

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

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- ① **The GFC was a watershed for capital flows worldwide. It had profound economic and financial implications.**
- ② **EMEs' capital inflows (relative to GDP) have been maintained compared to pre-GFC levels.^{1/} Although they have slowed down during some periods, these have been transitory. That said, **their pre-GFC positive trend was substituted by a volatile dynamic.****
- ③ **In Latam, their level increased in 2010, relative to pre-GFC, and since then, have maintained a fairly volatile dynamic.**
- ④ **A notable change has been a shift in their composition, from bank to investment funds intermediation. This reflects the different nature of the main players behind capital flows.**

1/ García López and Stracca (editors) (2021) Changing patterns of capital flows. CGFS Papers No 66. BIS.

- 5 Consider the **comments made by policy makers** and the **policy responses**, at first in the case of capital **inflows** in the years after the GFC. Remarks convey the zeitgeist at the time. Policy makers coined terms such as **“competitive easing”**, **“currency wars”** and **“liquidity tsunamis”**.
- 6 As for the policy responses, **in the case of significant capital inflows**, policy makers had the following two choices:
 - a. Allow the ER to appreciate, yet risk having real exchange rate misalignments and other “distortions”;
 - b. Fix the exchange rate and, thus, have the AEs’ monetary policy accommodation pass through to their economies.

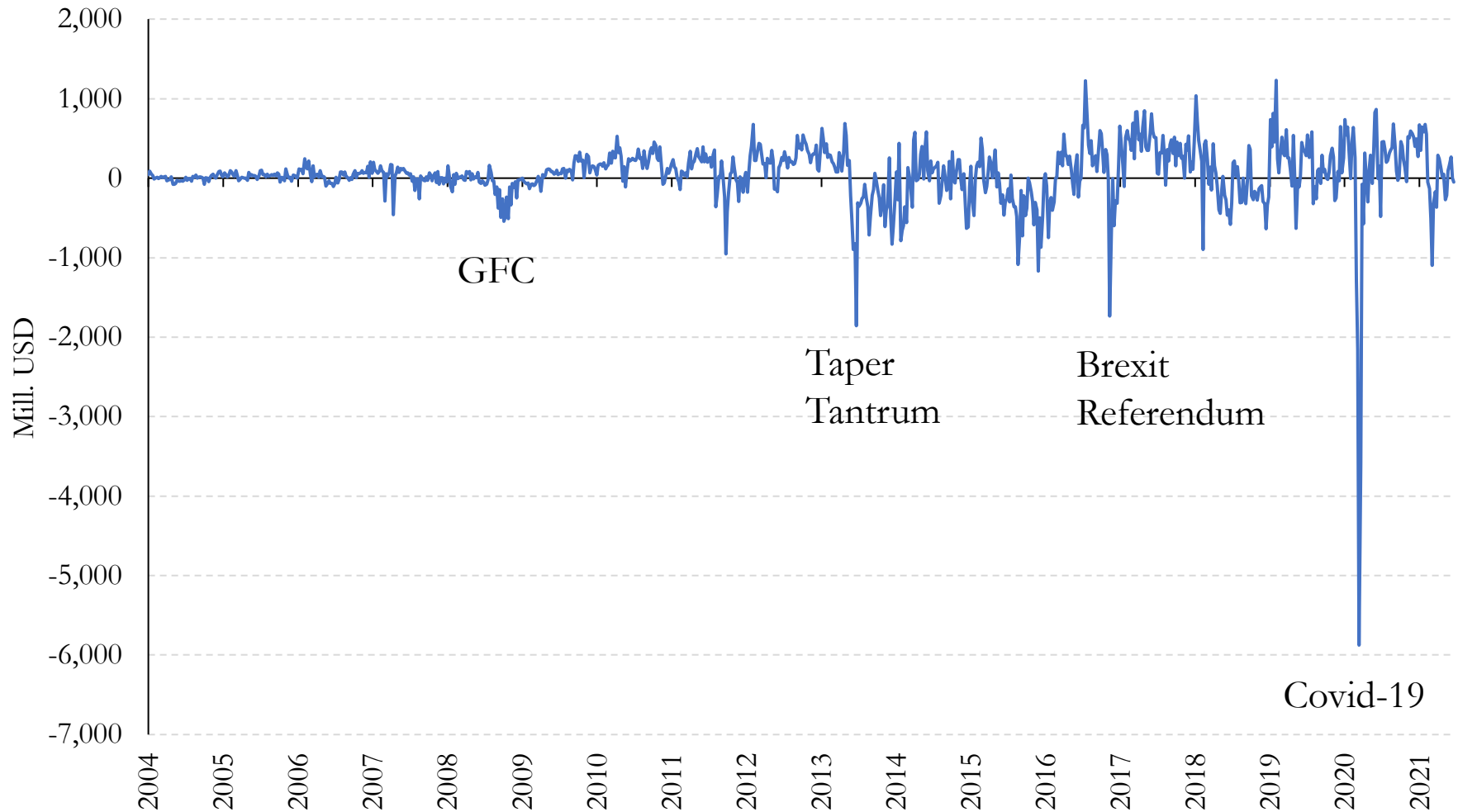
Neither was attractive for policy makers, which also had to consider domestic macro conditions.

- 7 **Capital controls and macroprudential policies** ensued as possible policy responses. Big debate. Even IMF took part...“It was as if the Vatican had given its blessing to birth control.”^{1/}
- 8 However, the **real problems** began with the **Taper Tantrum** episode, with **extreme** capital **outflows** from EMEs. During this episode, and a few others since, **macroeconomic management in EMEs** became complicated.

1/ The Economist (2013), “Just in case”, Capital controls are back as part of many countries’ financial armoury, October 10.

LATAM Bond Flows (EPFR)

Motivation
Bond Flows
Push, Pull and Pipes Factors
Bond Flows' Densities
Global Monetary Game



Notes: Weekly aggregate of the bond flows of Brazil, Chile, Colombia, Mexico and Peru.

