# Ample Reserves and Deposit Pass-Through

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July 15, 2026

**Abstract**

This paper studies how the euro area transition from a scarce-reserves operating framework to an ample-reserves regime with fixed-rate full allotment changed the pass-through from policy rates to household current account rates. Using IV local projections identified with high-frequency monetary policy surprises, I show that deposit-rate pass-through is low, substantially weaker in the ample-reserves era than in the pre-2008 scarce-reserves regime, and decreasing in country-level reserve abundance. To interpret these facts, I develop a parsimonious bank model in which deposit pricing depends on the expected marginal cost of non-deposit funding. Under ample reserves, central-bank funding is elastically available at the policy rate, so pass-through is governed by deposit-market primitives. Under scarce reserves, policy tightening raises the shadow value of marginal funding, generating stronger deposit rate pass-through. Next steps are to test the mechanism with bank-level ECB IMIR/IBSI data and to embed the pricing block in a richer dynamic general-equilibrium model with bank intermediation.

*Keywords*: monetary policy pass-through; deposit channel; operating framework; ample reserves
*JEL codes*: E52; E58; E42; G21

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# 1 Introduction

In canonical monetary models, the central bank controls a short nominal interest rate that enters households' intertemporal optimality condition and, through it, affects aggregate demand (Woodford, 2003; Galí, 2015). A direct empirical counterpart to this mechanism would require that the relevant return on liquid saving faced by households comoves closely with the policy-controlled short rate. In practice, households do not lend at the policy rate. At the household level, the closest observable return on liquid balances is the remuneration on transaction deposits—overnight deposits/current accounts. These accounts provide liquidity and payments services, so their remuneration can be interpreted as the return on an asset that bundles pecuniary return and convenience yield (Piazzesi et al., 2022). More broadly, this is a quantitatively important margin: in the first quarter of 2025, euro area households held about EUR 33.6 trillion in financial assets, of which EUR 10.7 trillion—about 32%—was in currency and deposits, while euro area Monetary and Financial Institutions excluding the Eurosystem had total assets and liabilities of about EUR 43.3 trillion in January 2026 (European Central Bank, 2025, 2026). Understanding the pass-through to transaction-deposit rates is therefore important not only for the return on household liquid saving, but also for banks' funding conditions and, through both margins, for aggregate dynamics.

This paper studies how the euro area transition from a scarce-reserves operating framework to an ample-reserves regime altered the pass-through from policy-controlled short rates to household current-account deposit rates. This question matters because limited deposit-rate pass-through attenuates the intertemporal-substitution channel relative to models that implicitly equate the household saving return with the policy rate. A large literature emphasizes that deposit pricing reflects market power and customer-market frictions, so deposit rates need not move one-for-one with policy (Drechsler et al., 2017; Egan et al., 2017; Polo, 2021). In addition, retail deposit rates can be compressed by the effective lower bound during low and negative-rate episodes (Heider et al., 2019). The contribution of this paper is to show that, beyond these forces, the monetary-policy operating framework can itself shape deposit-rate pass-through by changing banks' marginal funding environment.

The institutional background is the Eurosystem's shift from a pre-crisis scarce-reserves regime—in which liquidity supply was calibrated to keep overnight rates close to the main policy rate within a corridor—to fixed-rate full allotment (FRFA) in October 2008, under which eligible counterparties can obtain central-bank liquidity elastically at the announced policy rate against eligible collateral (European Central Bank, 2008). Together with longer-term refinancing operations and large-scale asset purchases, this shift generated persistently high excess liquidity and a de facto floor-type implementation in which money-market rates tracked the deposit facility rate for extended periods (European Central Bank, 2023). This change provides a natural setting in which to study whether a more elastic supply of central-bank funding weakens banks' incentive to reprice retail deposits in response to monetary-policy shocks.

Empirically, using an IV local-projections design identified with high-frequency monetary-policy surprises around ECB announcements, I document three facts. First, pass-through from policy-controlled short rates to household current-account deposit rates is low at horizons up to one year. Second, pass-through is materially higher in the pre-2008 scarce-reserves environment than in the post-2008 ample-reserves era. Third, in country-level panel evidence, reserve abundance is associated with weaker deposit-rate pass-through.

