0.75] 1896 1.00	0.50 (0.06) [0.40–0.60] 2221 1.00	0.50 (0.09) [0.37–0.65] 1987 1.00	0.54 (0.12) [0.35–0.75] 1323 1.00	0.49 (0.06) [0.39–0.59] 1860 1.00
κ	0.06 (0.02) [0.03–0.09] 2013 1.00	0.03 (0.01) [0.01–0.05] 1642 1.00	0.05 (0.02) [0.02–0.08] 1586 1.00	0.04 (0.02) [0.01–0.07] 1879 1.00	0.02 (0.01) [0.00–0.05] 1490 1.00	0.03 (0.02) [0.01–0.06] 1512 1.00	0.04 (0.02) [0.01–0.07] 1426 1.00
σ	2.09 (0.20) [1.77–2.43] 2817 1.00	1.58 (0.21) [1.24–1.94] 2932 1.00	1.68 (0.21) [1.36–2.04] 2534 1.00	2.00 (0.22) [1.64–2.38] 1608 1.01	1.46 (0.21) [1.13–1.82] 2887 1.00	1.49 (0.21) [1.15–1.85] 2631 1.00	1.98 (0.25) [1.54–2.36] 412 1.05
δ_π	1.29 (0.20) [1.03–1.67] 1539 1.01	1.34 (0.22) [1.04–1.75] 2154 1.00	1.20 (0.17) [1.01–1.54] 2230 1.00	1.29 (0.29) [0.81–1.79] 2086 1.00	1.57 (0.19) [1.26–1.89] 1555 1.00	1.34 (0.22) [1.04–1.75] 1765 1.00	1.19 (0.30) [0.70–1.69] 2139 1.00
δ_x	41 (0.18) [0.13–0.72] 1798 1.00	0.29 (0.15) [0.06–0.56] 1802 1.01	0.49 (0.17) [0.21–0.78] 2091 1.00	0.41 (0.19) [0.12–0.73] 1633 1.00	0.26 (0.10) [0.10–0.43] 2538 1.00	0.41 (0.16) [0.16–0.67] 1118 1.01	0.38 (0.18) [0.10–0.70] 1561 1.00
Parameter	**JPN**	**NOR**	**NZL**	**POL**	**ROU**	**SWE**	**USA**
β	0.50 (0.11) [0.33–0.68] 130 1.01	0.51 (0.10) [0.34–0.68] 1366 1.00	0.50 (0.07) [0.39–0.61] 1940 1.00	0.49 (0.08) [0.37–0.63] 2012 1.00	0.49 (0.07) [0.39–0.60] 1732 1.00	0.50 (0.08) [0.36–0.64] 1936 1.00	0.51 (0.06) [0.40–0.61] 2129 1.00
κ	0.04 (0.02) [0.01–0.08] 101 1.01	0.04 (0.02) [0.01–0.07] 1509 1.00	0.04 (0.02) [0.02–0.07] 1864 1.00	0.04 (0.02) [0.01–0.07] 1500 1.00	0.04 (0.02) [0.01–0.07] 1424 1.00	0.04 (0.02) [0.01–0.07] 1559 1.00	0.05 (0.01) [0.03–0.07] 2159 1.00
σ	1.26 (0.22) [0.91–1.64] 2645 1.00	1.83 (0.20) [1.50–2.17] 2271 1.00	1.74 (0.20) [1.41–2.09] 2675 1.00	1.94 (0.24) [1.55–2.35] 1120 1.02	2.58 (0.19) [2.27–2.90] 2571 1.00	1.69 (0.20) [1.37–2.05] 2933 1.00	1.76 (0.21) [1.43–2.11] 2753 1.00
δ_π	1.09 (0.08) [1.00–1.26] 1584 1.00	1.33 (0.21) [1.04–1.71] 1559 1.00	1.43 (0.24) [1.07–1.86] 1055 1.00	1.40 (0.24) [1.02–1.82] 1115 1.00	1.51 (0.30) [1.02–1.98] 2015 1.00	1.51 (0.23) [1.14–1.91] 2778 1.00	1.33 (0.21) [1.04–1.72] 1992 1.02
δ_x	0.17 (0.08) [0.04–0.31] 231 1.00	0.38 (0.18) [0.10–0.69] 1540 1.01	0.25 (0.15) [0.04–0.52] 1866 1.00	0.37 (0.17) [0.10–0.66] 1052 1.00	0.48 (0.19) [0.17–0.80] 1521 1.00	0.18 (0.11) [0.02–0.39] 1821 1.00	0.53 (0.18) [0.23–0.83] 1156 1.02

