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Sensitivity of the Euro OIS Term Structure to ECB Policy Rate Surprises

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Abstract

We analyze the sensitivity of the euro-area yield curve to revisions in market expectations of the ECB policy rate. Using changes in the maintenance-period forward OIS as a market-based measure of policy-rate surprises, we document that yield responses vary systematically across maturities. To interpret these patterns, we adopt a short-rate model with stochastic jumps occurring only at scheduled ECB meeting dates and derive closed-form expressions for the conditional sensitivity of yields to changes in the expected jump size. We compare the model-implied term-structure responses with realized yield changes on days of large revisions in expectations. The model reproduces the cross-sectional shape and magnitude of observed sensitivities, especially the pronounced peak at intermediate maturities, underscoring the importance of incorporating scheduled jump times when modeling interest-rate dynamics.

Keywords: OIS; €STR; ECB; monetary policy surprises; scheduled jumps; term-structure sensitivity.

JEL: E43, E52, G12

*The code used in this work is available at the following link: `https://github.com/MarcoNicolosi1/Sensitivity-of-the-Euro-OIS-Term-Structure-to-ECB-Policy-Rate-Surprises`

1 Introduction

Central banks strive to implement transparent and predictable monetary policies, yet expectations about forthcoming decisions are frequently revised as new macroeconomic, financial, or geopolitical information arrives. Such revisions in expectations can significantly affect money-market conditions and propagate along the entire yield curve. Understanding how these changes in expected policy rates transmit to interest-rate term structures is valuable for several practical applications. Traders can price and hedge event risk more effectively; banks and insurers can improve asset–liability management, discounting, and collateral valuation; and policymakers can quantify how unexpected shifts in expectations propagate across maturities.

We study how changes in expectations about the European Central Bank (ECB) policy rate affect the euro-area interest rate term structure. Our empirical analysis begins with the introduction of the Euro Short-Term Rate (€STR) and extends to the present. To measure revisions in monetary policy expectations, we exploit the variation in the forward rate over the next reserve maintenance period (MP-forward rate). This rate represents the Overnight Indexed Swap (OIS)–implied average overnight rate between the next two maintenance-period boundaries. Since its underlying is €STR, which closely tracks the Deposit Facility Rate (DFR), movements in the MP-forward capture changes in expectations about the level of the policy rate after the next ECB meeting.

We focus on the largest daily changes in the MP-forward rate to identify substantial revisions in expectations about forthcoming ECB decisions. Using this measure, we show that the sensitivity of yields is stronger at intermediate maturities—around two years—and declines both at the short end and toward the long end of the curve. This pattern suggests that market participants expect monetary policy adjustments to be implemented gradually and subsequently reversed over longer horizons.

To interpret these findings, we develop a structural model in which the short rate is constant between ECB meetings and may jump only at meeting dates, with jump sizes driven by a latent Gaussian state vector. This modelling choice is motivated by the behaviour of €STR, which moves almost exclusively when policy changes are implemented.

Our paper relates to two main lines of research in the literature studying how central bank policies affect the yield curve, empirically and through structural term-structure models.

The empirical line of research focuses on the response of interest rates to monetary policy surprises, typically identified using high-frequency changes in futures or OIS rates around policy announcements. For the United States, Kuttner (2001) shows that Treasury yields react primarily to the unexpected component of changes in the federal funds target rate, measured from fed funds futures. Gürkaynak et al. (2005) extend this approach and document that asset prices respond to at least two distinct monetary policy factors: a current "target" factor and a "path" factor related to forward guidance, with longer maturities being particularly sensitive to the latter. Gürkaynak et al. (2007) provide a detailed comparison of market-based measures of policy expectations and show how they can be used to extract near-term policy-rate surprises from futures and OIS prices. In a related contribution, Piazzesi and Swanson (2008) show how futures prices can be interpreted as risk-adjusted forecasts of the future path of monetary policy, highlighting the role of risk premia in the mapping from policy expectations to market rates.

For the euro area, a large literature adopts similar high-frequency identification strategies around ECB Governing Council meetings. Brand et al. (2010) use changes in money-market and OIS rates in tight event windows around policy decisions and press conferences to identify news about both the current policy decision and the expected path of future rates, showing that communication has relevant effects on medium and long maturities. Building on this approach, Altavilla et al. (2019) construct the Euro Area Monetary Policy Event-Study Database and identify multiple ECB monetary policy shocks, including target, timing, forward-guidance, and asset-purchase shocks. They find that short-maturity OIS yields are mostly driven by target and timing shocks, while intermediate and long maturities are especially sensitive to forward-guidance and quantitative-easing shocks. These contributions highlight that the yield curve reacts heterogeneously to different dimensions of monetary policy, and that forward guidance and balance-sheet policies play an important role in shaping longer-term yields.