To interpret these findings, I develop a minimal static banking model in which a bank sets deposit and loan rates under market power. Deposit pricing is proportional to the shadow value of marginal non-equity funding. Under ample reserves, policy-rate funding is effectively available with probability one and the shadow value moves one-for-one with the policy rate, so pass-through is pinned down by deposit-market primitives. Under scarce reserves, access to funding at the policy rate is uncertain: tightening reduces the probability of obtaining funds at the policy rate and raises the expected marginal funding cost by more than one-for-one with policy. Since the optimal deposit rate scales with that expected marginal cost, deposit-rate pass-through is higher under scarcity while remaining incomplete because of deposit market power.

The analysis also points to a natural next step on both the empirical and quantitative sides. Empirically, bank-level evidence based on the ECB's Individual Main Interest Rate (IMIR) and Individual Balance Sheet Items (IBSI) data can test more directly whether banks with lower reserve intensity or greater reliance on central-bank funding exhibit stronger deposit-rate pass-through. Quantitatively, the pricing block developed here can be embedded in a richer dynamic general-equilibrium model with bank intermediation to assess how alternative operating frameworks reshape the transmission of monetary policy to bank funding conditions, household saving returns, and aggregate demand.

The remainder of the paper proceeds as follows. Section 2 presents the empirical strategy and evidence. Section 3 develops the model and characterizes deposit-rate pass-through under ample and scarce reserves. Section 4 discusses extensions and data work that can sharpen identification and quantify macro implications.

## 2 Empirical strategy and evidence

This section documents the empirical patterns that the model is designed to match: household current-account deposit rates respond weakly to policy-rate shocks, pass-through is lower in the ample-reserves era than in the pre-2008 scarce-reserves environment, and reserve abundance is associated with weaker pass-through across euro area countries.

Figure 1 provides a first time-series look at these objects. It plots the deposit facility rate (DFR), average household current-account deposit rates from the ECB Main Interest Rates (MIR) database, and a measure of reserve abundance (excess liquidity). The post-2008 period is characterized by persistently high excess liquidity and a floor-type implementation in which short-term market rates are closely tied to administered rates. Over the same period, current-account deposit rates move little relative to policy-controlled short rates, motivating a focus on deposit-rate pass-through and its interaction with reserve abundance.

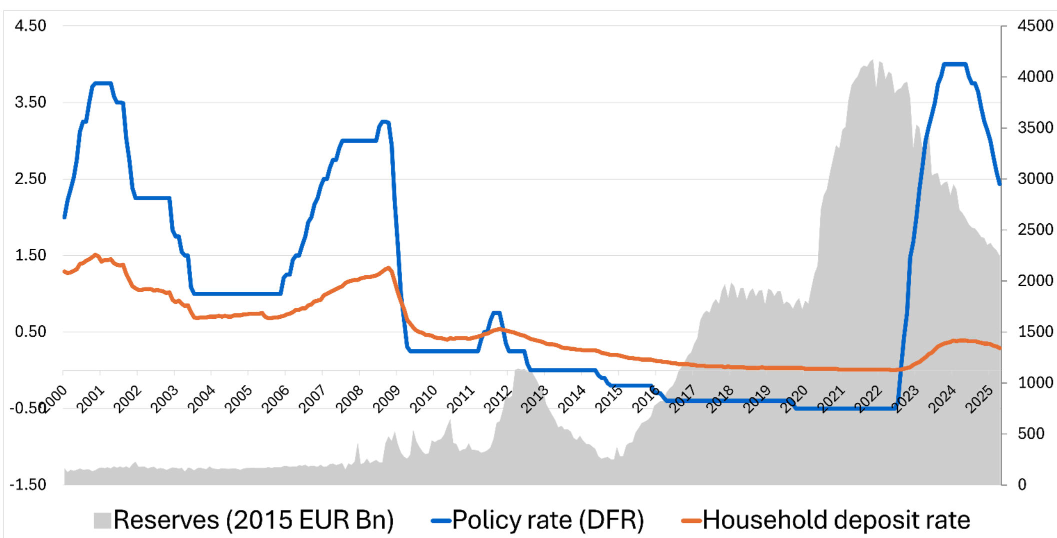


Figure 1: Policy rate (DFR), household current-account deposit rates, and reserve abundance in the euro area.

