Capital Flow Management: Basis Control

Pierre-Olivier Gourinchas

UC Berkeley

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Motivation

- Recent literature discusses the importance of macroprudential policies: CFM and FXI.

- **Key insight**: correcting externalities (aggregate demand, pecuniary, terms of trade)

- Gradually incorporated in the policy framework (i.e. the IMF's IPF)

- General feeling that implementation can be complex: optimal prudential 'tax' that decentralizes the planner's problem often a complicated state-dependent object

- This paper proposes -for simple environments- a way to characterize the optimal tax in terms of 'observables'.

- One such observable when FX markets are 'shallow': the CIP deviation (the 'basis'). I call this 'basis control'

'Basis Control': A Rationale

Define the cross-currency basis ('the basis') as:

$$bs_t = i_t^\$ - (i_t - (f_s - s_t))$$

Negative basis ($bs_t < 0$): synthetic dollar more expensive than cash dollar.

- CIP deviations small for AEs before the GFC, but possibly much larger for EMs.
  [harder to measure due to credit risk, Du & Schreger, 2016]

- Shadow cost of dollar balance-sheet expansion for global financial intermediaries
  [Du, Verdelhan, Hebert, 2021]

- Implies different local currency rates: $i \neq i^\$ + (f - s)$, potentially creating challenges for the transmission of domestic monetary policy. [Obstfeld et al, 2020]

- Basis control: When can we express optimal policy in terms of a target for the basis? .

- Suggests supplementing an inflation targeting rule with a 'basis targeting rule'.
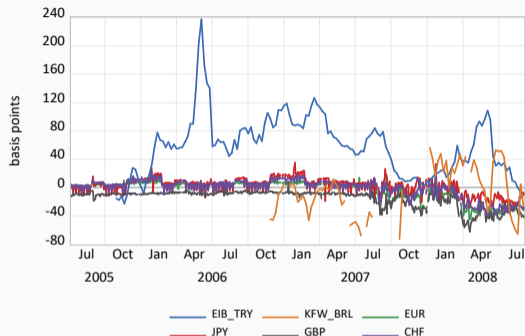
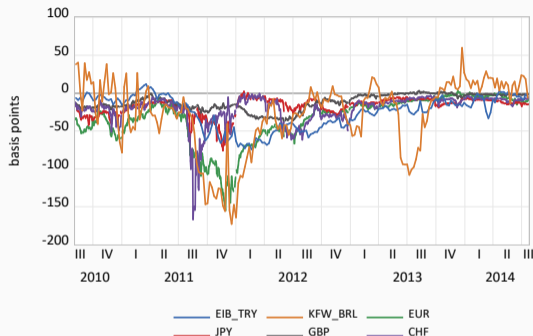# Cross-Currency Basis: Advanced vs Emerging
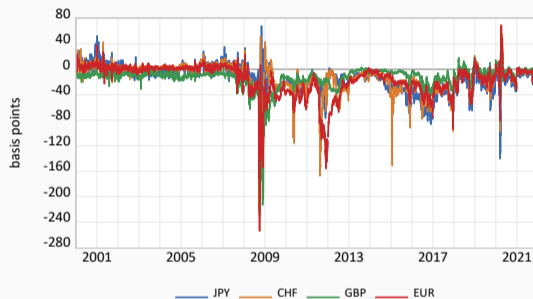
Advanced Economies
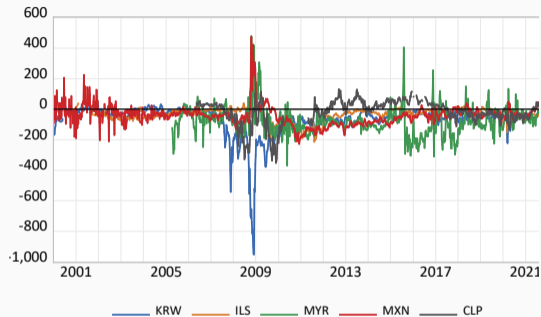
Sample of EMs

Note: The figure reports the 3-m LIBOR cross-currency basis for a set of Advanced and Emerging market economies. [Source: Bloomberg.]