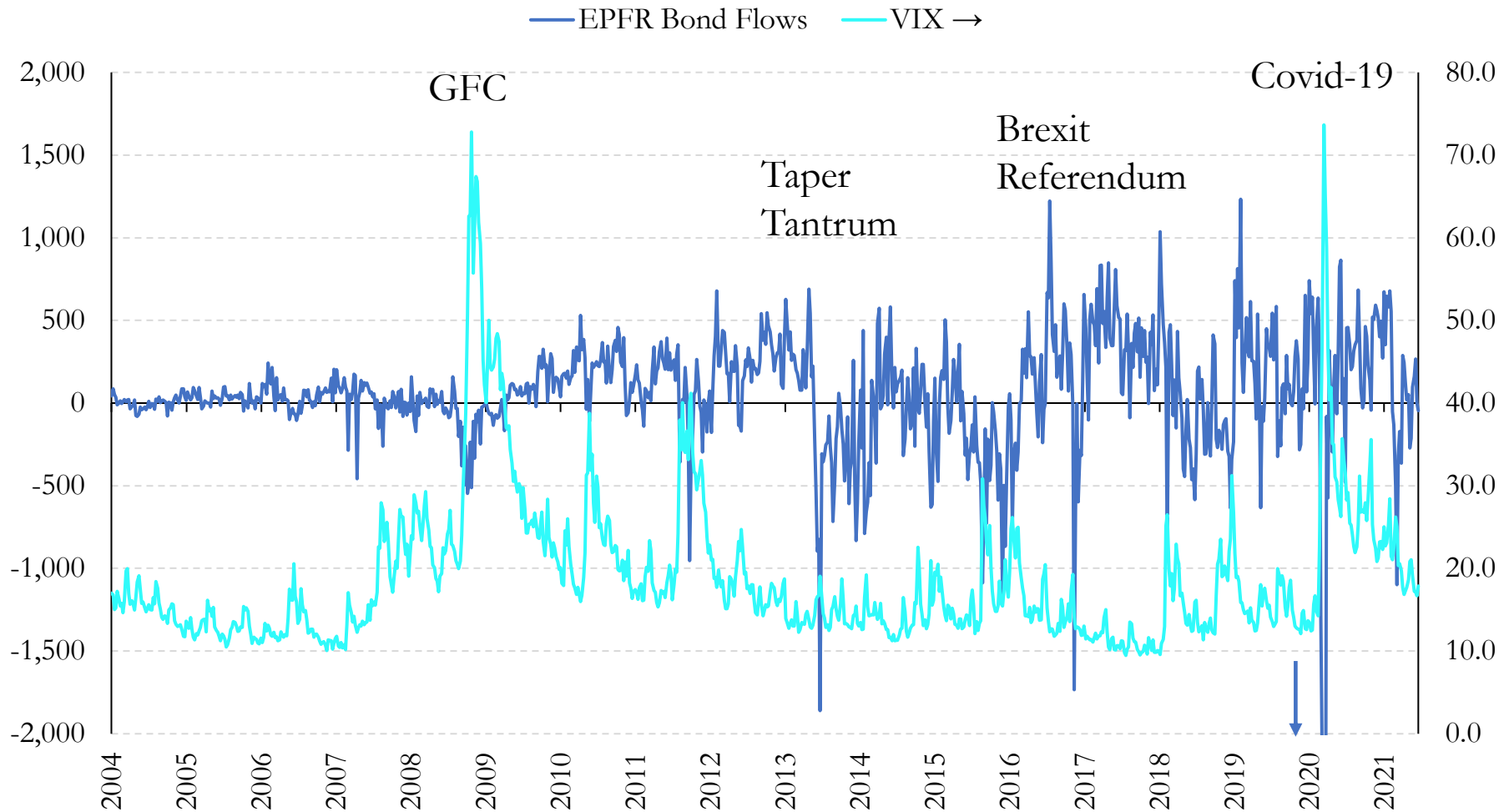
Sample: January 7, 2021 – June 23, 2021.

Source: With data from EPFR Global.

- ① Push (aka Global) factors are those that incentivize (“push”) investors to seek opportunities beyond their country of residence.^{1/}
- ② Importantly, they are **exogenous to the recipient** economies. This has policy implications.
- ③ **They relate to the global economic and financial conditions,** in particular, those that have a bearing on funding availability and its price. In our case, we use the VIX Index.

1/ García López and Stracca (editors) (2021) Changing patterns of capital flows. CGFS Papers No 66. BIS.

LATAM Bond Flows (EPFR) and VIX



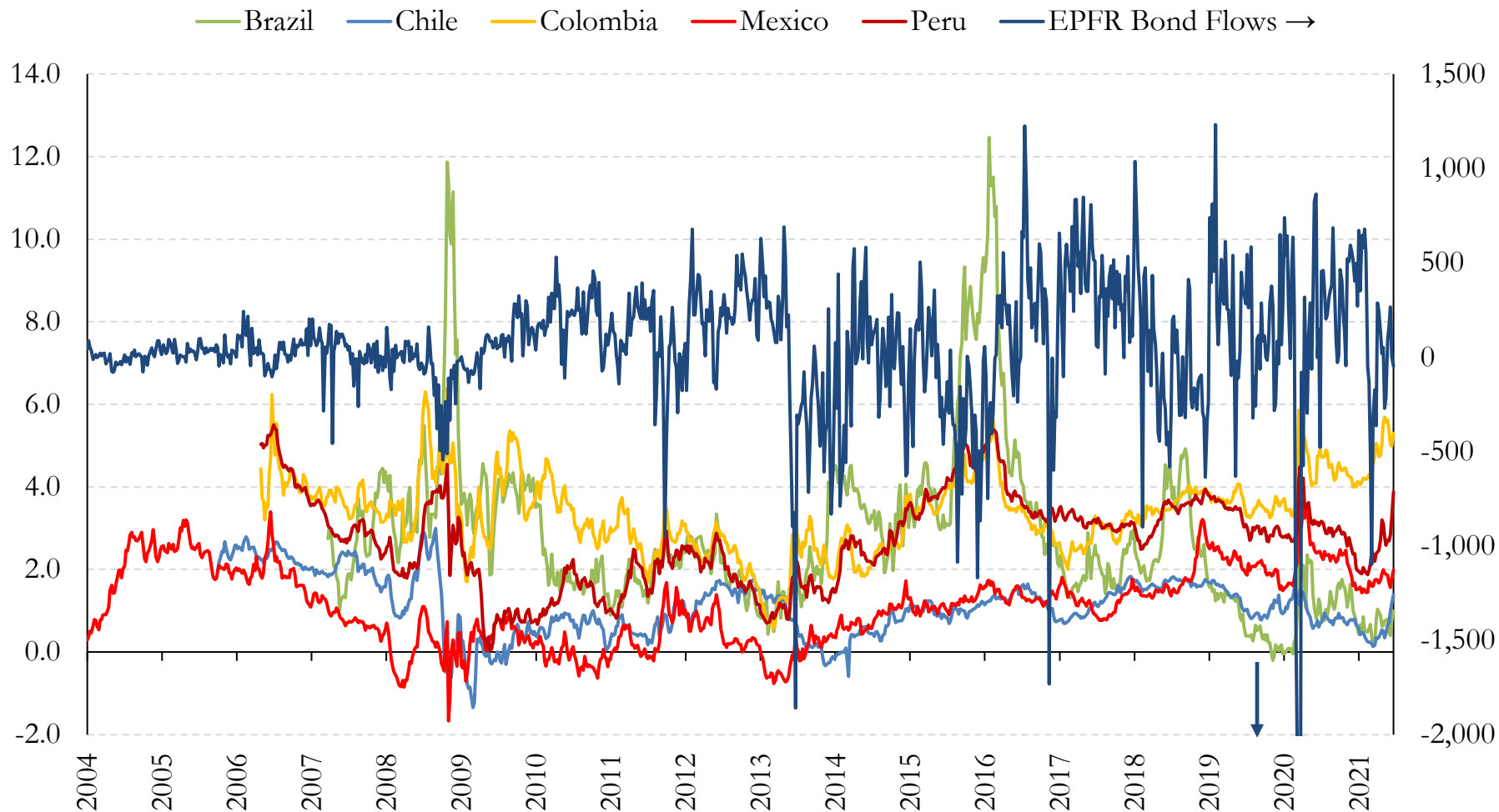
Notes: Weekly aggregate of the bond flows of Brazil, Chile, Colombia, Mexico and Peru.