Notes:
The first row reports the posterior mean of each parameter along with its standard deviation. The second row presents the 5^{th}–95^{th} percentile credible interval. The final row reports the effective sample size (ESS) and the $\hat{R}$ convergence statistics.

Smoothing parameters

This appendix presents the time-varying evolution of the interest rate smoothing parameter in the Taylor rule. The results of the two specifications (basic and forward-looking) are presented separately. Each version of the model is estimated using two inflation measures (CPI and core).

Figure 1
Time series of the interest rate smoothing parameter ρ, 2000–2025

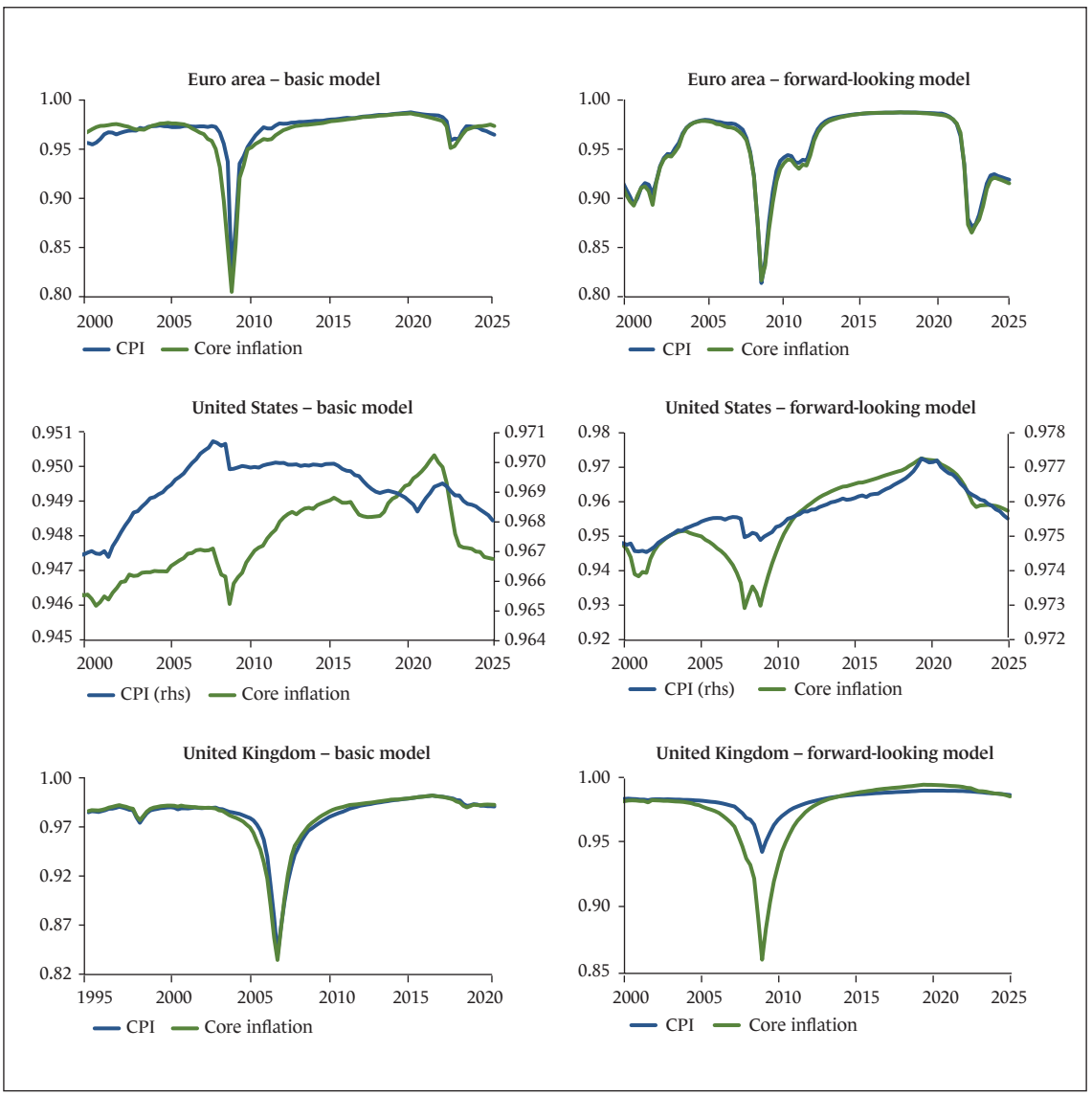
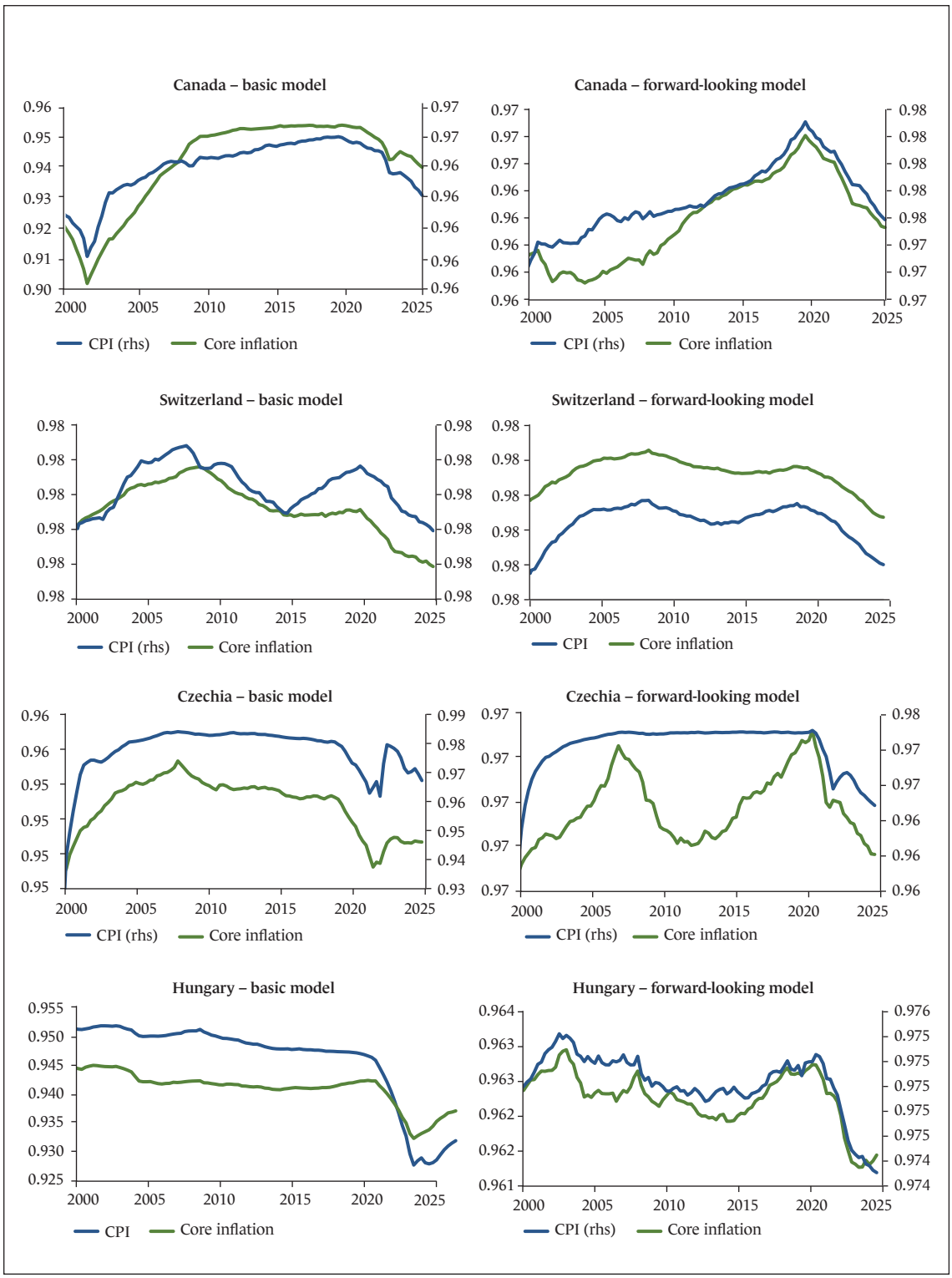