A second strand of research embeds monetary policy directly into macro–finance term-structure models. Affine no-arbitrage models with macroeconomic factors and explicit policy rules allow one to decompose yields into expected future short rates and term premia, and to assess how policy shocks and changes in the reaction function propagate across maturities; see, among others, the survey in Gürkaynak and Wright (2012). In these models, central bank policy typically affects the short rate through a Taylor-type rule, and yield-curve sensitivity is studied via the joint dynamics of macro factors and term-structure factors under the physical and risk-neutral measures.

More closely related to our work is the literature that incorporates *stochastic jumps at deterministic times* into term-structure models, explicitly reflecting the pre-announced schedule of monetary policy meetings or macroeconomic announcements. Piazzesi (2005) models the federal funds target rate as a jump process with meeting-driven dynamics and shows that such a specification can reproduce the "snake-shaped" volatility profile of U.S. yields and the clustering of yield movements around FOMC meetings. Kim and Wright (2014) develop a model in which yields can jump at known announcement dates, deriving pricing formulas that account for both diffusive and jump components and documenting a hump-shaped response of yields on U.S. employment-report days. In the context of the new risk-free benchmarks, Schlögl et al. (2023) propose a dynamic term-structure model for SOFR in which the short rate exhibits jumps only at scheduled FOMC meetings, and show that including such jumps delivers substantial gains in fitting the SOFR curve and its volatility. Within the euro-area context, Angelini et al. (2025) apply a related jump-at-scheduled-times short-rate model to jointly describe the term structures associated with €STR and EURIBOR. They show that explicitly accounting for the ECB meeting calendar improves the fit of the risk-free curve and captures key features of its volatility term structure. In a more general setting, Fontana et al. (2020) and Fontana et al. (2024) extend the Heath–Jarrow–Morton framework to allow for stochastic discontinuities at predetermined dates, providing no-arbitrage conditions and valuation formulas for a wide class of interest-rate derivatives.

Our paper differs from these contributions in its focus and objective. We concentrate specifically on the sensitivity of the €STR-based OIS term structure to revisions in expectations of the ECB policy rate, with the objective of formulating a structural model that is able to explain the empirical observations. We contribute to the literature along three main directions: empirical, theoretical, and applied. Our empirical contribution consists in measuring the sensitivity of the Euro OIS term structure to revisions in ECB policy expectations using the MP-forward rate and documenting a humped maturity profile with a peak around two years. For the theoretical contribution, we propose a structural short-rate model with deterministic jump times aligned with the ECB meeting calendar, with jump size driven by a latent Gaussian factor and we derive a closed-form expression for the sensitivity of yields to changes in the expected policy rate. Finally, we show how to calibrate the model to market data and how it fits the magnitude and the shape of the empirical sensitivity curve. In particular, it reproduces the hump at intermediate maturities, confirming that scheduled policy discontinuities are essential for accurately modelling Euro-area OIS dynamics. We make the code developed for this application available at the link: `https://github.com/MarcoNicolosi1/Sensitivity-of-the-Euro-OIS-Term-Structure-to-ECB-Policy-Rate-Surprises`.

The rest of the paper is structured as follows. Section 2 presents the data and the empirical results. Section 3 introduces the model and the theoretical results, Section 4 discusses its calibration and compares its capabilities to reproduce the empirical observations. Section 5 concludes.

2 Measuring ECB Policy Surprises

The ECB Governing Council meets on a pre-announced schedule, typically every six weeks, to set the key policy rates: the Deposit Facility Rate (DFR), the Main Refinancing Operations (MRO) rate, and the Marginal Lending Facility rate. The DFR is the overnight rate paid by the Eurosystem on banks' excess reserves. Reserve remuneration follows the so-called *Reserve Maintenance Period*, which begins on the settlement day of the first MRO after a monetary-policy meeting—usually six days after the meeting—and ends at the start of the next maintenance period.

Forward OIS contracts referencing the upcoming maintenance period are regularly traded and allow market participants to hedge or speculate on changes in the DFR expected at the next ECB meeting. We refer to the rate on such contracts as the *maintenance-period forward rate*, or *MP-forward rate*.

