# Intermediary Constraints and the Shape of the Yield Curve

Your Name

August 15, 2025

## Executive summary


- In a frictionless rational-expectations world, the curve slope equals the market's path of short rates. In practice, **intermediary frictions** distort that mapping. The frictions are proxied through the following channels:
- **Foreign channel (CIP basis).** In levels, *GBPUSD 3M* basis is the strongest of the three bases; the three are largely redundant. In differences, basis does not move daily $\Delta$10Y premia: $\Delta$GBP basis $\approx -0.044$ ($p = 0.84$), $\Delta$EUR basis $\approx +0.158$ ($p = 0.34$).
- **Domestic channel (funding).** An ECM with `GCF_survey` delivers a **large long-run loading** on the 10Y premium of $\sim$ 15.75 bp/1 bp, with **slow mean reversion**: half-life $\approx$38.4 trading days. An alternative spec gives 14.76 bp/1 bp, half-life $\approx$44.4 trading days.
- **Calendar frictions.** End-of-month (`eom`) effects are more robust and frequently significant; quarter-end (`eoq`) is mixed and often subsumed once `eom` is included.


## 1 Motivation

*What determines the shape of the term structure?* Rational expectations says: the slope reflects expected short rates—if the market expects short rates to fall for two years, the curve slopes down to year two. That holds only in a frictionless world. In reality, balance-sheet and funding constraints for *intermediaries* are the norm; almost every trade passes through them. If intermediaries are unwilling or unable to warehouse long duration—say, due to liquidity or balance-sheet pressure—prices move away from frictionless values. Supply shocks can become *localized and persistent* (a preferred-habitat effect) rather than instantly arbitraged across maturities.

This study asks whether observable proxies for intermediary constraints load on U.S. Treasury term premia; if so, *through which channel (foreign vs. domestic) and horizon (short-run flows vs. long-run levels).*

## 2 Data, variables, and controls

Daily data. Dependent: 10Y term premium / ACM-style measure (`ACMY10` in the notebook). **Foreign constraints:** `GBPUSD_3M`, `EURUSD_3M`, `JPYUSD_3M` cross-currency bases (CIP deviations). **Domestic constraints:** `IORB{SOFR` and `GCF_survey`. Controls in all regressions: `MOVE` (rate vol), curve slopes (10Y–2Y; 2Y–1M), and `eom`/`eoq` dummies. Stationarity is checked via ADF; nonstationary series are differenced. Inference uses HAC (Newey–West).

# 3 Empirical strategy

We begin with static level regressions to gauge unconditional linkages and collinearity across the three bases. We then run (i) difference regressions for flow effects and (ii) a single-$X$ error-correction model (ECM) for the domestic channel to separate long-run level effects from short-run flows:

$$\Delta Y_t = \alpha\,(Y_{t-1} - \theta X_{t-1}) + \sum_{i=0}^{p} \beta_i\,\Delta X_{t-i} + \mathbf{c}'\mathbf{Z}_t + \varepsilon_t,$$

with $X =$ `GCF_survey` and $\mathbf{Z}_t$ controls. Half-life (daily frequency) is $\mathrm{HL} = \ln(0.5)/\ln(1+\alpha)$.

# 4 Results

### Foreign channel (CIP basis)

**Levels.** `GBPUSD_3M` carries the strongest signal among the three bases across level specs; the three bases are collinear, so one can either use only GBP or reduce dimension with PCA. (Static level fits show high $R^2$ but serial correlation—addressed below.)

**Differences.** Basis changes do not explain daily changes in the 10Y premium once controls are in:

$$\Delta\text{BPBS\_3MO}: \ -0.044\ (p = 0.84), \qquad \Delta\text{EUBS\_3MO}: \ +0.158\ (p = 0.34).$$

Interpretation: persistent *levels* of foreign funding stress co-move with the level of term premia; month/day-to-day *flows* do not move $\Delta Y$.

### Domestic channel (funding spreads)

**ECM with `GCF_survey`.** The error-correction coefficient is negative (mean reversion). The implied **long-run effect** of domestic funding stress on the 10Y term premium is about

$$\theta \approx 15.75\,\text{bp}/1\,\text{bp}, \quad \text{half-life} \approx 38.4 \text{ trading days}.$$

An alternative spec yields 14.76 bp/1 bp with half-life ≈44.4 trading days; a slower case ($\alpha \approx -0.0072$) implies 96.0 trading days. Short-run sums of $\Delta$GCF lags are small and not statistically meaningful—consistent with a *level* channel dominating.

**IORB–SOFR.** Weaker and less robust than `GCF_survey`; `GCF_survey` dominates the domestic proxy set.

### Controls & calendar effects

`MOVE` and slope controls absorb broad risk/curve effects (significance varies by specification; treated as controls, not targets). **End-of-month (`eom`)** effects are reliably significant across many specifications; **quarter-end (`eoq`)** is mixed and typically loses significance once `eom` is included. HAC errors are used; differenced and ECM forms mitigate serial correlation seen in level regressions.