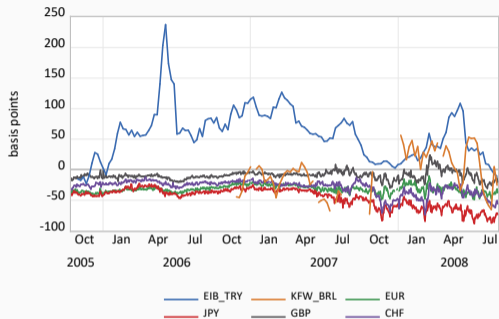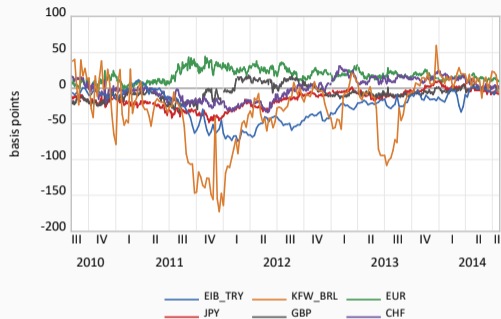# Cross-Currency Basis: 3m-Advanced vs 5y-Supranational Emerging

Pre-GFC

Post-GFC

SSA-basis (5y) much larger than AEs basis (3m) pre-GFC, but comparable post-GFC.
EIB_TRY and KFW_BRL: Basis on 5-year ZC bonds issued by supranationals in TRY and BRL. [Du & Schreger 2016]

Cross-Currency Basis: 5y-Advanced vs 5y-Supranational Emerging

Pre-GFC

Post-GFC

SSA-basis (5y) much larger than AEs basis (5y) pre-GFC, somewhat larger post-GFC.
EIB_TRY and KFW_BRL: Basis on 5-year ZC bonds issued by supranationals in TRY and BRL.
[Du & Schreger 2016]

Question: Can the basis inform policymakers about the optimal intervention (CFM or FXI)?

A Simple Model of Basis Control

[Building on Bianchi & Lorenzoni (2021)]

- 2-goods small open economy: T-good y^T and produced N-good $y_t^N = L_t$
- Separable preferences (we will specialize to $\sigma = 1$)

$$U = \frac{1}{1-\sigma} E_t \sum_s^\infty \beta^{s-t} \left(\phi^\sigma (c_s^T)^{1-\sigma} + (1-\phi)^\sigma (c_s^N)^{1-\sigma} \right)$$

$$p_t^T c_t^T + p_t^N c_t^N - S_t d_{t+1}^* = p_t^T y^T + w_t L_t - S_t (R_{t-1}^* + x_{t-1}) d_t^*$$

with S_t nominal exchange rate, $d_{t+1}^* \geq 0$ dollar debt

- x_{t-1}: spread over the dollar risk-free rate R_{t-1}^*.
- Competitive pricing: $p_t^T = S_t$ and $p_t^N = w_t$.
- Wages are downwardly sticky: $w_t \geq \bar{w}$ and $L_t \leq \bar{L}$.

Dollar Supply

[Similar to Gabaix-Maggiori, 2015].

- Foreign banks lend d_{t+1}^* dollars at rate $R_t^* + x_t$, borrow at rate R_t^* and face balance sheet implicit cost $\Phi(d_{t+1}^*)/\omega_t \equiv (d_{t+1}^*)^2/(2\omega_t)$

$$\max_{d_{t+1}^*} d_{t+1}^* x_t - \frac{(d_{t+1}^*)^2}{2\omega_t}$$

- ω_t: elasticity of dollar supply. [$\omega = \infty$ no friction; $\omega = 0$: no funding.]
- Supply of dollars: Funding Equation (FE)

$$d_{t+1}^* = \omega_t x_t$$

Link between spread and basis

Define the cross-currency 'basis' $bs_t = \ln R_t^* - [\ln R_t - \ln(F_t/S_t)]$.