Although €STR is closely linked to the DFR, the two rates differ in important ways. The DFR is an administered policy rate set by the Governing Council, whereas €STR is a market-based benchmark derived from actual unsecured overnight borrowing transactions among a broad set of counterparties, many of whom do not have access to the deposit facility. Because of this market segmentation, but also because of residual credit and liquidity frictions, €STR typically trades a few basis points below the DFR, while still moving almost one-for-one with policy decisions. Since €STR does not have an observable term structure, the OIS curve built from €STR-linked contracts is widely regarded as the relevant representation of the euro-area risk-free term structure. In this study, we use the Refinitiv/LSEG zero €STR–OIS curve (London Stock Exchange Group, 2025).

Let f_t denote the MP-forward rate at time t, referring to the first maintenance period following t, and define its daily change as

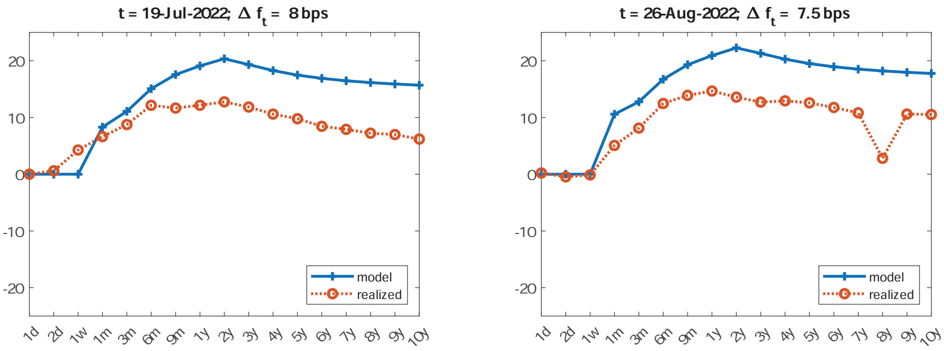
$$\Delta f_t = f_{t+1} - f_t. \tag{1}$$

We use Δf_t as a market-implied measure of surprise change in monetary policy expectations. This approach is motivated by the fact that, as observed by (Piazzesi and Swanson, 2008), the change in the risk premium over a short time period is negligible in comparison to the change in expectations itself. Moreover, the MP-forward rate reflects almost directly revisions in expectations about the next DFR (European Central Bank, 2025).

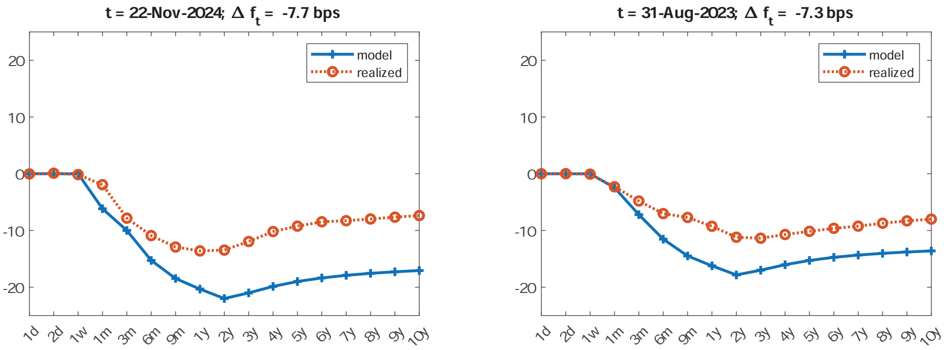
We denote by $y(t, \tau)$ the €STR-based zero-coupon yield observed at time t with maturity τ. The analysis uses 1,380 daily observations of MP-forward rates and zero-coupon yields over the period 2 October 2019, the first publication date of €STR, to 24 September 2025. Maturities range from one day to ten years, for a total of 17 maturity points.

The MP-forward rate has been relatively stable during the sample period: 90% of daily changes lie between -1.3 and 1.4 basis points, and only 1% fall below -4.37 or above 3.10 basis points. This stability reflects the ECB's communication strategy, which aims to minimize policy surprises. Over the same sample, the yield changes are substantially larger. For example, the 1%–99% percentiles of $\Delta y(t, \tau)$ are $[-2.98, 6.14]$ bps for $\tau = 1$ month, $[-13.65, 13.47]$ bps for $\tau = 3$ years, and $[-12.25, 11.81]$ bps for $\tau = 10$ years. The three-year maturity exhibits the fattest tails, consistent with the humped volatility patterns documented, on different datasets, in Kim and Wright (2014); Piazzesi (2005).