Sample: January 7, 2021 – June 23, 2021. **Source:** With data from EPFR Global and Bloomberg.

- ① Pull factors **reflect the recipient economy's characteristics** that have a role in enticing global capital.^{1/} They are also known as **local factors. They can have a more important role in determining the allocation of capital across economies.**
- ② They capture **the risk-return profile that an economy provides to global investors.**
- ③ For instance, economic growth, risk premiums, and sovereign debt ratings can be considered pull factors.

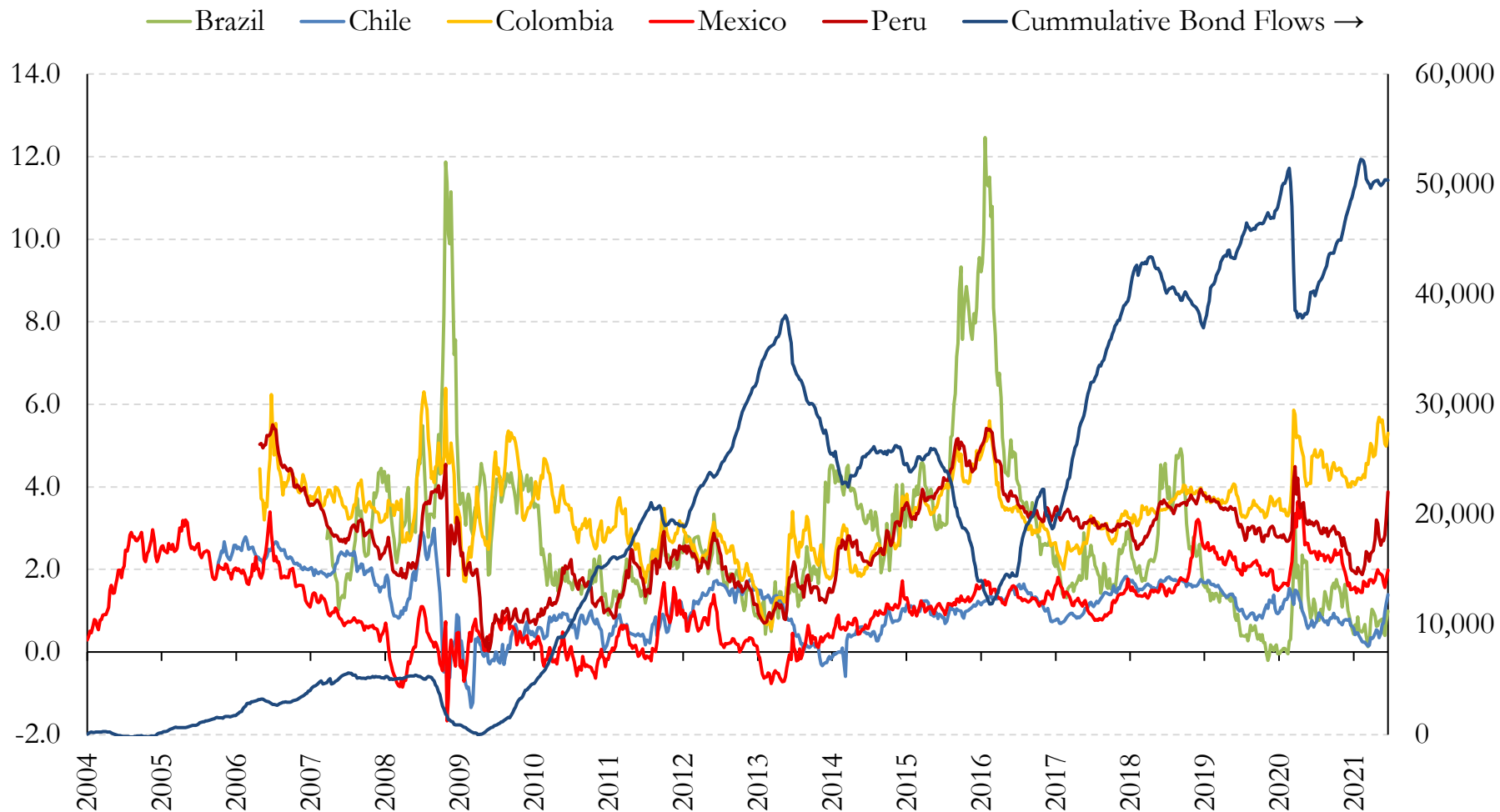
1/ García López and Stracca (editors) (2021) Changing patterns of capital flows. CGFS Papers No 66. BIS.

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. 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 23, 2021. **Source:** With data from Valmer, Bloomberg, and Adrian, Crump and Moench (2013).

LATAM Bond Flows (EPFR) and Local minus U.S. Term Premiums



Notes: Bond flows accumulated since 2004. Weekly aggregate of the bond flows of Brazil, Chile, Colombia, Mexico and Peru. 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 23, 2021. **Source:** With data from Valmer, Bloomberg, and Adrian, Crump and Moench (2013).

- ① Pipes refer to the **institutional infrastructure** through which capital flows transit.
- ② They include the kind of financial intermediaries that manage them, the laws and regulation they follow, etc.
- ③ We focus on three pipes, which in turn capture several aspects.
 - ❖ (Changes in) international reserves (excluding gold). While international reserves are macroeconomic factors, they relate to pipes. Self-insurance. Signal to Global Investors. FX Intervention. Liquidity provision.
 - ❖ The proportion of government bonds denominated in local currency that are held by non-resident investors (relative to total). Global Asset Management Companies. Nature of Players. Averse to Ranking Last. Reputation. Redemptions. Externalities. Big player dominance, but high competition among Fund Managers. Crowded trades. Algorithmic trading. Herdlike dynamics. Liquidity risk.
 - ❖ EMEs Trading Volume. Financial Market Depth. EMEs Fiscal “Fire Power”. Electronic Trading Platforms. CLS type. Liquidity Risk.

Quantile Panel Regressions

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- 1 We use **quantile panel regressions** to model conditional quantiles of bond flows BF_t as function of VIX, term premium differences, and pipe factors $\mathbf{P}_{i,t}$:

$$Q_{BF_{t+h} | VIX_t, TP_{i,t} - TP_{US,t}}(\tau | VIX_t, TP_{i,t} - TP_{US,t}, \mathbf{P}_{i,t}) \\ = \alpha_i(\tau) + \beta_1(\tau)VIX_t + \beta_2(\tau)(TP_i - TP_{US})_t + \boldsymbol{\beta}'_3(\tau)\mathbf{P}_{i,t} + \epsilon_{i,t}(\tau),$$

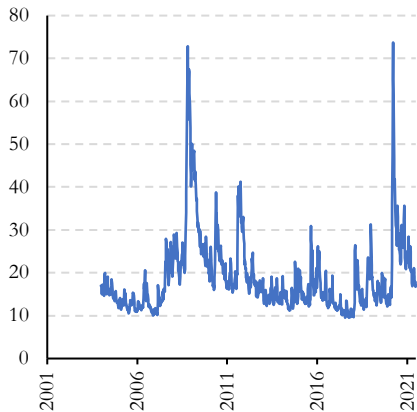
α_i are time-invariant fixed effects for country i , and $\epsilon_{i,t}$ are the error terms.