- Local bank borrows at $R_t^* + x_t$, swaps and deposits locally. Cannot be profitable:

$$R_t \leq \frac{F_t}{S_t}(R_t^* + x_t) \iff -x_t \leq bs_t$$

- Local bank borrows at R_t, swaps abroad, earns $F_t R_t^*/S_t$. Cannot be profitable:

$$\frac{R_t^* F_t}{S_t} \leq R_t \iff bs_t \leq 0$$

- Local bank lends synthetic dollars $S_t R_t/F_t$ to local investors. Must be more expensive than dollar borrowing:

$$\frac{S_t R_t}{F_t} \geq R_t^* + x_t \iff bs_t \leq -x_t$$

Combining: $$bs_t = -x_t \leq 0.$$

[Link to Liu & Zhang (2021): 'adjusted basis' $bs_t + x_t$ is zero]

Dollar Demand in the Decentralized Equilibrium

Consider scenario where $\omega_{t+s} = \infty$ and wages are flexible for all $s > 1$, and $\beta \to 1$.

- Can solve the demand for dollars from the Euler equation (EE-CE):

$$d_{t+1}^* = \frac{y^T}{R_t^* + x_t} - (y^T - b_t^*)$$

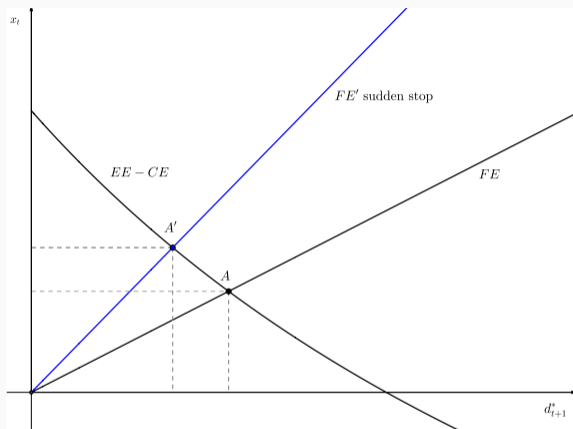where $b_t^* = (R_{t-1}^* + x_{t-1})d_t^*$ is the dollar debt repaid today.

- More debt to repay b_t^* means more borrowing today d_{t+1}^*. More expensive debt $(R_t^* + x_t)$ means less borrowing today.

Together (FE) and (EE) determine the basis, amount borrowed and T-consumption:
$x_t(\omega_t, R_t^*, b_t^*)$, $d_{t+1}^*(\omega_t, R_t^*, b_t^*)$ and $c_t^T(\omega_t, R_t^*, b_t^*)$ with

$$c_t^T = y^T - b_t^* + d_{t+1}^*$$

Competitive Equilibrium

- Funding shock ($\omega_t \downarrow$):
  - (FE) rotates counterclockwise
  - $x_t \uparrow$ and $d_{t+1}^* \downarrow$
  - Consumption of T-good $c_t^T \downarrow$.

- Externality: With nominal rigidities and an insufficiently flexible exchange rate, N-sector experiences a recession:

$$L_t = c_t^N = c_t^T \frac{S_t}{\underline{w}} \frac{1-\phi}{\phi} < \bar{L}$$

- Dichotomy: Monetary policy (S_t) has no effect on the basis (not general).

Ex-ante (prudential) and ex-post (crisis management) policies may improve outcomes if exchange rate cannot depreciate enough.

Constrained Efficient Crisis-Management

Two externalities: (a) Terms-of-trade; (b) Aggregate demand. Intertemporal trade-off:

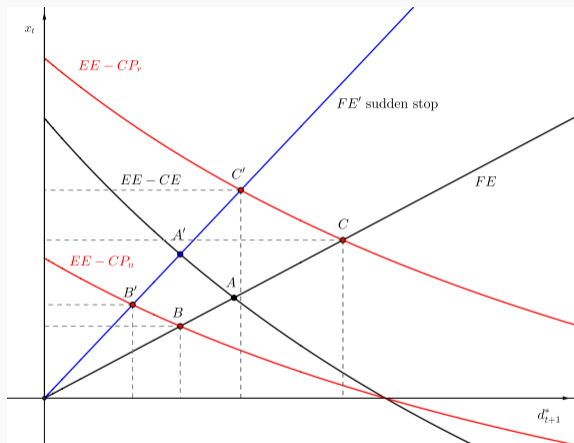$$\frac{\phi}{c_t^T} = \beta \frac{\phi}{c_{t+1}^T}(R_t^* + 2x_t) - \frac{1-\phi}{c_t^T}I_{L<\bar{L}}$$

- if no recession at t, $L_t = \bar{L}$, ($EE - CP_n$):

$$d_{t+1}^* = \frac{y^T}{R_t^* + 2x_t} - (y^T - b_t^*)$$

- if recession at t, $L_t < \bar{L}$, ($EE - CP_r$)

$$d_{t+1}^* = \frac{y^T}{\phi(R_t^* + 2x_t)} - (y^T - b_t^*)$$

Ex-Post Constrained-Efficient Crisis Management

Ex-Post Constrained-Pareto

- Two externalities:
  - Terms of Trade: less borrowing reduces the basis
  - Aggregate demand: more borrowing increases output in recessions

- $EE - CP_n$: no recession. ToT externality. Always borrow less, smaller basis.

- $EE - CP_r$: in recession: both externalities. Borrow more, larger basis.

Optimal crisis management: expand basis during SS-recessions, otherwise keep it tight.

Ex-Ante Policy

Consider now choices at $t - 1$. Assume $L_{t-1} = \bar{L}$.

- Competitive Equilibrium

$$\frac{1}{y^T + d_t^*} = \beta(R_{t-1}^* + x_{t-1})E_{t-1}\left[\frac{1}{y^T - b_t^* + d_{t+1}^{*,CE}(\omega_t, R_t^*, b_t^*)}\right]$$
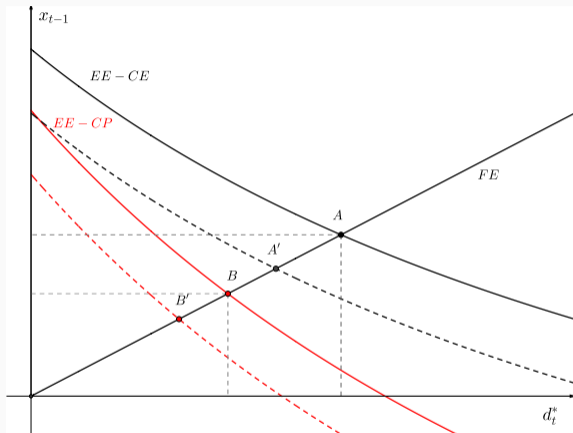
- Planner

$$\frac{1}{y^T + d_t^*} = \beta(R_{t-1}^* + 2x_{t-1})E_{t-1}\left[\frac{1 + (1-\phi)/\phi I_{L_t < \bar{L}_t}}{y^T - b_t^* + d_{t+1}^{*,CP}(\omega_t, R_t^*, b_t^*)}\right]$$

where $b_t^* = d_t^*(R_{t-1}^* + x_{t-1})$.

Always want to borrow less today: tighter basis.

Ex-Ante Constrained Pareto

- Ex-ante, policy leans against borrowing:
  - lowers the basis today
  - reduces future borrowing needs (hence likelihood of recession)

- Small basis means small rent extraction + 'dry powder'

- Higher likelihood of SS: less borrowing today

Optimal prudential policy: discourage borrowing and keep basis tight.

Basis Control: Implementation with Capital Controls

Basis x_t acts as a 'sufficient statistic,' with optimal level x_t^n.