We are interested in days that exhibit unusually large revisions in expectations, to observe the corresponding shifts in the yield curve. Figure 1 shows the changes in the term structure on days corresponding to the largest absolute values of Δf_t recorded in our data. The largest positive shift (8 bps) occurred on 19 July 2022, two days before an ECB meeting, reportedly due to growing



(a) Increasing Expectations



(b) Decreasing Expectations

Figure 1: Realized vs. model-implied yield responses across maturities on big-move days.

expectations of a stronger-than-anticipated rate hike amid persistent inflation. The second-largest increase (7.5 bps) occurred on 26 August 2022, fourteen days before the forthcoming meeting, likely reflecting more hawkish messaging from central bankers during the Jackson Hole symposium. The largest negative shift (-7.7 bps) occurred on 22 November 2024, following data indicating a contraction in euro-area economic activity, which led markets to anticipate faster and larger policy cuts. Another significant decline (-7.3 bps) was recorded on 31 August 2023, when markets inferred that the ECB might raise rates less than previously expected at the forthcoming meeting.

For the empirical analysis, we consider as "surprises" the largest revisions in the expectations, and hence we select the days when Δf_t lies below the 5th percentile or above the 95th percentile. This yields 56 negative changes (ranging from -1.7 to -7.7 bps) and 55 positive changes (from 1.4 to 8.0 bps). Table 1 reports the percentiles of the selected days, both for Δf_t and for $\Delta y(t, \tau)$. These statistics show that changes in the yield curve are amplified relative to the changes in Δf_t, with the amplifying factor increasing with maturity.

To quantify the sensitivity of yields to revisions in expectations, we estimate, on the dataset restricted to the surprises, the regressions

$$\Delta y(t, \tau) = \alpha(\tau) + \beta(\tau)\Delta f_t + \varepsilon_t(\tau), \tag{2}$$

for each maturity τ. Figure 2 reports the estimated coefficients $\beta(\tau)$, which confirm the amplification

Table 1: The percentiles of the series obtained after selecting the 111 days of the major shifts of the MP forward rate. The values are in basis points.

	5	25	50	75	95
Δf_t (bps)	-5.88	-2.28	-1.30	2.20	3.88
$\Delta y(t, \tau = 1m)$	-2.51	-1.05	-0.02	1.28	4.61
$\Delta y(t, \tau = 1y)$	-11.72	-4.59	0.10	4.53	11.88
$\Delta y(t, \tau = 10y)$	-12.21	-4.57	0.61	4.49	12.02

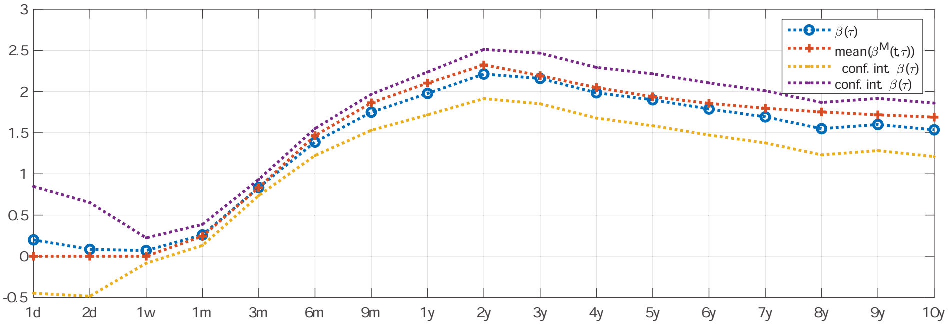


Figure 2: The regression coefficients $\beta(\tau)$ estimated by Equation (2) and their 95% confidence interval. Comparison with the mean with respect to t of the coefficients $\beta^M(t, \tau)$ in Equation (11) produced by the model.

suggested by the percentile analysis[1]. For maturities above one month, the most significant changes in f_t translate into larger movements in yields, and the response increases up to medium maturities. This pattern is consistent with the view that markets expect monetary policy to adjust gradually across several meetings rather than in a single step. In the next section, we propose a model that tries to explain and reproduce these empirical findings.

3 A Short-Rate Model with Jumps at Scheduled Dates

We adopt the short-rate framework introduced by Kim and Wright (2014), recently applied by Schlögl et al. (2023) to model SOFR. The model is a simplified version of the one proposed by Angelini et al. (2025) to study the euro-area risk-free rates. The key feature of this class of models is that the short rate is constant between monetary-policy meetings and may jump only at the scheduled meeting dates. This structure captures the empirical observation that €STR moves almost exclusively when ECB policy decisions are implemented.