# 5 Trading strategies (research prototypes)

These rules reflect the findings above; they are specified at **daily** frequency to match the estimation. *Research only; not investment advice.* Use realistic costs/slippage and tight risk controls.

### 5.1 ECM mispricing in UST 10Y

**Signal.** Error-correction term $ec_{t-1} = Y_{t-1} - \theta X_{t-1}$, with $\theta \approx 15.75$ bp/bp. From the ECM, $\Delta Y_t = \alpha\, ec_{t-1} + \cdots$ with $\alpha < 0$ (half-life ∼38.4 trading days).

**Rule.** Daily position $s_t = -\,ec_{t-1}/\widehat{\sigma}(ec)$. Long duration if $ec > 0$ (yield too high vs. GCF), short if $ec < 0$.

**Sizing.** Target DV01 per $NAV scaled by `MOVE`: $\text{DV01}_t = \kappa\,|s_t| / \max(\texttt{MOVE}_t,\ \text{floor})$. Cap DV01 (e.g., 5–10 bp per 1% NAV). Instruments: TY futures / 10Y cash.

**Exit.** Close when $|ec_t|$ halves (roughly one half-life) or on a 2–3 $\sigma$ stop.

### 5.2 End-of-month calendar (balance-sheet/flow seasonality)

**Rule.** Go long 10Y duration in the last $k$ business days of each month and exit over the first $m$ business days of the next month. Start with $k = 3$–5, $m = 2$–3. Suppress trades that coincide with major events (FOMC, CPI, NFP) to reduce event risk.

**Sizing.** Small fixed DV01 (e.g., 1–2 bp per 1% NAV) or a MOVE-scaled DV01 as in the ECM strategy.

**Rationale.** `eom` dummies are more robust than `eoq` in the regressions; month-end balance-sheet and index/flow effects (extensions, rebalancing) are consistent with this pattern.

### 5.3 Cross-market RV tilt by GBP basis (levels)

**Rule.** Compute an expanding-window z-score of `GBPUSD_3M` basis (levels). When in top quartile, overweight USD duration vs. FX-hedged Gilts/Bunds by $\omega$ (e.g., ±20% of duration budget); bottom quartile underweight; otherwise neutral. Keep total DV01 constant; rebalance weekly to limit turnover.

**Rationale.** Basis *levels* co-move with U.S. term premia; changes do not—so use a slow allocation tilt, not a high-frequency predictor.

### 5.4 Carry/roll harvest gated by MOVE

**Rule.** Run standard roll-down/carry ladders (e.g., 5s/10s/30s DV01-neutral) only when `MOVE` is below its rolling median; otherwise cut exposures by 50–100%. Combine direction with the ECM signal.

**Rationale.** `MOVE` is a robust state variable across your specs; gating improves carry robustness.

### Risk & backtest hygiene

- Use expanding-window z-scores; timestamp inputs properly (today's positions use prior-day $X_{t-1}$).
- Futures rolls, transaction costs (TY: ∼ 0.2–0.5 bp yield per round-trip baseline), and event filters.
- Daily VaR/ES on P&L; DV01 caps; stress sets (2013 taper, 2020 COVID, 2022 hikes).
- Re-estimate $\theta, \alpha$ at a regular cadence; down-weight ECM if $|\alpha|$ decays materially.

**Strategy summary (at a glance)**

| Strategy | Signal | Horizon | Core risk control |
|---|---|---|---|
| ECM mispricing | $-ec_{t-1}$ with $\theta \approx 15.75$ bp/bp | weeks–months | DV01 scaled by `MOVE` |
| End-of-month calendar | last $k$ biz days, exit first $m$ | days–weeks | small DV01, event filters |
| Cross-mkt RV tilt | `GBPUSD_3M` basis (level z-score) | months–quarters | DV01-neutral tilt |
| Carry/roll gated | roll-down ladder, gated by `MOVE` | weeks–months | MOVE thresholding |

# 6 Conclusions

1. **Foreign frictions load in levels, not flows.** Strong co-movement in levels (GBP basis strongest), no predictive power in $\Delta$basis for daily $\Delta$10Y premia.
2. **Domestic frictions load in the long run.** `GCF_survey` shows a large long-run association ($\sim 15.75\,\text{bp}/1\,\text{bp}$) with slow, but tradable, mean reversion (38.4 trading days).
3. **Calendar frictions persist.** Quarter-end effects are economically and statistically relevant.

# Reproducibility note

All figures/tables originate from the companion notebook; regression summaries and printed ECM diagnostics were exported to plain text for auditability. Half-lives are reported in **trading days** (daily frequency).