Identification relies on instrumental-variable local projections (IV-LP) using high-frequency monetary policy surprises around ECB announcements. The instrument is based on swap/OIS rate movements within narrow event windows (Altavilla et al., 2019). To focus on conventional policy-rate shocks, I use surprises measured around the press release and the "target" component of the surprise factorization, following the interpretation in Jarociński and Karadi (2020). Local projections provide a flexible framework to study state dependence and cross-sectional heterogeneity (Plagborg-Møller and Wolf, 2021).

Let $Z_t$ denote the surprise instrument, $R_t$ the short policy rate (ESTR, formerly EONIA), and $Y_{i,t+h}$ an outcome measured at the country level (e.g., the average household current-account deposit rate). The IV-LP system is

$$R_t = \alpha + \beta^{(R)} Z_t + \Gamma X_{t-1} + \varepsilon_t^{(R)}, \tag{1}$$

$$Y_{i,t+h} = \alpha_i + \beta^{(Y,h)} \widehat{R}_t + \Gamma X_{i,t-1} + \varepsilon_{i,t+h}^{(Y)}, \qquad h = 0, \ldots, H. \tag{2}$$

Following Stock and Watson (2018), I report policy-relative impulse responses, rescaling the response of $Y$ by the contemporaneous response of $R$:

$$IRF_h^{(Y,R,Z)} \equiv \frac{\beta^{(Y,h)}}{\beta^{(R)}}. \tag{3}$$

Controls $X_{t-1,i}$ include 12 lags of the dependent variable and the policy rate, a stock market index, corporate bond spreads, average sovereign bond yields, and the CISS measure of financial distress (Holló et al., 2012). The sample is monthly, from January 2002 to April 2025.

Figure 2 reports the macroeconomic responses to a contractionary policy shock normalized to raise the policy rate by 10 basis points on impact. The policy rate displays a humped-shaped response, as in the euro-area high-frequency identification literature. Household current-account deposit rates respond significantly but much more weakly, consistent with incomplete pass-through.