Figure 1, cont'd



Figure 1, cont'd

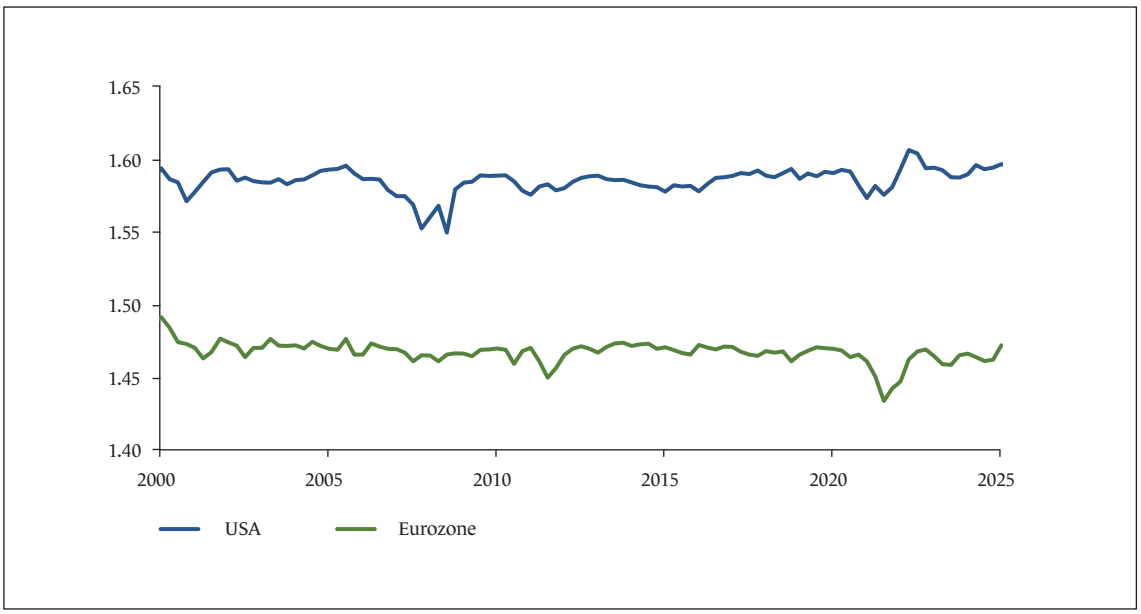


Source: own calculations based on combined data from Federal Reserve Economic Data and Eurostat.

Response to inflation parameters

This appendix presents the estimation of the inflation response parameter modelled as a time-varying parameter. The reliable identification of more than one time-varying process was achieved only for a moderate number of countries; therefore, we report the results exclusively for the euro area and the United States. Our model suggests relatively smaller fluctuations in the inflation response coefficient over time – these are displayed on the Figure 2.

Figure 2
Response to inflation – time varying process



Czy „przejściowy” charakter inflacji zmienił tempo dostosowań stóp procentowych? Dowody z gospodarek rozwiniętych

Streszczenie

Celem artykułu jest ilościowa ocena, w jaki sposób epizod inflacji po pandemii COVID-19 przełożył się na zmianę funkcji reakcji polityki pieniężnej w wybranych gospodarkach rozwiniętych. Autorzy koncentrują się na kluczowym parametrze nowoczesnych reguł Taylora – stopniu wygładzania stóp procentowych.