Let $(\Omega, \mathcal{F}, \{\mathcal{F}_t\}_{t\geq 0}, P)$ be a filtered probability space. Denote by $\mathcal{T}$ the set of the ECB meeting days. The short rate is assumed to satisfy

$$r_t = r_{t^-} + J_t \mathbf{1}_{\{t\in\mathcal{T}\}}, \qquad J_t = a^\top X_t + w\,\varepsilon_t, \tag{3}$$

where a is a d-dimensional vector, X_t is a d-dimensional latent process, w is a constant, and

[1]The intercepts $\alpha(\tau)$ are not statistically significant at the 95% confidence level, and are not reported for brevity.

$\varepsilon_t \sim \mathcal{N}(0,1)$ are i.i.d. shocks independent of X. Between the dates in $\mathcal{T}$, the short rate remains constant.

The state vector X_t follows the d-dimensional Ornstein–Uhlenbeck process

$$dX_t = K(\bar{X} - X_t)\,dt + \Sigma_X\,dW_t, \tag{4}$$

where K and Σ_X are $d \times d$ matrices, $\bar{X}$ is a d-vector, and W is a d-dimensional Brownian motion under P. The explicit solution to (4) is

$$X_{t+h} = e^{-Kh}X_t + (I - e^{-Kh})\bar{X} + \int_0^h e^{-K(h-s)}\Sigma_X\,dW_{t+s}. \tag{5}$$

Risk-neutral dynamics

The short rate r_t and the state vector X_t are not observable; instead, we observe the €STR-based term structure $y(t,\tau)$, given by

$$y(t,\tau) = -\frac{1}{\tau}\log\left(E_t^Q \exp\Big(-\int_0^\tau r_{t+u}\,du\Big)\right), \tag{6}$$

where Q denotes the risk-neutral measure. We assume that, under Q,

$$J_t = \gamma a^\top X_t + w\,\varepsilon_t,$$

where γ is a constant allowing for different jump loadings under P and Q and that the Q-Brownian motion satisfies

$$dW_t^Q = dW_t + \lambda\,dt,$$

for some d-dimensional market price of risk vector λ. Therefore, the distribution of the state process X_t under Q are the same as those under P, with

$$\bar{X}^Q := \bar{X} - K^{-1}\lambda$$

replacing $\bar{X}$ and, since it is Gaussian, its moment generating function is

$$E_t^Q[\exp(u^\top X_{t+\tau})] = \exp\Big(\Phi^Q(\tau,u) + \Psi^Q(\tau,u)^\top X_t\Big), \tag{7}$$

where

$$\Psi^Q(\tau,u) = e^{-K\tau}u, \qquad \Phi^Q(\tau,u) = u^\top(I - e^{-K\tau})\bar{X}^Q + \tfrac{1}{2}u^\top\Big(\int_0^\tau e^{-Ks}\Sigma_X\Sigma_X^\top e^{-K^\top s}ds\Big)u.$$

Zero-coupon yields

Let $T_1 < \cdots < T_n$ be the scheduled ECB meeting days in the interval $[t, t+\tau)$. As shown in Angelini et al. (2025), the zero-coupon yield can be computed by backward recursion:

$$\begin{aligned} y(t,\tau) = r_t &- \frac{1}{\tau}\Big(G(T_1,\ldots,T_n,t+\tau) + \Phi^Q(T_1{-}t, F(T_1,\ldots,T_n,t+\tau))\Big) \\ &- \frac{1}{\tau}\,\Psi^Q(T_1{-}t, F(T_1,\ldots,T_n,t+\tau))^\top X_t, \end{aligned} \tag{8}$$

where, recursively,

$$\begin{aligned} G(T_k,\dots,T_n,t+\tau) &= \tfrac{1}{2}w^2(t+\tau-T_k)^2 + G(T_{k+1},\dots,T_n,t+\tau) \\ &\quad + \Phi^Q(T_{k+1}-T_k, F(T_{k+1},\dots,T_n,t+\tau)), \\ F(T_k,\dots,T_n,t+\tau) &= -(t+\tau-T_k)a\gamma + \Psi^Q(T_{k+1}-T_k, F(T_{k+1},\dots,T_n,t+\tau)), \end{aligned}$$

with terminal conditions

$$G(T_n,t+\tau) = \tfrac{1}{2}w^2(t+\tau-T_n)^2, \qquad F(T_n,t+\tau) = -(t+\tau-T_n)a\gamma.$$

For notational convenience we rewrite (8) as

$$y(t,\tau) = r_t + A(t,\tau) + Z(t,\tau)X_t, \tag{9}$$

where $A(t,\tau)$ and $Z(t,\tau)$ depend on the scheduled jump times between t and $t+\tau$. If no jump date lies in $[t,t+\tau)$, then $A(t,\tau) = Z(t,\tau) = 0$ and the yield is simply $y(t,\tau) = r_t$.