Can implement optimal policy with a basis targeting rule of the form:

$$\tau_t = \tau(x_t, E_t x_{t+1}, L_t, E_t L_{t+1}, ...)$$

For instance, in our simple model, ex-post capital controls take the following simple form:

- Outside a recession:

$$\tau_t = \frac{x_t}{R_t^* + 2x_t} \approx x_t > 0$$

- In a recession:

$$\tau_t = -\frac{(1-2\phi)x_t + (1-\phi)R_t^*}{\phi(R_t^* + 2x_t)} \approx \frac{x_t - (1-\phi)}{\phi} < 0 \text{ when } \phi < 0.5$$

Generic Basis Control Rule

General form of the basis control rule:

$$\tau_t = \alpha_n + \beta_n x_t + (\beta_r x_t - \alpha_r) I_r + \gamma E_t x_{t+1}$$

- CFM generally increasing in basis, even in recessions ($\beta_n, \beta_r > 0$)
- Term structure of the basis matters for prudential policy: $\gamma > 0$ [Du et al, 2021]
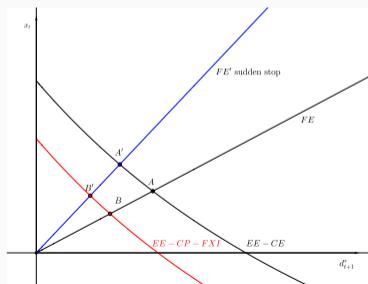
Implementation with FX Intervention

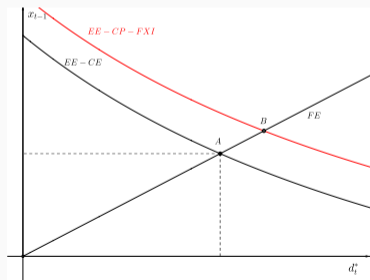Can also think of implementing with a rule on FX interventions:

$$A_t^* = A^*(x_t, E_t x_{t+1}, L_t, E_t L_{t+1}, ...)$$

FX interventions generically not optimal. Intervention today reduces basis ex-post but can increase the basis ex-ante (quasi fiscal cost).

Can still improve welfare (locally) but potential negative externalities [Fornaro & Romei]
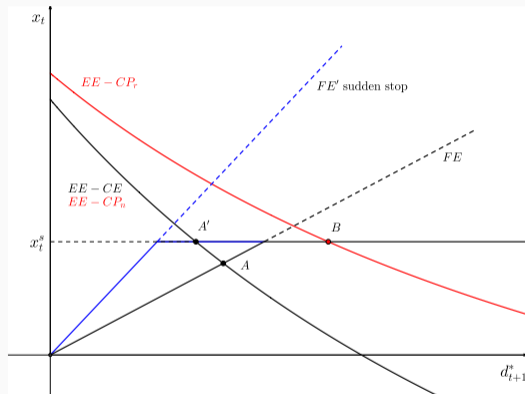

Ex-Post FX Intervention

Ex-Ante FX Intervention

Ex-post Swap Line

- Suppose the *foreign* central bank offers a swap line at rate x^s in times of stress

- This makes the funding curve (FE) elastic at the swap rate and caps the basis.

- Results in more borrowing in a recession, but the optimal tax does not vary with x:

$$\tau_t = \frac{\phi - 1}{\phi} 1_{L_t < \bar{L}} < 0$$

- Prudential motive for keeping the basis tight ex-ante still there but weakened.

CIP vs. UIP?

- Should CFM target CIP deviations ('basis') or UIP deviations?

- In principle, the little model above can be interpreted either way

- However, UIP deviations more likely to be 'home-grown' (see Kalemli-Ozcan & Varela, 2021)

- Same is true about 'naive' CIP deviations that don't control for credit risk

Conclusion

- Paper asks a simple question: Are there situation where a country would want to target the cross currency 'basis'?

- Answer is yes when the 'basis' reflects the elasticity of the supply of funds (i.e. $x_t = d^*_{t+1}/\omega_t$)

- Then can supplement interest policy rule with a 'basis control' rule for capital controls. Provides guidance and transparency to capital controls

- Implementation with FX interventions might be possible, but less efficient

- When country has access to swap line, rule simplifies further and basis becomes irrelevant (determined by swap line pricing)

Thank You!