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

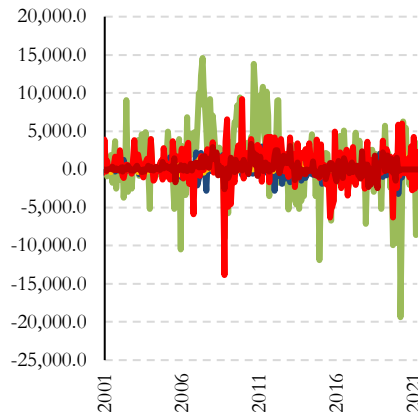
$$\hat{\boldsymbol{\beta}}(\tau) = \underset{\boldsymbol{\beta} \in R^k}{\operatorname{argmin}} \sum_{t=1}^T \rho_{\tau}(BF_{t+h} - \mathbf{X}_t \boldsymbol{\beta}(\tau)) \\ = \underset{\boldsymbol{\beta} \in R^k}{\operatorname{argmin}} \sum_{t=1}^T \tau \left(BF_{t+h} - \mathbf{X}_{i,t} \boldsymbol{\beta}(\tau) \right)_{BF_{t+h} > \mathbf{X}_{i,t} \boldsymbol{\beta}(\tau)} + (1 - \tau) \left(BF_{t+h} - \mathbf{X}_{i,t} \boldsymbol{\beta}(\tau) \right)_{BF_{t+h} < \mathbf{X}_{i,t} \boldsymbol{\beta}(\tau)}$$

Bond Flows' Densities

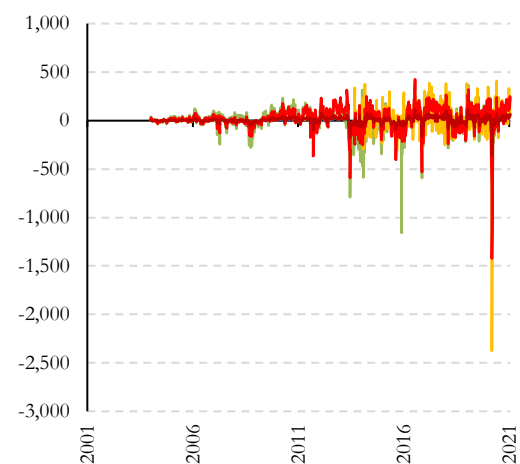
- Motivation
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- Push, Pull and Pipes Factors
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- Global Monetary Game



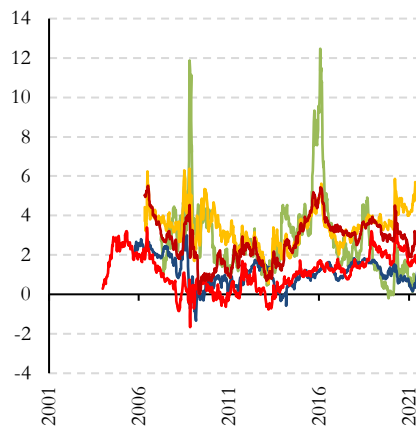
VIX



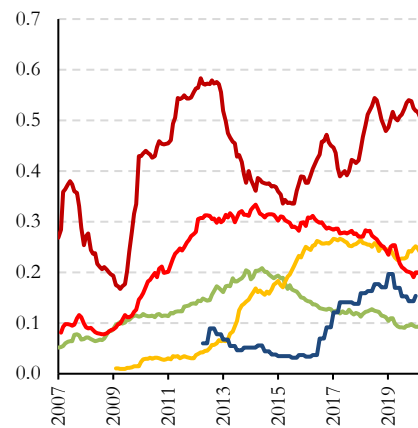
Changes in International Reserves



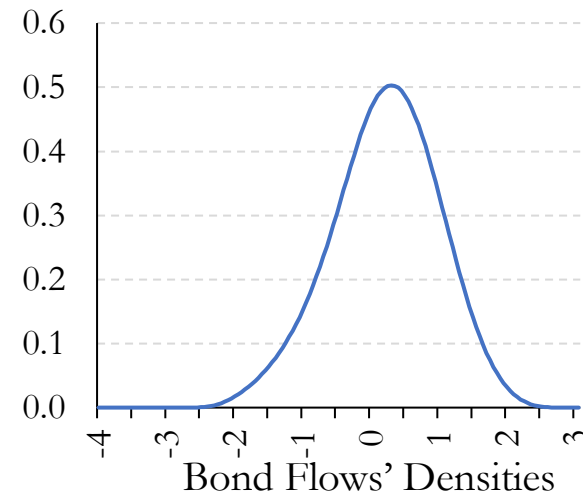
Bond Flows' Time Series



Term Premiums Diff.