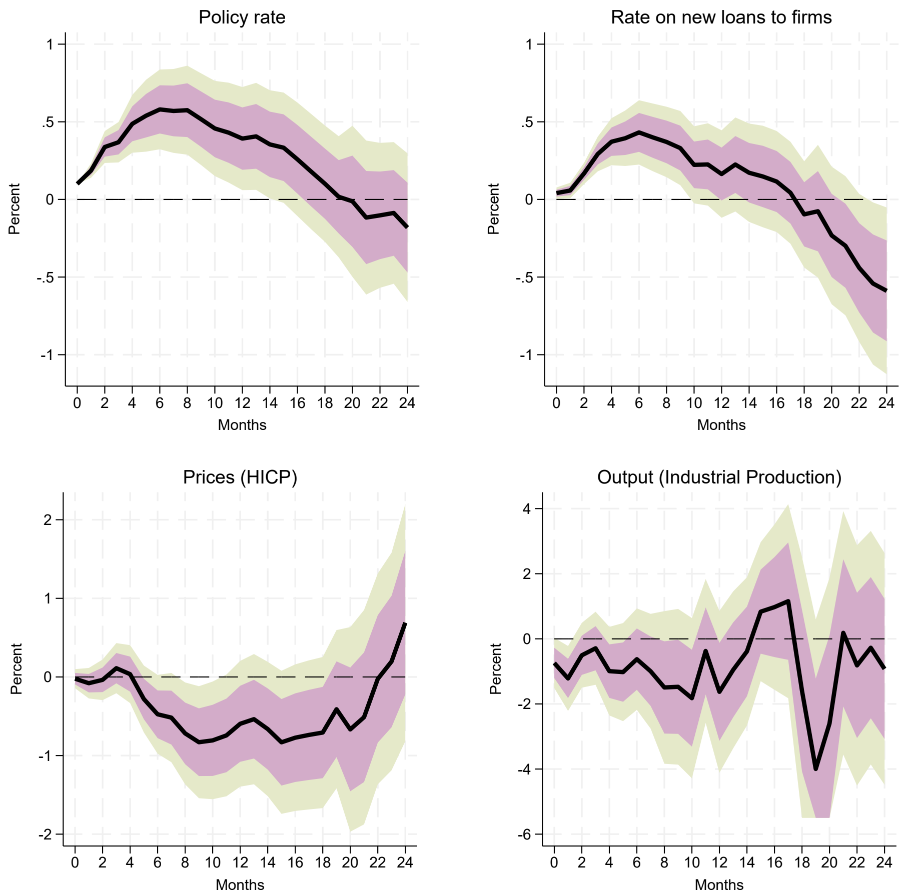


Figure 2: Responses to a 10 basis point monetary policy shock. Shaded areas represent 68% and 90% confidence bands.

To focus on deposit pricing, Figure 3 shows three objects estimated at the euro-area level using country-panel IV-LP with fixed effects: the response of the policy rate, the response of the household current-account deposit rate, and the implied pass-through (the ratio of the two responses). Pass-through is well below one-for-one, remaining below roughly 20% over horizons up to one year.

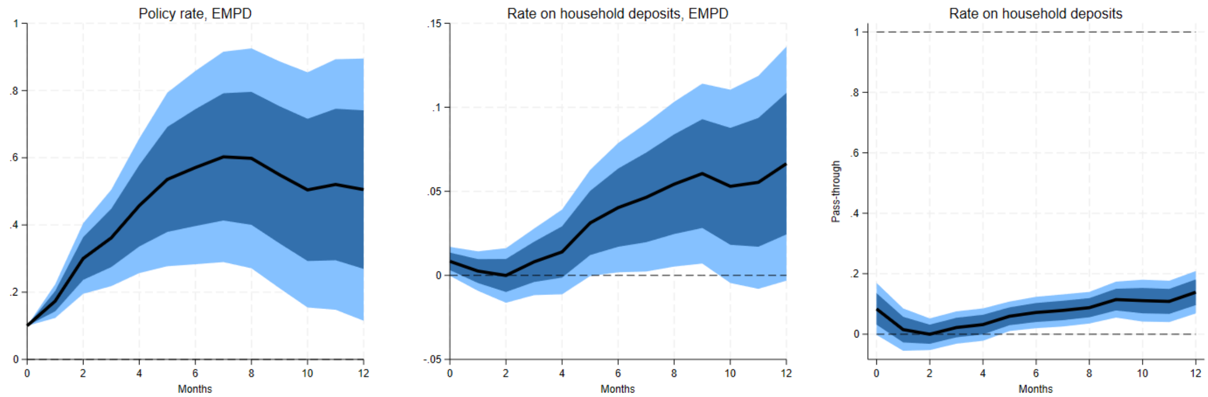


Figure 3: Policy-rate response, household current-account deposit-rate response, and deposit pass-through (ratio of responses), estimated via country-panel IV local projections. Shaded areas represent 68% and 90% confidence bands.

A simple way to visualize the regime change is to split the sample around the onset of FRFA and sustained excess liquidity. Figure 4 compares estimated pass-through in the pre-2008 sample with the post-2008 sample. Pass-through is higher in the scarce-reserves era and markedly weaker in the ample-reserves era.