Conditional sensitivity to changes in policy expectations

In what follows we will use the time-shift operator Δ_h that is defined as $\Delta_h g(t,\cdot) = g(t+h,\cdot) - g(t,\cdot)$ for any function or process g. Let us denote by T_1 the time of the ECB meeting immediately following the current time t, and let h be such that

$$t < T_1 < t+h.$$

From (9),

$$\Delta_h y(t,\tau) = \Delta_h A(t,\tau) + \Delta_h Z(t,\tau)X_t + \Delta_h r_t + Z(t+h,\tau)\Delta_h X_t.$$

Since $T_1 > t+h$, $\Delta_h r_t = 0$. Using (5),

$$\Delta_h X_t = (\Lambda(h) - I)X_t + \mu(h) + \varepsilon(h),$$

where

$$\Lambda(h) = e^{-Kh}, \qquad \mu(h) = (I - e^{-Kh})\bar{X}, \qquad \varepsilon(h) \sim N(0, Q(h)),$$

and

$$Q(h) = \int_0^h e^{-Ks}\Sigma_X\Sigma_X^\top e^{-K^\top s}\,ds.$$

The expected jump in the short rate is

$$\bar{f}_t := E_t[r_{T_1} - r_t] = a^\top(\Lambda(T_1-t)X_t + \mu(T_1-t)).$$

Since $T_1 > t+h$, its increment is

$$\Delta_h \bar{f}_t = a^\top([\Lambda(T_1-(t+h)) - \Lambda(T_1-t)]X_t + \mu(T_1-(t+h)) - \mu(T_1-t) + \Lambda(T_1-(t+h))\Delta_h X_t).$$

Since $\Delta_h y(t,\tau)$ and $\Delta_h \bar{f}_t$ are jointly Gaussian, the conditional expectation is

$$\mathbb{E}_t[\Delta_h y(t,\tau) \mid \Delta_h \bar{f}_t] = \mathbb{E}_t[\Delta_h y(t,\tau)] + \beta^M(t,\tau)\,\Delta_h \bar{f}_t, \tag{10}$$

Table 2: Model parameter estimates.

	Estimate	95%-Confidence Interval	
k^ξ	1.5096	1.4840	1.5351
σ^ξ	4.3006×10^{-3}	4.1704×10^{-3}	4.4307×10^{-3}
k^θ	1.3673	1.3449	1.3897
$\bar{\theta}$	2.0781×10^{-4}	2.0658×10^{-4}	2.0904×10^{-4}
σ^θ	3.3302×10^{-3}	3.1805×10^{-3}	3.4798×10^{-3}
w	2.0674×10^{-3}	1.9034×10^{-3}	2.2315×10^{-3}
ρ	-0.89996	-0.90021	-0.89972
σ	4.0352×10^{-4}	4.0189×10^{-4}	4.0515×10^{-4}
λ^ξ	0.00011	-0.72605	0.72627
λ^θ	-8.9453×10^{-6}	-0.72133	0.72132
γ	0.99974	0.79114	1.2083

where

$$\beta^M(t,\tau) = \frac{\mathrm{Cov}_t(\Delta_h y(t,\tau),\, \Delta_h \bar{f}_t)}{\mathrm{Var}_t(\Delta_h \bar{f}_t)}. \tag{11}$$

Straightforward computation yields

$$\mathrm{Var}_t(\Delta_h \bar{f}_t) = a^\top \Lambda(T_1 - (t+h))\, Q(h)\, \Lambda(T_1 - (t+h))^\top a,$$

$$\mathrm{Cov}_t(\Delta_h y(t,\tau), \Delta_h \bar{f}_t) = Z(t+h,\tau)\, Q(h)\, \Lambda(T_1 - (t+h))^\top a.$$

Thus the model delivers an explicit expression for the expected change in the yield at maturity τ, conditional on a revision $\Delta_h \bar{f}_t$ in policy expectations. In Section 2 we estimated such sensitivities empirically; the next section compares those empirical responses with the model-implied coefficients $\beta^M(t,\tau)$.