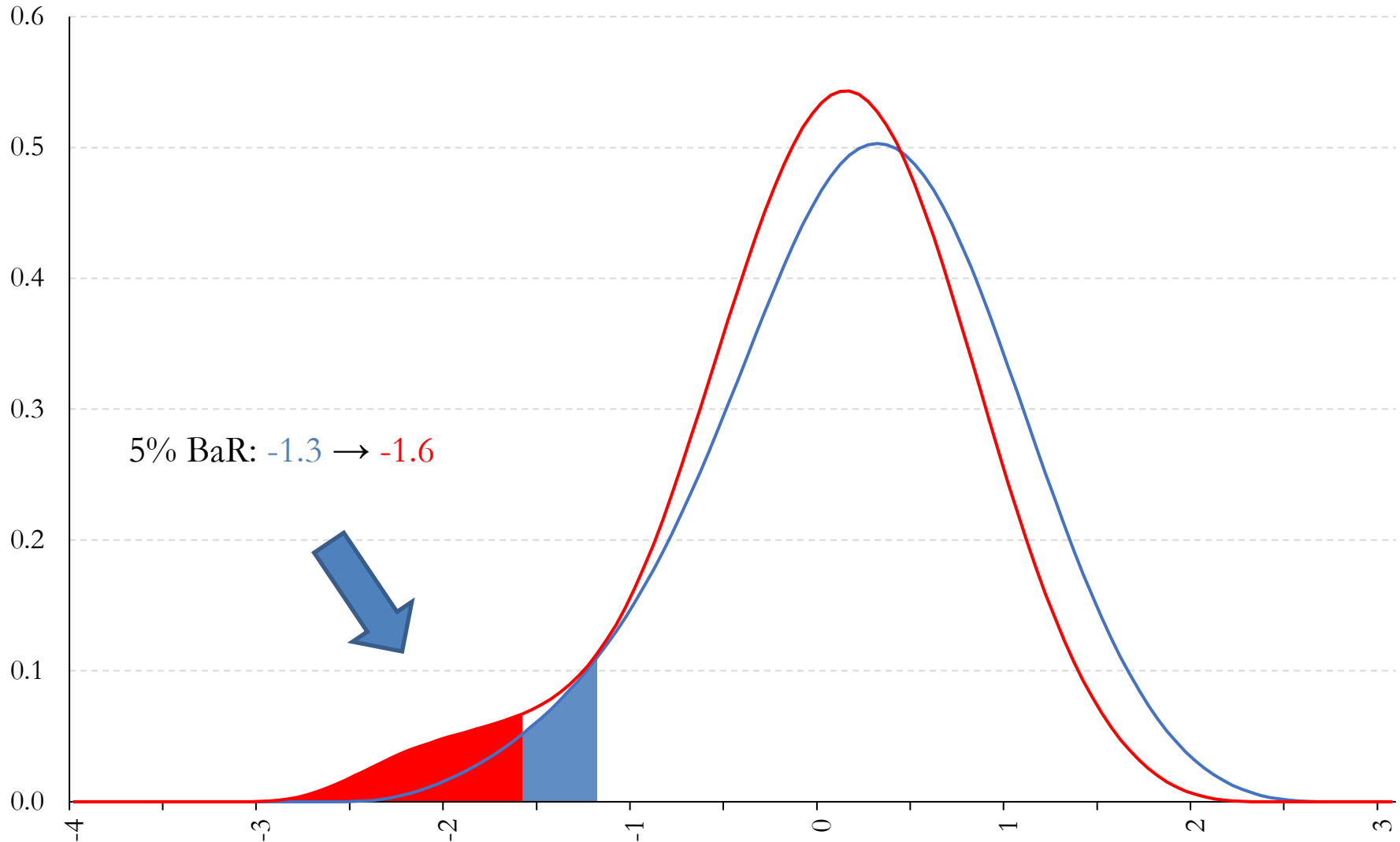
Proportion Held by Non-Residents



Bond Flows' Densities

Bond Flows at Risk + Shock

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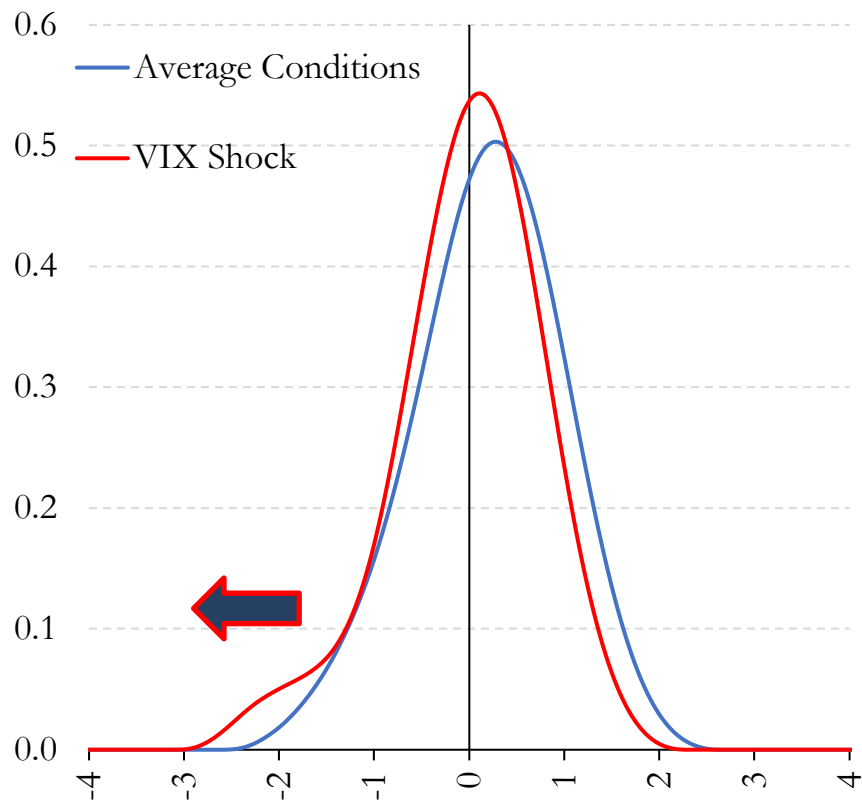
- ❑ A rise in the **VIX** deteriorates the bond flows density's variance, skewness, and kurtosis. It markedly worsens **bond flows at risk**.
- ❑ A larger **term premiums (TP) difference**, similarly, worsens the density. It decreases its mean marginally. Quantitatively, the impact from the VIX is greater than that of the TP difference.
- ❑ Changes in pipes affect the **variance, skewness, kurtosis and bond flows at risk**.
 - ✓ **An increase in international reserves** improves the density's variance, skewness, and kurtosis. It notably reduces bond flows at risk.
 - ✓ An increase in the **proportion of government bonds denominated in local currency that are held by non-resident investors**, for the most part, deteriorates its variance and kurtosis, although increases **bond flows at risk** somewhat as well.
 - ✓ A higher **EMEs' trading volume** mends (reduces) the density's variance, skewness, and kurtosis individually, but is not significant when all pipe factors are considered jointly.

- ❑ A higher VIX reflects less risk-appetite. As some global investors might exit their positions in the local bonds, others could follow suit, potentially due to 1) their aversion to ranking last, 2) fearing they don't know what others might do, or 3) assuming it is a fad that they can profit from. Herd like dynamics can ensue and increase **bond flows at risk**.
- ❑ On pipes,
 - ✓ **International reserves** appear to have a **self-insurance role**. Their changes are, essentially, neutral for the right-hand side of the density and beneficial to its left-hand side, in particular, they quell **bond flows at risk**.
 - ✓ An increase in the **proportion of government bonds denominated in local currency that are held by non-resident investors is beneficial in good times, but detrimental in bad ones, deteriorating bond flows at risk**.
 - ✓ A higher **EMEs' trading volume** reduces the density's variance, skewness, and kurtosis, making an extreme bond outflow less likely. (Result not statistically robust when pipe factors are considered jointly).
- ❑ Global, local, and pipes factors not only move in tandem, but can also interact, affecting bond flows' densities.

Global and Local Factors

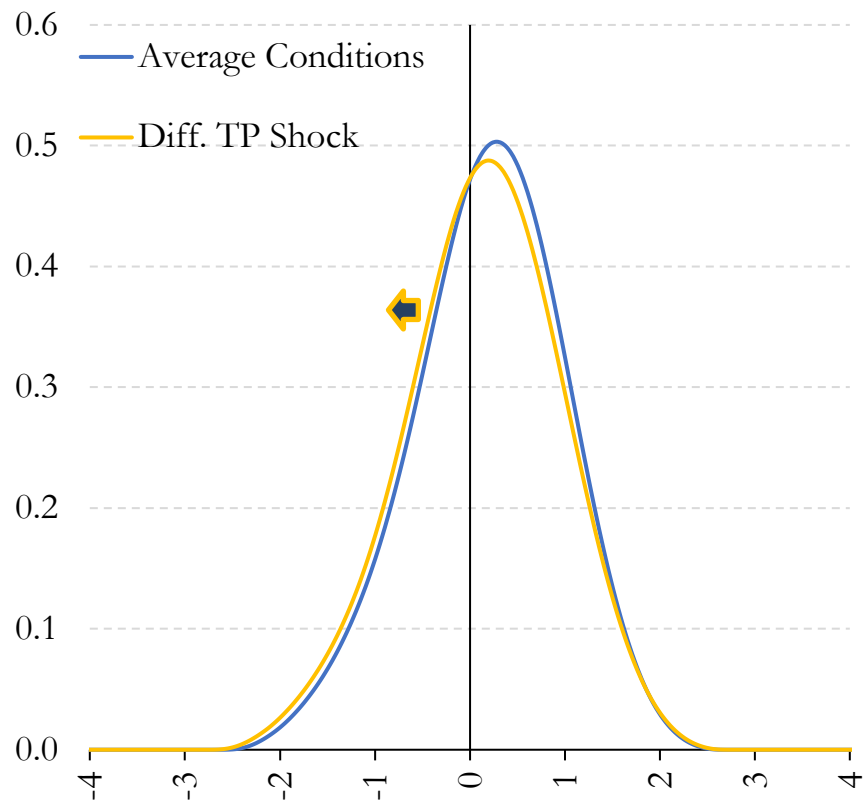
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Shock on the Global Factor