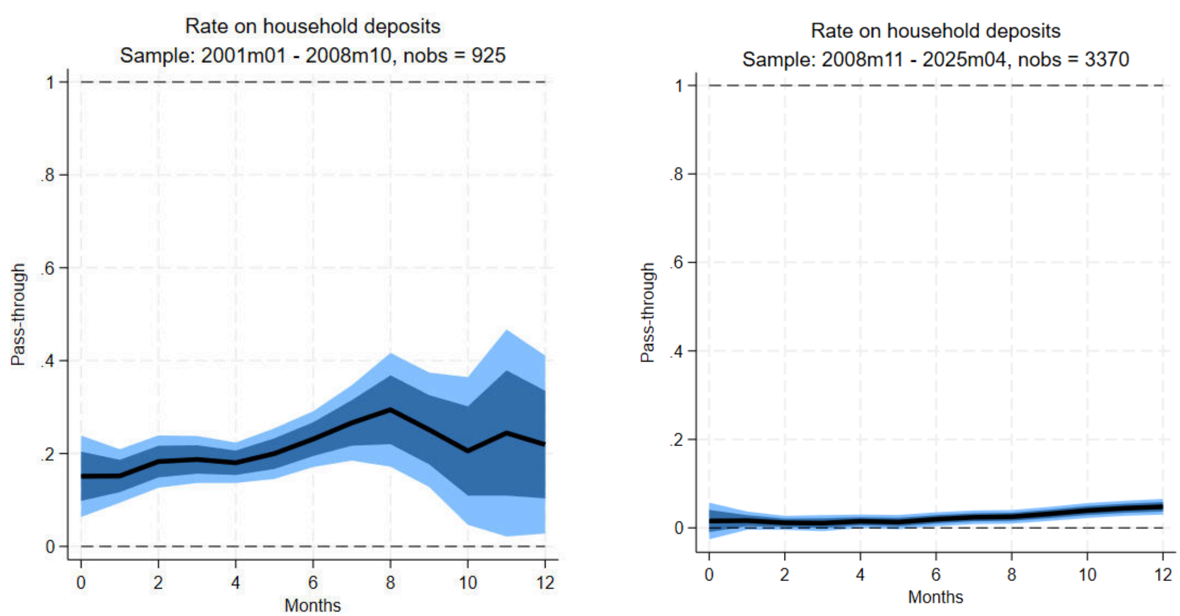


Figure 4: Deposit-rate pass-through to a 10 basis point monetary policy shock in scarce-reserves (left) and ample-reserves (right) subsamples. Shaded areas represent 68% and 90% confidence bands.

To assess whether reserve abundance predicts weaker transmission beyond time variation, I interact the policy shock with country-level measures of reserves. Specifically, I estimate

$$Y_{i,t+h} = \alpha_i + \beta^{(Y,h)} \widehat{R}_t + \beta^{(Res,h)} \widehat{R}_t \, Res_{i,t-1} + \Gamma X_{i,t-1} + \varepsilon_{i,t+h}, \tag{4}$$

where $Res_{i,t-1}$ is either (i) real reserves (rebased using euro-area HICP) or (ii) reserves as a share of country-level banking-sector total assets. Figure 5 reports the estimated interaction coefficients across horizons: higher reserves are associated with a weaker deposit-rate response to the same policy shock.

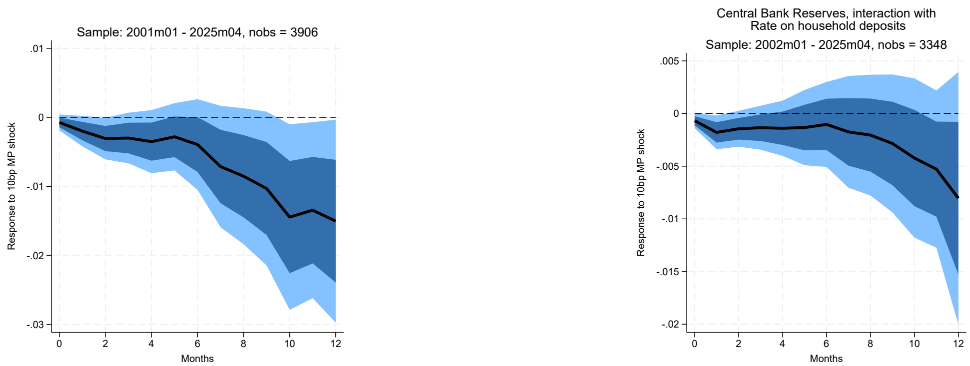


Figure 5: Interaction of monetary policy shocks with reserve abundance. Left: interaction with real reserves (country-level, rebased using euro-area HICP). Right: interaction with reserves over total assets. Shaded areas represent 68% and 90% confidence bands; regressions use weights proportional to each country's share of euro-area deposits.