4 Model Calibration and Validation

We calibrate the model by means of a standard Kalman filter applied to the time series of the €STR-implied zero-coupon yield curve. We can employ the standard Kalman filter because, as from Formula (9), the yields are linear functions the Gaussian processes X_t and r_t. The transition equations follow from (3) and (5), while the measurement equations are given by (9). The measurement-error standard deviation σ is assumed to be the same across maturities. The calibration uses

We run the calibration process on daily data from 2 October 2019, to 24 September 2025, covering 17 maturities from 1 day to 10 years. We specify the model setting $d = 2$, adopting the parametrization of Angelini et al. (2025), where

$$X_t = \begin{bmatrix} \xi_t \\ \theta_t \end{bmatrix}, \qquad K = \begin{bmatrix} \kappa^\xi & -\kappa^\xi \\ 0 & \kappa^\theta \end{bmatrix}, \qquad \Sigma = \begin{bmatrix} \sigma^\xi & 0 \\ \rho\sigma^\theta & \sqrt{1-\rho^2}\sigma^\theta \end{bmatrix},$$

$$a = (1,0)^\top, \qquad \bar{X} = (\bar{\theta},\bar{\theta})^\top, \qquad \lambda = (\lambda^\xi, \lambda^\theta)^\top.$$

Under this structure, ξ_t, the first state variable, drives the expected jump size at scheduled dates, while θ_t, the second one, represents its long-run mean.

Table 2 reports the parameter estimates and their 95% confidence intervals. The Root Mean Squared Errors (RMSEs) range from 1.44 basis points at the 6-year maturity to 5.64 basis points at

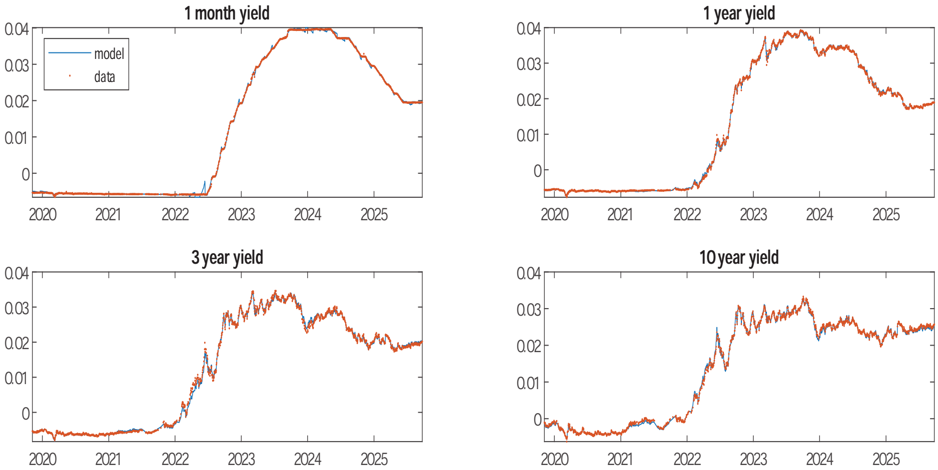


Figure 3: Observed and model-implied yields for selected maturities (1 month, 1 year, 3 years, 10 years)

the 2-year maturity, with an average RMSE below 4 basis points, consistent with the estimated measurement error. Most parameters are statistically significant, with the exception of those governing the change of measure. In particular, λ^ξ and λ^θ are not significantly different from zero, and γ is not significantly different from unity, suggesting limited statistical evidence to distinguish between the objective and risk-neutral dynamics. The mean-reversion speed of the expected jump component, κ^ξ, implies a half-life of approximately 0.46 years. The estimated correlation $\rho \approx -0.90$ confirms the strong negative link between the expected jump size and its long-run mean, consistent with the fact that the central bank rates are expected to revert to a normal level. Figure 3 compares the observed and model-implied yields for selected maturities (1 month, 1 year, 3 years, 10 years). We see that the model closely reproduces the dynamics of the yields. Reconstructions for all maturities and all dates are available via the calibration script available at `https://github.com/MarcoNicolosi1/Sensitivity-of-the-Euro-OIS-Term-Structure-to-ECB-Policy-Rate-Surprises`.

