Discussion of “When Funding Markets Move Credit Markets: Foreign Investors and U.S. CLOs"

by Amy Huber and Shohini Kundu

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Motivation and Contribution

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  - They provide lots of convincing evidence to demonstrate interconnectedness: (i) price and quantity responses, (ii) 3 different identified shocks—JFSA Basel III (2019), BOJ normalisation (2023–24), quarter-end reporting, (iii) placebos with other US credit markets, (iv) placebos with other currencies ...

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- **Endogenous elasticity:** Changes in the tightness of Japanese banks' constraints adjust the connectedness of these two markets by changing their demand elasticity
- **Relevance:** FX funding shocks in Japan can have first-order effects on the borrowing costs of US firms; likely relevant in many other yet undiscovered contexts.

Discussion Points

- **Comment 1** — Do we need/do we expect CLO and FX swap markets to be jointly determined?
- **Comment 2** — Quantities in the empirics vs the model.

Joint Determination of CLO and FX Swap Markets

s_t: U.S. CLO AAA spread. x_t: JPY/USD basis (increase is a *fall* in cost of synthetic USD funding).

(1) Japanese bank CLO demand

$$Q_t^{\text{JP}} \;=\; \alpha_t + \eta_t s_t + \kappa_t x_t$$

(2) Residual CLO supply

$$Q_t^{\text{CLO}} = \bar{Q}_t^{\text{CLO}} - \xi_t s_t$$

(3) Residual FX swap supply

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Market Clearing

(a) CLO Market:

$$Q_t^{\mathsf{JP}} = Q_t^{\mathsf{CLO}}$$

(b) FX swap Market:

$$\bar{\kappa}\, Q_t^{\mathsf{JP}} = Q_t^{\mathsf{FX}}$$

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Of note: η_t, κ_t and α_t depend on tightness of banks' constraints

Joint Determination: Two-Directional Price Feedback

CLO equilibrium set: $s_t = \dfrac{\bar{Q}_t^{\text{CLO}} - \alpha_t}{\eta_t + \xi_t} - \dfrac{\bar{\kappa}\,\eta_t}{\eta_t + \xi_t}\,x_t,$ $\qquad \dfrac{\partial s_t}{\partial x_t} = -\dfrac{\bar{\kappa}\,\eta_t}{\eta_t + \xi_t} \equiv -\Pi$

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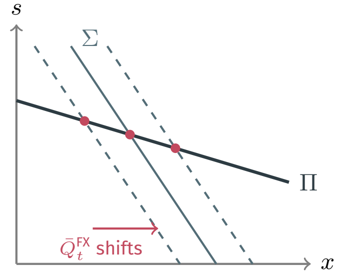
$\bar{Q}_t^{\mathsf{FX}}$ **shock** $\Rightarrow$ **traces CLO line (Π)**



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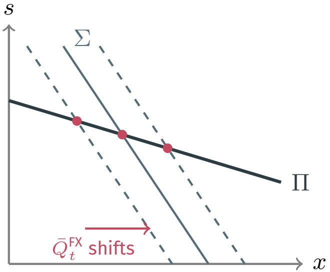

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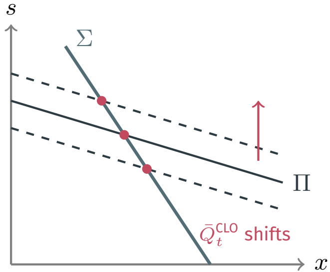


Price Regressions in a world with Supply Shocks

- Assume we live in a world with only supply shocks ($\bar{Q}_t^{\text{FX}}$ and $\bar{Q}_t^{\text{CLO}}$) and one estimates:

$$s_t \;=\; \beta_0 + \beta_1 x_t + \Gamma' Z_t + \varepsilon_t$$

then the regression coefficients measure

$$\text{plim}\;\hat{\beta}_1 \;=\; \omega_{\text{FX}}\,\Pi \;+\; \omega_{\text{CLO}}\,\Sigma, \qquad \omega_{\text{FX}} + \omega_{\text{CLO}} = 1,$$

with ω_{FX} the variance share of FX swap shocks and ω_{CLO} that of CLO shocks.