Taken together, the evidence establishes three modeling targets: (i) incomplete pass-through in levels, (ii) lower pass-through under ample reserves than under scarce reserves, and (iii) a negative relationship between pass-through and reserve abundance. The next section develops a parsimonious mechanism that delivers these patterns by linking deposit pricing to the policy-dependent expected marginal cost of non-deposit funding under different operating frameworks (Drechsler et al., 2017; Polo, 2021; Bianchi and Bigio, 2022; Piazzesi et al., 2022).

# 3 A minimal bank model of deposit pass-through across reserves regimes

The empirical evidence in Section 2 points to two robust features: pass-through from policy-controlled short rates to household current-account deposit rates is incomplete, and it is materially lower in the ample-reserves era than in the pre-2008 scarce-reserves environment. This section develops a deliberately parsimonious mechanism that can rationalize both facts in a way that is tightly connected to the operating framework. The key idea is standard in models of retail deposit market power: optimal deposit pricing scales with the bank's marginal cost of funds, so deposit-market primitives pin down a baseline degree of incomplete pass-through (Drechsler et al., 2017; Egan et al., 2017; Polo, 2021). The operating framework matters because it changes how the relevant marginal cost of non-deposit funding comoves with the policy rate.

**Environment.** A representative bank funds a loan portfolio $L$ with household deposits $D$ (current accounts) and non-deposit short-term funding $W$:

$$L = D + W. \tag{5}$$

The policy-controlled short rate is $i^{MP}$. The bank chooses a deposit rate $i^D$ and a loan rate $i^L$. Retail quantities are determined by isoelastic schedules expressed in policy-relative net rates,

$$m_D \equiv \frac{i^D}{i^{MP}}, \qquad m_L \equiv \frac{i^L}{i^{MP}}, \tag{6}$$

so that monetary policy remains the relevant outside option in both markets even when non-deposit funding is constrained. Deposits and loans satisfy

$$D(m_D) = A_D \, m_D^{\varepsilon_D}, \qquad \varepsilon_D > 0, \tag{7}$$

$$L(m_L) = A_L \, m_L^{-\varepsilon_L}, \qquad \varepsilon_L > 1, \tag{8}$$

so deposits increase in $i^D$ and loans decrease in $i^L$. Residual non-deposit funding is $W = L(m_L) - D(m_D)$.

**Operating framework as a funding wedge.** Let $i^W$ denote the bank's expected marginal cost of non-deposit funding. In an ample-reserves regime with fixed-rate full allotment, the relevant benchmark is $i^W = i^{MP}$: at the margin the bank can fund at the policy rate. In scarce reserves, access to policy-rate funding is imperfect and the expected marginal cost of funding can exceed $i^{MP}$. A reduced-form representation that will be useful below is

$$i^W \equiv i^{MP} + \lambda_W, \tag{9}$$

where $\lambda_W \geq 0$ is the scarcity wedge (the shadow value of policy-rate funding).

**Bank problem and pricing.** Profits are

$$\Pi = i^L L - i^D D - i^W W. \tag{10}$$

Using $W = L - D$ and the policy-relative representation (6), profits can be written as

$$\Pi = i^{MP}\Big[(m_L - \tfrac{i^W}{i^{MP}})L(m_L) - (m_D - \tfrac{i^W}{i^{MP}})D(m_D)\Big].$$

The first-order conditions deliver constant policy-relative markups over the marginal cost of funds. In particular,

$$i_L^\star = \tau_L\, i^W, \qquad i_D^\star = \tau_D\, i^W, \tag{11}$$

where

$$\tau_L \equiv \frac{\varepsilon_L}{\varepsilon_L - 1} > 1, \qquad \tau_D \equiv \frac{\varepsilon_D}{\varepsilon_D + 1} \in (0,1). \tag{12}$$

The loan-side markup $\tau_L$ is standard with isoelastic loan demand. The deposit-side expression $\tau_D \in (0,1)$ captures deposit market power: the bank sets the deposit rate as a fraction of its marginal funding cost, implying incomplete pass-through even when the marginal cost of funds moves one-for-one with policy. This is the baseline "deposit channel" force emphasized in Drechsler et al. (2017) and related work.