Artykuł jest osadzony w literaturze neokeynesowskiej, która opisuje inflację jako wynik interakcji oczekiwań inflacyjnych, luki popytowej i szoków podażowych. Autorzy pokazują, że narracja *transitory inflation* była spójna z dominującym wówczas konsensusem teoretycznym i empirycznym. Konsensus wskazujący, że oczekiwania inflacyjne są mocno zakotwiczone przy celu banku centralnego, wnioski o ograniczonej inercji inflacji w badaniach nad krzywą Phillipsa oraz spłaszczona relacja między inflacją a realną aktywnością gospodarczą sprzyjały bagatelizowaniu trwałości szoku. Jednocześnie wyjątkowa kombinacja zaburzeń podażowych (łańcuchy dostaw, ceny energii), silnego popytu po odmrożeniu gospodarki oraz luźnej polityki fiskalnej tworzyła środowisko, w którym inflacja okazała się trwała.

Na gruncie analitycznym autorzy stosują model neokeynesowski obejmujący: (1) hybrydową krzywą Phillipsa, (2) dynamiczną krzywą IS oraz (3) regułę Taylora rozszerzoną o element wygładzania stopy procentowej. Parametr wygładzania jest modelowany jako proces zmienny w czasie, co pozwala identyfikować zarówno stopniowe, jak i skokowe zmiany inercji polityki pieniężnej w reakcji na kolejne epizody kryzysowe. Model jest estymowany metodami bayesowskimi (stan) na danych kwartalnych z lat 2000–2025 dla 14 gospodarek globalnych.

Wyniki estymacji wskazują, że w stabilnych czasach banki centralne charakteryzują się wysokim stopniem inercji polityki. Średnie wartości parametru wygładzania w latach 2010–2014 i 2015–2019 mieszczą się dla większości banków centralnych w przedziale 0,95–0,98, a ich zmiany w czasie były niewielkie. Oznacza to preferowanie małych, przewidywalnych kroków w zmianach stóp procentowych oraz dążenie do minimalizacji krótkookresowej zmienności rynkowej. Wyraziste zmiany parametru wygładzania pojawiają się w okresach silnych wstrząsów. Globalny kryzys finansowy 2008–2009 oraz epizod inflacyjny po 2021 r. pokazują, że w takich momentach stopień inercji istotnie maleje. Oznacza to odejście od dotychczasowego gradualizmu na rzecz serii dużych, szybkich podwyżek stóp procentowych, będących spóźnioną korektą po wcześniejszej bierności w obliczu narastającej inflacji oraz pogarszającego się zakotwiczenia oczekiwań.

Drugi ważny wynik dotyczy fazy łagodzenia polityki po szczycie inflacji. Analiza okresu 2023–2025 pokazuje zaskakująco dużą zbieżność zachowań banków centralnych. Wszystkie badane gospodarki rozpoczynają cykl obniżek stóp w relatywnie wąskim oknie czasowym. Autorzy argumentują, że tak silna synchronizacja wynika z doświadczeń „przejściowej” inflacji – błędy z tamtego okresu osłabiły tradycyjny gradualizm polityki pieniężnej. Częściowo zsynchronizowane łagodzenie polityki zwiększa ryzyko ponownego nasilenia presji inflacyjnej, a ponowne zaskoczenie wysokim wzrostem może podważać wiarygodność reżimów bezpośredniego celu inflacyjnego.

Autorzy zaznaczają, że przedstawione wnioski należy interpretować z ostrożnością. Ograniczenia wynikają przede wszystkim z niepewności szacunku luki popytowej i innych zmiennych nieobserwowalnych, rewizji danych makroekonomicznych w czasie rzeczywistym oraz specyficznych założeń dotyczących parametrów strukturalnych modelu. Mimo tych zastrzeżeń badanie wnosi istotny wkład do literatury, pokazując, że epizod „przejściowej" inflacji miał wpływ na kształt funkcji reakcji banków centralnych oraz na skalę dopuszczalnej inercji polityki pieniężnej w obliczu dużych, trudnych do przewidzenia wstrząsów.

Słowa kluczowe: polityka pieniężna, banki centralne, reguła Taylora, wygładzanie stóp procentowych, inercja polityki, funkcja reakcji