Bond Flows-at-Risk: Global, Local, and Pipe Factors in Latin America

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The GFC was a watershed for capital flows. EMEs’ capital inflows (relative to GDP) have been maintained compared to pre-GFC levels. Their pre-GFC positive trend was substituted by a volatile dynamic. In Latam, their level increased in 2010, relative to pre-GFC, and since then, they have maintained a volatile dynamic. A notable change has been the shift in their composition from bank to investment funds’ intermediation. Remember the comments made by policy makers and the policy responses.

1/ García López and Stracca (editors) (2021) Changing patterns of capital flows. CGFS Papers No 66. BIS.
In the case of significant capital inflows, policy makers had the following two choices:

a. Allow the ER to appreciate.

b. Or, fix the exchange rate.

None was an attractive option for policy makers, which had to consider domestic macroeconomic conditions.

Capital controls and macroprudential policies ensued as possible policy responses. Big debate. Even IMF took part.

The real difficulties began with the Taper Tantrum episode, with extreme capital outflows from EMEs. During this episode, macroeconomic management in EMEs became complicated.
LATAM Bond Flows (EPFR)

Notes: Weekly aggregate of the bond flows of Brazil, Chile, Colombia, Mexico and Peru in million USD.
Source: With data from EPFR Global.
Push factors are those that incentivize investors to seek opportunities beyond their country of residence.\(^1\)

They are **exogenous to the recipient** economies.

They relate to the global economic and financial conditions, in particular, those that have a bearing on funding availability and its price.

Pull factors **reflect the recipient economy’s characteristics** that have a role in enticing global capital.\(^1\)

They reflect **the risk-return profile that an economy provides to global investors**.
LATAM Bond Flows (EPFR) and VIX

Notes: Weekly aggregate of the bond flows of Brazil, Chile, Colombia, Mexico and Peru in million USD.
LATAM Bond Flows (EPFR) and Local minus U.S. Term Premiums

**Notes:** Weekly aggregate of the bond flows of Brazil, Chile, Colombia, Mexico and Peru in million USD. Weekly averages of term premium differences. Differences between the respective local Term Premium and the one for the US as simple interest rates. Estimations based on the Adrian, Crump and Moench (2013) methodology. Samples vary due to data availability. Last data point corresponds to June 30, 2021. **Source:** With data from Valmer, Bloomberg, and Adrian, Crump and Moench (2013).
Pipes refer to the **institutional infrastructure** through which capital flows transit.

We focus on three variables that measure pipes.

- **(Changes in) international reserves:**

- **The proportion of government bonds denominated in local currency that are held by non-resident investors.**

- **EMEs Trading Volume.**
We use **quantile panel regressions** to model conditional quantiles of bond flows $BF_t$ as function of VIX, term premium differences, and pipe factors $P_{i,t}$:

$$Q_{BF_{t+h}|VIX_t,TP_{i,t}-TP_{US,t},P_{i,t}}(\tau|VIX_t,TP_{i,t}-TP_{US,t},P_{i,t}) = \alpha_i(\tau) + \beta_1(\tau)VIX_t + \beta_2(\tau)(TP_{i,t}-TP_{US,t}) + \beta_3'(\tau)P_{i,t} + \epsilon_{i,t}(\tau),$$

$\alpha_i$ are time-invariant fixed effects for country $i$, and $\epsilon_{i,t}$ are the error terms.

Thus, we have to estimate the quantile coefficients $\hat{\beta}(\tau)$ such that:

$$\hat{\beta}(\tau) = \arg\min_{\beta \in \mathbb{R}^k} \sum_{t=1}^{T} \tau \left( BF_{t+h} - X_{i,t}\beta(\tau) \right)_{BF_{t+h}>X_{i,t}\beta(\tau)} + (1-\tau) \left( BF_{t+h} - X_{i,t}\beta(\tau) \right)_{BF_{t+h}<X_{i,t}\beta(\tau)}$$
Representation of Quantile Regressions

Figure from Mathematica for prediction algorithms. [URL]
Main Results I: Global and Local Factors

**Shock on the Global Factor**

- **Average Conditions**
- **VIX Shock**

**Notes:** Based on quantile panel regressions. **Source:** Own estimates with data from EPFR Global, Bloomberg, IFS, and the corresponding Finance Ministries and Central Banks.