**Pass-through across regimes.** Define deposit-rate pass-through as

$$PT \equiv \frac{di_D^\star}{di^{MP}}. \tag{13}$$

Combining (11) and (9) yields

$$PT = \tau_D\Big(1 + \frac{d\lambda_W}{di^{MP}}\Big). \tag{14}$$

Under ample reserves, $\lambda_W = 0$ and

$$PT_A = \tau_D \in (0,1). \tag{15}$$

The empirical question is therefore whether the operating framework generates $d\lambda_W/di^{MP} > 0$ in scarce reserves, which would raise pass-through relative to the ample-reserves benchmark.

**Probabilistic access microfoundation.** To discipline the wedge $\lambda_W$ and obtain a closed form, interpret scarcity as imperfect access to policy-rate funds. With probability

$\zeta(W, \bar{W}, i^{MP})$ the bank funds at the policy rate, and with probability $1 - \zeta$ it funds at a backstop rate $i^B = i^{MP} + s$, where $s > 0$ is a spread (e.g., unsecured money-market borrowing at a premium). The expected marginal funding cost is

$$i^W(W, \bar{W}, i^{MP}) = \zeta\, i^{MP} + (1 - \zeta)(i^{MP} + s) = i^{MP} + s(1 - \zeta). \tag{16}$$

Comparing (9) and (16), the scarcity wedge is $\lambda_W = s(1 - \zeta)$. Substituting (16) into (11) gives the optimal deposit rate

$$i_D^\star = \tau_D\Big(i^{MP} + s\big(1 - \zeta(W, \bar{W}, i^{MP})\big)\Big). \tag{17}$$

Differentiating yields scarce-regime pass-through

$$PT_S = \tau_D\Big(1 - s\,\zeta_i(W, \bar{W}, i^{MP})\Big), \tag{18}$$

where $\zeta_i \equiv \partial\zeta/\partial i^{MP}$. A sufficient condition for $PT_S > PT_A$ is

$$\zeta_i(W, \bar{W}, i^{MP}) < 0 \quad \text{in scarcity}, \tag{19}$$

namely that policy tightening reduces the probability of obtaining funding at the policy rate. The mechanism is immediate: tightening raises the expected marginal cost of non-deposit funds by more than one-for-one with $i^{MP}$, and the deposit rate inherits this amplification through the markup formula (17).

**Logistic specification and calibration.** A convenient parametric form is a logistic success probability. For illustration, consider a policy-only dependence,

$$\zeta(i^{MP}) = \Lambda(a - c\, i^{MP}), \qquad \Lambda(x) \equiv \frac{1}{1 + e^{-x}}, \qquad c > 0, \tag{20}$$

so that $\zeta_i = -c\zeta(1 - \zeta) < 0$ when $0 < \zeta < 1$. Equation (18) becomes

$$PT_S = \tau_D\Big[1 + s\, c\, \zeta(1 - \zeta)\Big] \;>\; \tau_D = PT_A. \tag{21}$$

Table 1 reports implied optimal rates and pass-through for an illustrative calibration targeting an ample-reserves pass-through of $PT_A = \tau_D \approx 0.459$.

Table 1: Optimal rates and deposit-rate pass-through across regimes (illustrative calibration)

| $i^{MP}$ (%) | $\zeta$ | $i_S^W$ (%) | $i_A^{D\star}$ (%) | $i_S^{D\star}$ (%) | $i_A^{L\star}$ (%) | $i_S^{L\star}$ (%) | $PT_A$ | $PT_S$ |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.794 | 1.206 | 0.459 | 0.554 | 1.333 | 1.608 | 0.459 | 0.497 |
| 2 | 0.700 | 2.300 | 0.919 | 1.057 | 2.667 | 3.067 | 0.459 | 0.508 |
| 3 | 0.586 | 3.414 | 1.378 | 1.569 | 4.000 | 4.552 | 0.459 | 0.515 |