We now examine whether the model replicates the sensitivity patterns documented in Section 2. For each large-shift day t and each maturity τ, we compute the model-implied response $\widehat{\Delta y}(t, \tau \mid \Delta f_t)$ using (10), where $\Delta \bar{f}_t$ is replaced by the observed change Δf_t in the MP-forward rate. Figure 1 compares these responses with the actual yield changes on the largest positive and negative MP-forward moves. The model reproduces the shape of the observed yield adjustments, although it tends to overestimate the magnitudes of the expected yield changes with respect to the realized ones.

To evaluate sensitivity more systematically, we compute the average across large-shift days of the coefficients $\beta^M(t, \tau)$ in (11). Figure 2 shows that the resulting profile closely matches the empirical regression coefficients obtained in (2), with the model-implied means lying within the 95% confidence bands.

Finally, we analyze the residuals

$$R(t, \tau) = \Delta y(t, \tau) - \widehat{\Delta y}(t, \tau).$$

Figure 4 reports the 5th, 25th, 50th, 75th, and 95th percentiles of $R(t, \tau)$ across the large-shift days.

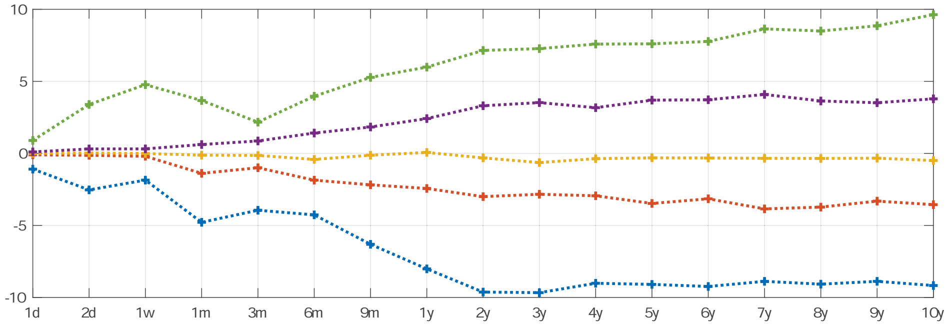


Figure 4: Percentiles (of order 5,25,50,75,95) of the residuals $\Delta y(t,\tau) - \widehat{\Delta y(t,\tau)}$ for each time to maturity τ across large-shift days. Values are in Basis Points

The median residual is close to zero for all maturities. The interquartile range, between the 25 and the 75 percentile, remains within 8 basis points, while the extremes reach approximately ± 10 basis points. The distribution is symmetric, with dispersion increasing from short maturities up to about 2 years, and flattening thereafter.

5 Conclusion

We have shown that a simple short rate affine model, with jumps at deterministic times, is able to reproduce the main features of the reaction of euro-area yields to large revisions in monetary policy expectations, as captured by the MP-forward rate. In particular, the model successfully replicates the qualitative pattern documented in the empirical regression (2), including the amplification of short-rate surprises at intermediate maturities.

The sensitivity of yields to revisions in expected ECB policy rates is measured with considerable accuracy. On the days corresponding to the most significant changes in the MP-forward rate, the model-implied response $\widehat{\Delta y}(t,\tau)$ is, on average, an unbiased predictor of the observed yield variation $\Delta y(t,\tau)$. Nonetheless, some extreme events reveal limitations of the specification, with the model occasionally under- or over-estimating the magnitude of the actual yield adjustments.

Overall, our results reinforce the relevance of term-structure models that incorporate stochastic discontinuities at scheduled dates, following the approach pioneered by Kim and Wright (2014) and Piazzesi (2005), applied to futures on SOFR by Schlögl et al. (2023), extended in Fontana et al. (2020). The specific two-factor model used in this paper provides a parsimonious yet effective framework for capturing the transmission of policy-rate surprises across maturities. However, the presence of sizable errors in a subset of extreme cases suggests that richer specifications—featuring additional latent factors or more flexible jump dynamics—may be required to fully account for all observed yield responses.

The evidence presented here indicates that models with scheduled stochastic discontinuities are well suited for measuring and managing the risks associated with interest-rate instruments in environments where monetary policy plays a dominant role. Future research could explore extensions of this framework to incorporate a better way to estimate the macroeconomic news, asymmetries in jump responses, or multi-curve interactions relevant for derivatives pricing and risk management. In particular, the inclusion of other observables depending in a non-linear way on the interest rates (like options), may help to obtain a more precise identification of the risk premium parameters. We leave this as a future development of this approach.

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