**Shock on the Local Factor**

- **Average Conditions**
- **Diff. TP Shock**

**Notes:** Based on quantile panel regressions. **Source:** Own estimates with data from EPFR Global, Bloomberg, IFS, and the corresponding Finance Ministries and Central Banks.
Main Results I: Pipes

**Change in the International Reserves**

- **Average Conditions**
- **Change in Reserves Shock**

**Proportion of Non-Resident Holders in Local Currency Denominated Bonds**

- **Average Conditions**
- **Non-Res. Holders Shock**

**Notes:** Based on quantile panel regressions. **Source:** Own estimates with data from EPFR Global, Bloomberg, IFS, and the and the corresponding Finance Ministries and Central Banks.
Main Results II: VIX Regime-Switching

Notes: Low and High volatility regimes for the VIX index based on an AR(1) model assuming that the shock’s variances are being affected by an underlying Markov regime-switching model. Source: Own estimates with data from Bloomberg.
Main Results II:
Quantile Panel Regressions

1. Now, we consider low and high volatility regimes for the global factor:

\[ Q_{BF_{t+h}\mid VIX_t, TP_{i,t} - TP_{US,t}}(\tau \mid VIX_t, TP_{i,t} - TP_{US,t}, P_{i,t}) = \alpha_i(\tau) + D_{t, high}\beta_{1, high}(\tau)VIX_t + D_{t, low}\beta_{1, low}(\tau)VIX_t \]
\[ + \beta_2(\tau)(TP_i - TP_{US}) + \beta'_3(\tau)P_{i,t} + \epsilon_{i,t}(\tau), \]

2. Thus, we have to estimate the quantile coefficients \( \hat{\beta}(\tau) \) such that:

\[ \hat{\beta}(\tau) = \arg\min_{\beta \in \mathbb{R}^k} \sum_{t=1}^{T} \rho_\tau(BF_{t+h} - X_t \beta(\tau)) \]
\[ = \arg\min_{\beta \in \mathbb{R}^k} \sum_{t=1}^{T} \tau(BF_{t+h} - X_{i,t} \beta(\tau))_{BF_{t+h} > X_{i,t} \beta(\tau)} + (1 - \tau)(BF_{t+h} - X_{i,t} \beta(\tau))_{BF_{t+h} < X_{i,t} \beta(\tau)} \]
Main Results II: Shock + Regime-switch

Notes: Based on quantile panel regressions including VIX switching regimes. Source: Own estimates with data from EPFR Global, Bloomberg, IFS, and the corresponding Finance Ministries and Central Banks.
Main Results III:(Modified)
Kullback–Leibler Divergence

- Kullback–Leibler divergence (KLD) is based on the notion of entropy. KLD between two densities \( p \) and \( q \) is given by:

\[
KLD(p|q) = \int_{-\infty}^{\infty} p(x) \ln\left(\frac{p(x)}{q(x)}\right) \, dx
\]

Which is the sum of the discrepancy between two densities \( p \) and \( q \), weighted by \( p \).

- **KLD is not invariant to the sequence of shocks.** For instance a shift on the VIX and change in regime. Then, we consider:

\[
M_r = 0.5 \left( KLD(q_{regime}|q) + KLD(q_{regime\rightarrow shock}|q_{shock}) \right); \quad \text{(divergence due to a regime switch)}
\]

\[
M_s = 0.5 \left( KLD(q_{shock}|q) + KLD(q_{shock\rightarrow regime}|q_{regime}) \right); \quad \text{(divergence due to a VIX shock)}
\]
Main Results IV

- U.S. policy responses to the COVID-19 financial turmoil in early 2020 have been favorable to the region.
- They reduced the probability of extreme bond outflows. All LAC-5 economies saw their bond flows at risk being reduced.
- For their part, Chile and Mexico saw their bond flows at risk being diminished in the week they announced their key local policies.
Different phenomena have been analyzed that can contribute to the increase in financial markets volatility. They entail externalities, market failures, problems with market infrastructures, and others.

Recently, attention has been centered on the nature of Global Asset Management Companies (GAMs) (Feroli et al. 2014).

In practice, all factors can be present and interact with each other, making herd-like behavior more likely.
Global Monetary Game

1. Global investors compare the return they can obtain in a core economy to that of an economy in the periphery. The return in the core economy depends mostly on the core economy’s policy rate. The expected return of the EMEs largely depends on the positions of other global investors in that EME. (Push, pull)

2. GAMs have gained participation in financial markets. Agency problems permeate investment relations in GAMs. There is typically a long chain of principal agent relations separating the owners of capital from the fund managers, who allocate the capital. (Pipes)

3. A mechanism to mitigate the agency problems is to compare the performance of fund managers against its peers. (Pipes)

4. This makes fund managers averse to ranking last among their peers (eg, Feroli et al. 2014). Fund managers that rank low face reputational costs. Redemptions. Herd like behavior. Liquidity Risk. (Pipes)
Global Monetary Game

6 Market structure of GAMs.

7 GAMs use common analytical tools to measure their risks and select portfolios. Investment’s concentration (e.g., ETFs). Liquidity risk. (Pipes)

8 A relatively more recent issue has been the growth of automated trading (AT), including, high frequency trading (HFT). While this implies benefits, it also has brought new risks. Liquidity risk. (Pipes)

9 Depth of EMEs financial markets. Market microstructure. (Pipes)

10 These elements make herd behavior and other types of “volatile behavior” more likely in EMEs’ financial markets.

11 Liquidity risk.