**Reserve abundance and a cap-to-demand interpretation.** To connect the model to the interaction evidence, allow $\zeta$ to depend on requested funding $W$ relative to an effective cap $\bar{W}$ that summarizes system-wide scarcity. A simple piecewise specification is

$$\zeta(W, \bar{W}, i^{MP}) = \begin{cases} 1, & \bar{W} \geq W, \\ \Lambda\Big(a - b\ln(\frac{W}{\bar{W}}) - c\, i^{MP}\Big), & \bar{W} < W, \end{cases} \qquad b > 0, \;\; c > 0. \tag{22}$$

When $\bar{W}/W \geq 1$ the cap is slack, $\zeta = 1$, and pass-through coincides with the ample-reserves benchmark $PT_A = \tau_D$. When $\bar{W}/W < 1$, the cap binds and pass-through increases as scarcity intensifies (lower $\bar{W}/W$), consistent with the empirical finding that higher reserve abundance is associated with weaker deposit-rate transmission.

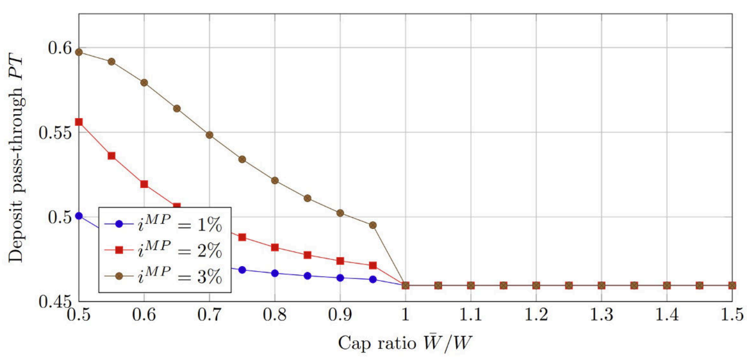


Figure 6: Illustration: pass-through as a function of the cap-to-demand ratio $\bar{W}/W$. For $\bar{W}/W \geq 1$ the cap is slack, $\zeta = 1$, and $PT$ coincides with the ample-reserves benchmark $PT_A = \tau_D \approx 0.459$.

# 4 Next steps

The empirical evidence points to a natural next stage of the project: to move from country-level evidence to bank-level evidence using interest rate data from the ECB's

Individual Main Interest Rate sample, merged with balance sheet information from the Individual Balance Sheet Items database. This would allow a sharper test of the mechanism by relating deposit rate pass-through directly to banks' own reserve intensity, central-bank funding reliance, and balance-sheet composition, rather than to country-level measures of reserve abundance alone. In turn, this would make it possible to assess more directly whether, when reserves are scarce, deposits become more nearly the marginal source of funding for the individual bank, as suggested by the evidence in Section 2.

On the modelling side, a first priority is to enrich the representation of the operating framework. In the current reduced-form setup, scarcity is summarized by the wedge $\lambda_W$ or, equivalently, by the success probability $\zeta(\cdot)$ of obtaining funding at the policy rate. A natural extension is to give more structure to this object by modelling explicitly the distinction between a bidding-based scarce-reserves system and a fixed-rate full-allotment ample-reserves system. This would sharpen the mapping from institutional features of the Eurosystem's implementation framework into the expected marginal cost of non-deposit funding and, therefore, into deposit pricing.

Another priority is to extend the bank balance sheet beyond the minimal $L = D + W$ environment. In particular, introducing other assets such as government bonds, together with additional constraints—for example collateral constraints, leverage or capital constraints, and reserve requirements—would allow the model to capture more explicitly the portfolio and funding margins through which operating frameworks affect banks' marginal funding conditions. This would also help clarify when the baseline mechanism is likely to be quantitatively dominant, and when it may be attenuated or reinforced by other balance-sheet channels.

Finally, the static pricing block can be embedded in a general equilibrium dynamic monetary model with bank intermediation. The objective of this extension is not only to discipline the reduced-form objects of the static setup, but also to quantify the aggregate implications of regime-dependent deposit-rate pass-through. In particular, such a framework would make it possible to study policy counterfactuals on how alternative operating frameworks and instruments reshape the transmission of monetary policy to bank funding conditions, household saving returns, and ultimately aggregate demand.

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