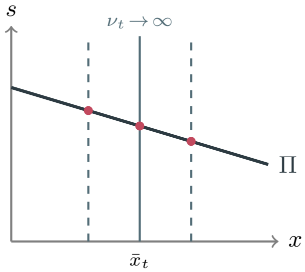
- Joint determination of CLO and FX swap markets harms identification of Π
- Since both $\Pi < 0$ and $\Sigma < 0$, measured $\hat{\beta}_1 < 0$ does not distinguish which slope is estimated.
- Since $\Pi \leq \Sigma$, $\hat{\beta}_1 \geq \Pi$, that is one estimates an upper bound for the object of interest.
- If Japanese banks are small and don't move the basis: $\hat{\beta}_1 \to \Pi$.

Is Japanese Banks' CLO Funding Marginal in FX Swap Market?

- Let FX supply be $Q_t^{\text{FX}} = \bar{Q}_t^{\text{FX}} - \nu_t(x_t - \bar{x}_t)$ and $\nu_t \to \infty$ s.t. dealers elastically absorb Japanese banks' CLO hedging flows because they are small, then...

$$x_t \to \bar{x}_t,$$

where $\bar{x}_t$ is CIP deviation that clears market for $\bar{Q}_t^{\text{FX}}$ (hedging demand of Japanese pension funds, investment funds, insurers etc...)



- The FX line goes vertical: FX-swap shocks transmit to CLO market but not vice versa and $\hat{\beta}_1 = \Pi$.
- Possibly a good approximation: japanese banks' CLO holdings $\sim \$100$bn, whereas gross size of USD/JPY FX swap market $\sim \$15$tn.
- Connection between markets may be mostly one-directional: FX swap $\to$ CLO

Japanese Banks and Long-Maturity FX Hedging

- Empirical results strongest with *5-year* CIP deviations, motivated by fact that Japanese banks need to fund long-maturity CLO positions.
- But, FX swap volume is predominantly short-term and needs to be rolled over...

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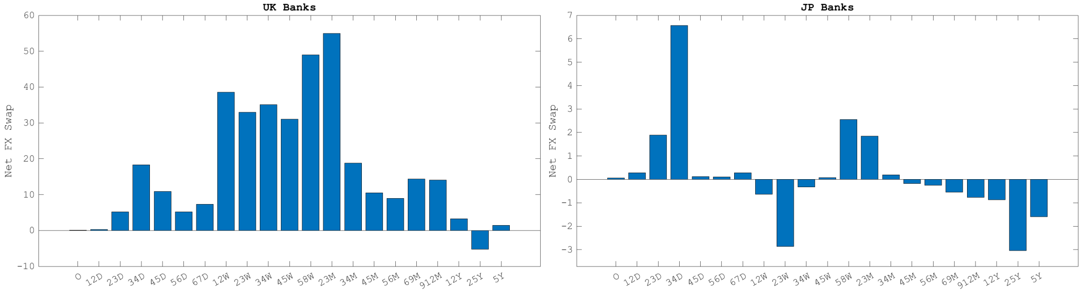
Figure: UK and Japanese Banks' Average Net USD Swap Exposure, by Maturity (2019-2026)



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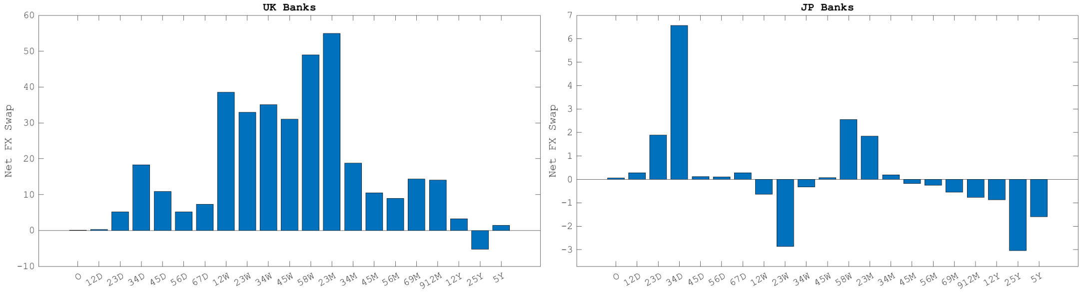

- Are banks actually the marginal actors for long-maturity FX swaps?

Bank Constraints, Curve Tilting and One-Directional Determination

- Authors investigate how changes in banks' constraints influence pass-through:

$$s_t \;=\; \beta_1 x_t \;+\; \beta_2\, x_t \cdot \Delta\text{Bank constraint}_t \;+\; \Gamma' Z_t + \varepsilon_t.$$

  where ΔBank constraint$_t > 0$ implies banks' aggregate demand elasticity falls $\eta_t \downarrow$.