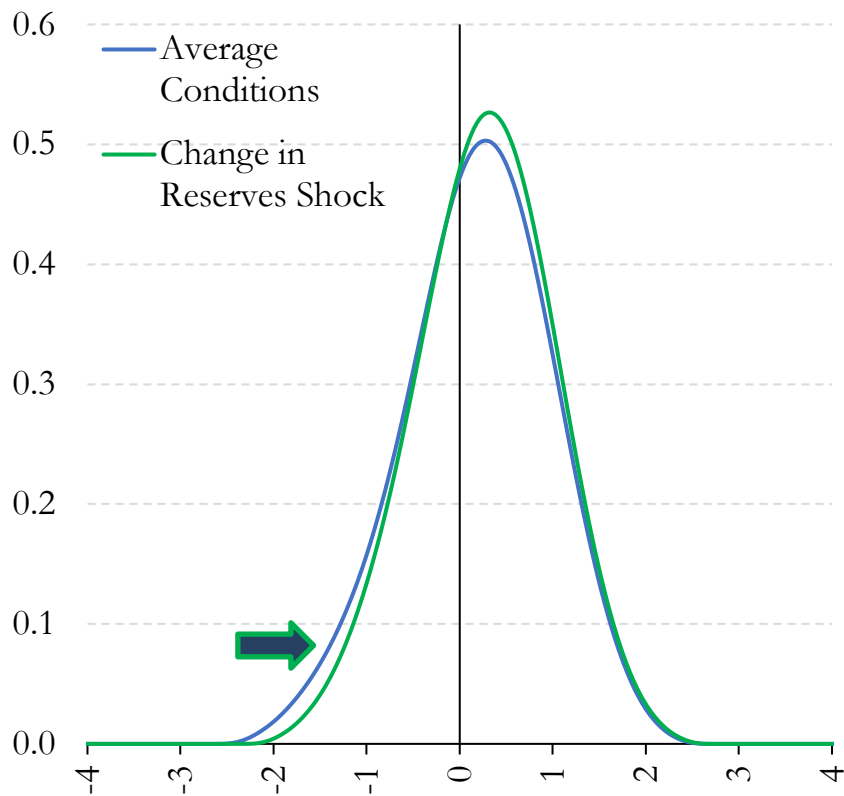
Notes: Based on quantile panel regressions. **Source:** Own estimates with data from EPFR Global, Bloomberg, IFS, and the and the corresponding Finance Ministries and Central Banks.

Shock on the Local Factor



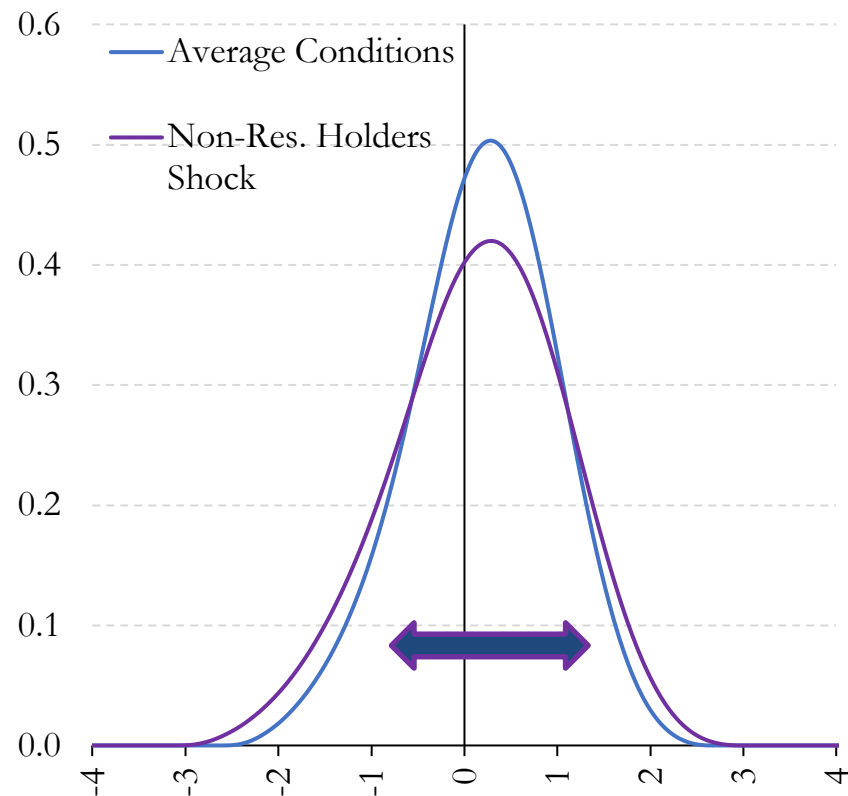
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Change in the International Reserves



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.

Proportion of Non-Resident Holders in Local Currency Denominates Bonds



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.

- The VIX time series can be represented in a statistically significant way by a regime-switching model, with a high-volatility regime state and a low-volatility one.^{1/}
- A shift to a **high-volatility VIX regime** leads to a deterioration of the bond flows' variance, skewness, and kurtosis. **Bond flows at risk** increase significantly. Such changes are due to a pair of aspects that operate concomitantly:
 - a. A **greater level of the VIX**; and,
 - b. A **greater sensitivity** of bond flows to the VIX.