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- How this affects pass-through depends on which shock is dominant:

$$\frac{\partial \Pi}{\partial \eta_t} = \frac{\bar{\kappa}_t \, \xi_t}{(\eta_t + \xi_t)^2} > 0$$

steepens the negative slope

$\Rightarrow$ **amplifies** $\bar{Q}_t^{\text{FX}}$ shocks if $\eta_t \uparrow$

$$\frac{\partial \Sigma}{\partial \eta_t} = -\frac{\nu_t}{\bar{\kappa}_t \, \eta_t^2} < 0$$

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- Key: We have assumed only supply shocks ($\bar{Q}_t^{\text{FX}}$ and $\bar{Q}_t^{\text{CLO}}$), but there are also demand shocks (constraints). These not only tilt both curves (η) but also shift both curves (α) and hence trace out both curves. Thus, need $\nu \to \infty$ to avoid bias...

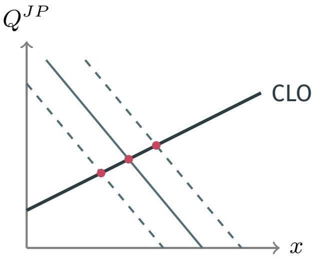
Joint Determination in Quantity Space

- Moving from equilibria defined by (x_t, s_t) to (x_t, Q_t^{JP}) gives:

CLO equilibrium: $$\frac{dQ_t^{JP}}{dx_t} = \frac{\bar{\kappa}_t \eta_t \xi_t}{\eta_t + \xi_t} > 0$$

FX equilibrium: $$\frac{dQ_t^{JP}}{dx_t} = -\frac{\nu_t}{\bar{\kappa}} < 0$$

$\bar{Q}_t^{\text{FX}}$ **shock** $\Rightarrow$ **traces CLO line, positive relation**



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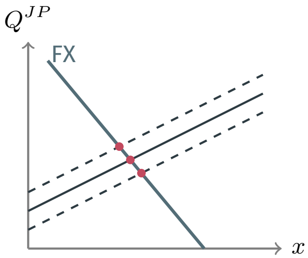

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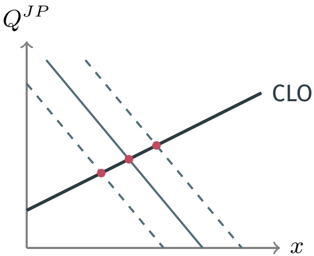

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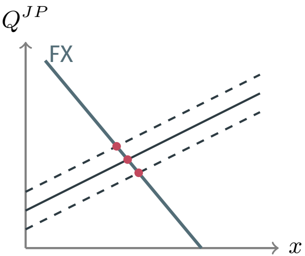

- In world with only supply shocks ($\bar{Q}_t^{\text{FX}}$ and $\bar{Q}_t^{\text{CLO}}$), sign of $\hat{\beta}_1$ from regression $Q_t^{JP} = \beta_0 + \beta_1 x_t + \Gamma' Z_t + \varepsilon_t$ isolates which shock is dominant. Find $\hat{\beta}_1 > 0$, supports dominance of $\bar{Q}_t^{\text{FX}}$ shocks/$\nu \to \infty$. With demand shocks, need $\nu \to \infty$ to isolate $\xi\Pi$.

Quantities in the Model vs the Data

- Relevant model quantity is $Q_t^{JP} = Q_t^{CLO}$. Data measures total, not residual, CLO supply... Decompose residual CLO supply Q_t^{CLO} into total CLO supply G_t and US CLO demand D_t:

$$G_t = \bar{G}_t - \xi_t^g s_t, \qquad D_t = d_0 + d_1 s_t, \qquad \text{so} \qquad \xi_t = \xi_t^g + d_1, \quad G_t = Q_t^{JP} + D_t^{US}$$

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$\Rightarrow$ Signs of slopes are unchanged, so still implies dominance of $\bar{Q}_t^{FX}$ shocks/$\nu \to \infty$.

$\Rightarrow$ Regressions recover CLO-line slope if US demand perfectly inelastic $d_1 \to 0$ (and $\nu \to \infty$).

$\Rightarrow$ Same holds for interaction regressions.

Conclusion

- A terrific paper! Shows that two seemingly disconnected markets are connected to one another via common large marginal investors.
- My two comments:

  Comment 1. The evidence points to a *one-directional* link, FX swap $\rightarrow$ CLO, rather than joint determination.

  Comment 2. Quantities in the data do not exactly correspond to those in model. They can be a good approximation under certain conditions.

I learned a great deal from this paper — I hope some of this is useful going forward.