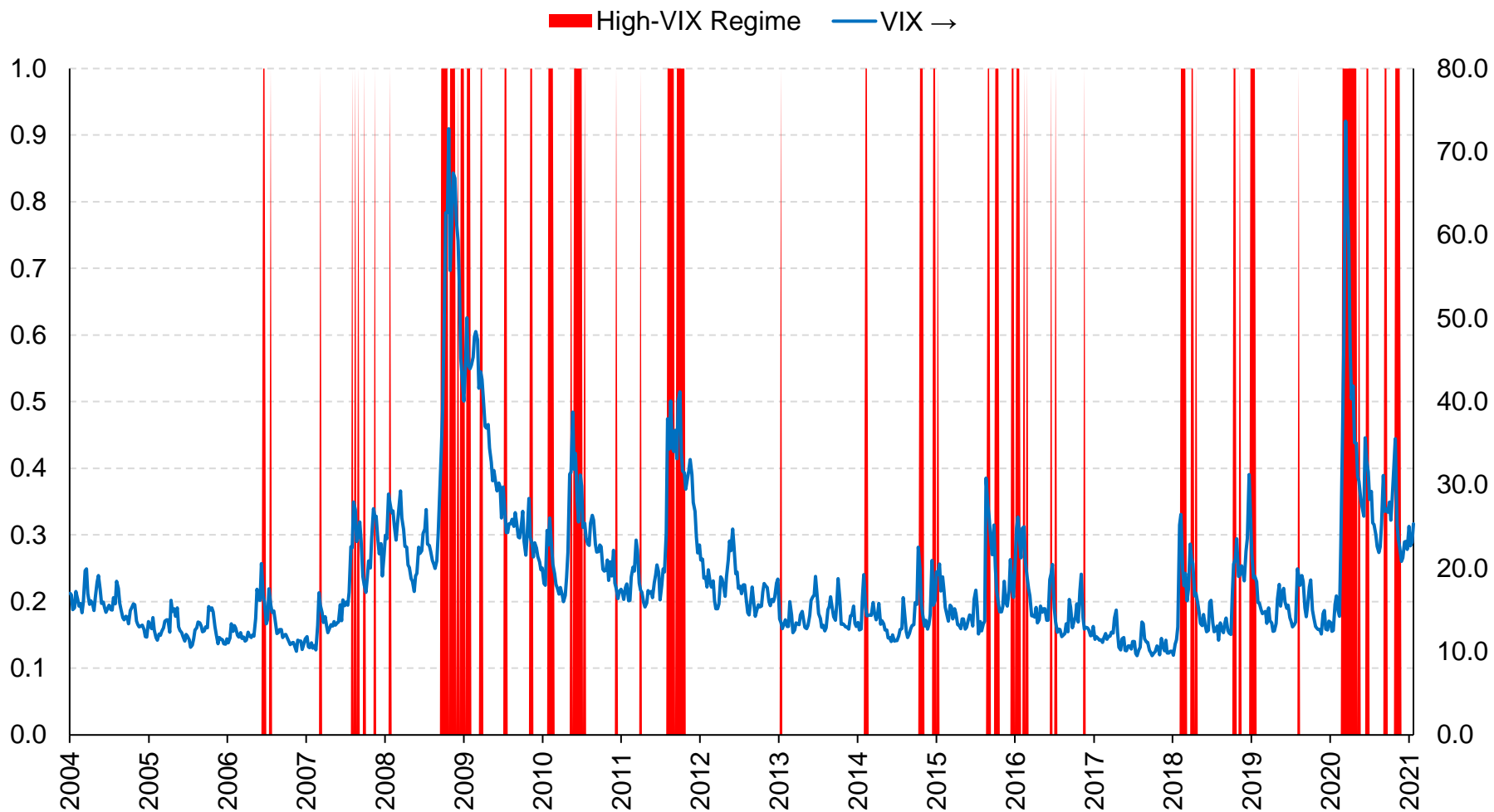
Pipes could be affecting such a sensitivity.

- **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**.
- Likewise, **Chile and Mexico** saw their **bond flows at risk being diminished** in the week they announced **their key policies**.

^{1/} The regime itself follows a Markov chain probability model.

VIX Regime-Switching

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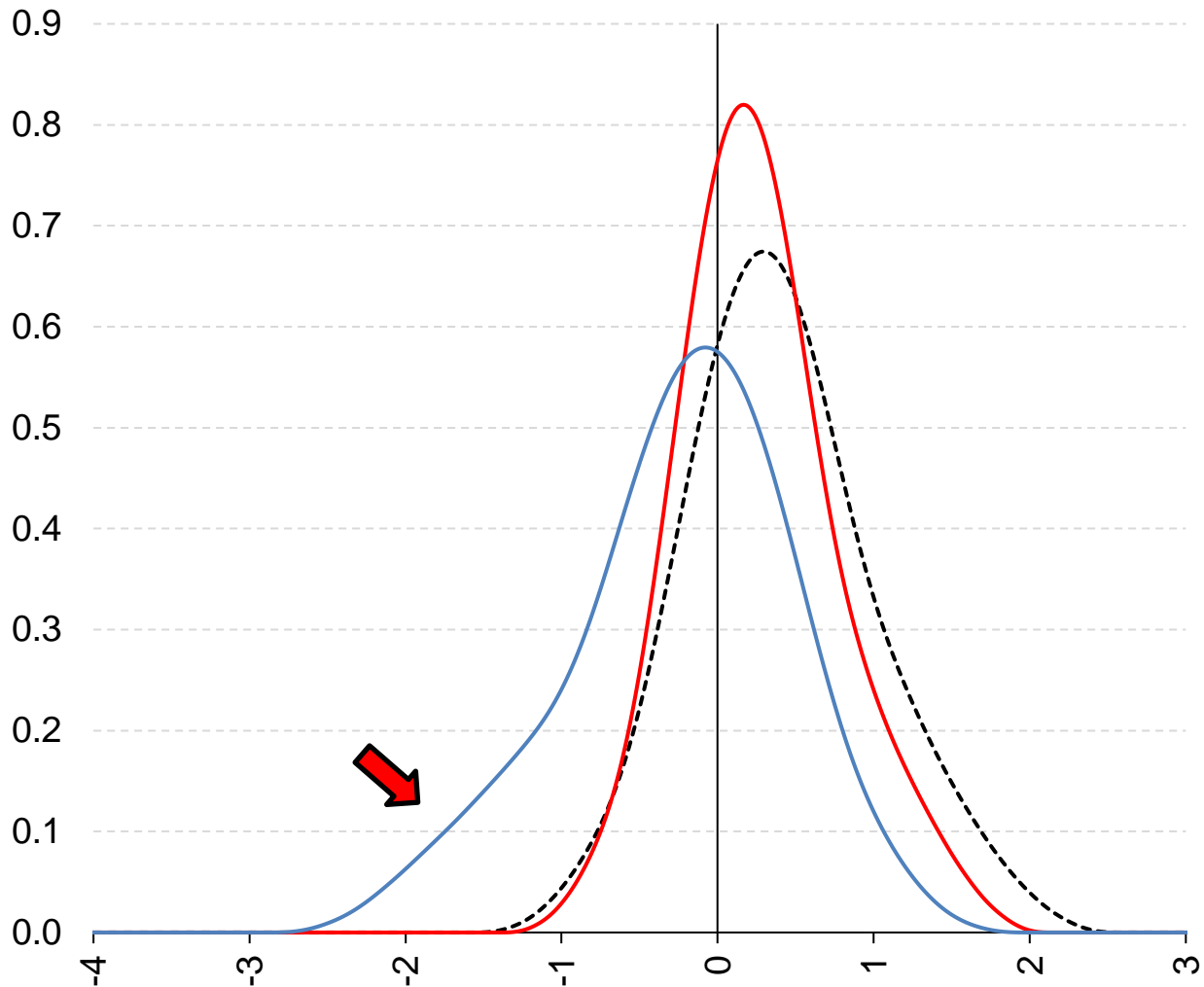


Notes: Low and High volatility regimes for the VIX index based on an AR(1) model assuming that the shock's variances are being affected by an underlying Markov regime-switching model.

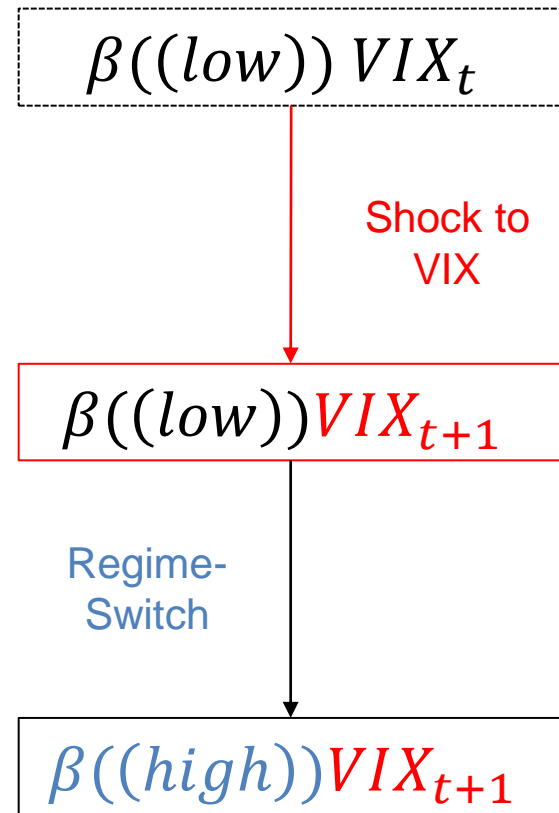
Source: Own estimates with data from Bloomberg.

Shock + Regime-switch

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Low Regime $\rightarrow \Delta VIX$
 $\rightarrow \Delta$ Regime



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

- ❑ Historically, 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.
- ❑ Among the most prominent ones, we have:
 - ❖ **Incomplete information** (Brunnermier, 2001).
 - ❖ **Asymmetric information** (Brunnermier, 2001).
 - ❖ **Rational bubbles** (Blanchard and Watson, 1982).
 - ❖ **Informational Cascades** (Bikhchandani et al., 1992).
 - ❖ More 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.

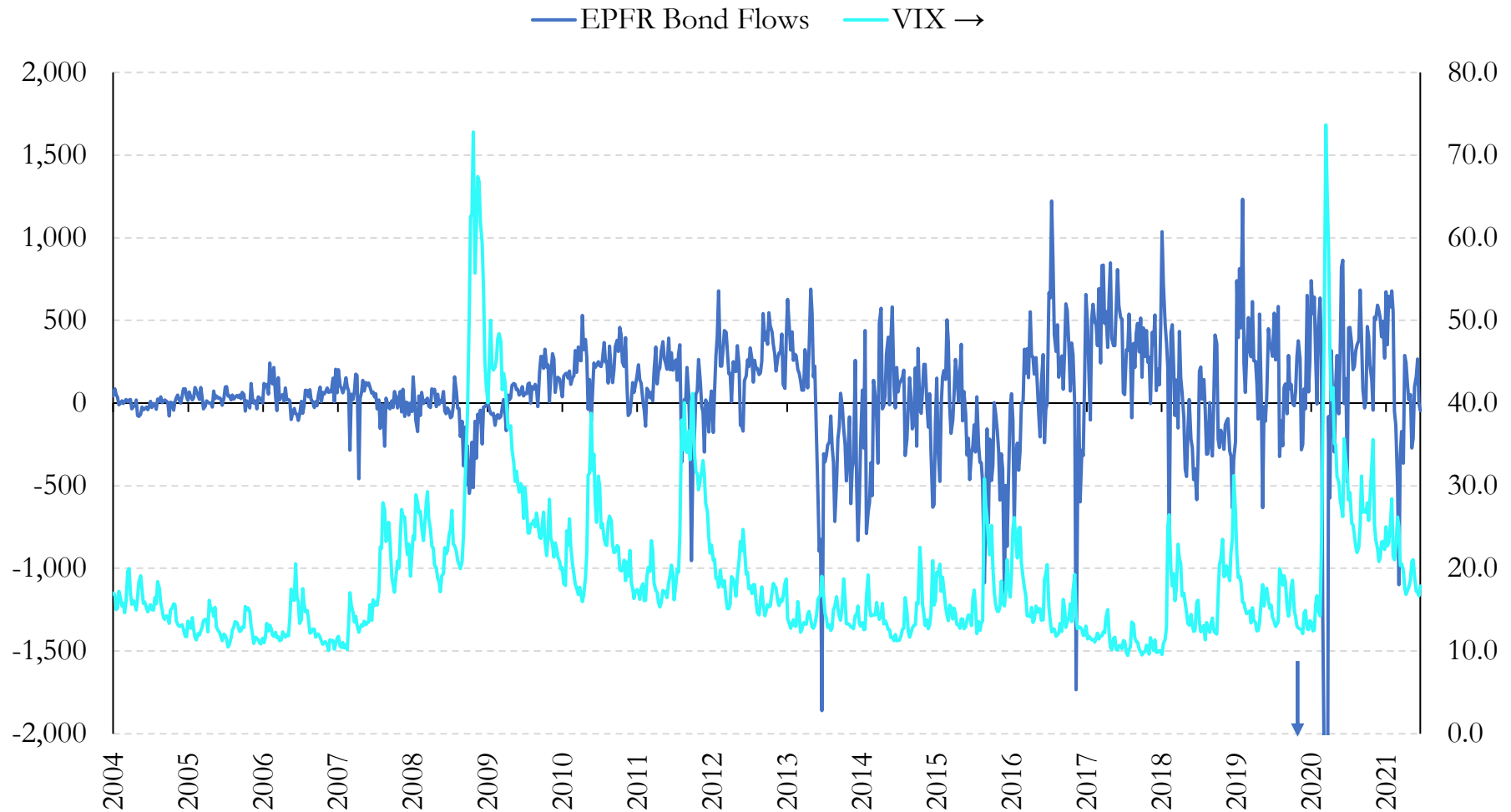
- ① **Global investors compare the return they can obtain in a core economy to that of an economy in the periphery.** The return in the core economy depends mostly on the **core economy's policy rate (low natural rates)**. The expected return of the EMEs largely depends on the **positions of other global investors in that EME (also, higher inflation, higher rates and term premiums)**. **(Push, pull)**
- ② **Intense search for yield.**
- ③ **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)**

- ④ A (monitoring) mechanism to mitigate the agency problems is to compare the performance of fund managers against a market index, as well as to their peers. **(Pipes)**
- ⑤ This comparison makes **fund managers averse to ranking last** among their peers (eg, Feroli et al. 2014). Fund managers that rank low, or last, face **reputational costs. Redemptions.** “Disciplining mechanism”. Herd like behavior. Liquidity Risk. **(Pipes)**
- ⑥ There is also the **market structure** of GAMs, which is characterized by a **substantial concentration of Assets Under Management, although asset managing is highly contested.** Big player dominance.
- ⑦ GAMs use **common analytical tools to measure their risks and select optimal portfolios.** There is investment's concentration (e.g., ETFs). Crowded trades. This **could lead to heightened liquidity risk.** **(Pipes)**

- ⑧ A relatively more recent issue has been the growth of **automated trading** (AT), in particular, **high frequency trading** (HFT). Also, of **algorithmic trading** (e.g., kill switches). While this implies some benefits, it also has brought new risks. Liquidity risk. **(Pipes)**
- ⑨ There is the **depth of EMEs financial markets**, and **market microstructure** issues. **(Pipes)**
- ⑩ These elements make herd behavior and other types of “volatile behavior” more likely in EMEs financial markets.
- ⑪ Significant liquidity risk.

Appendix

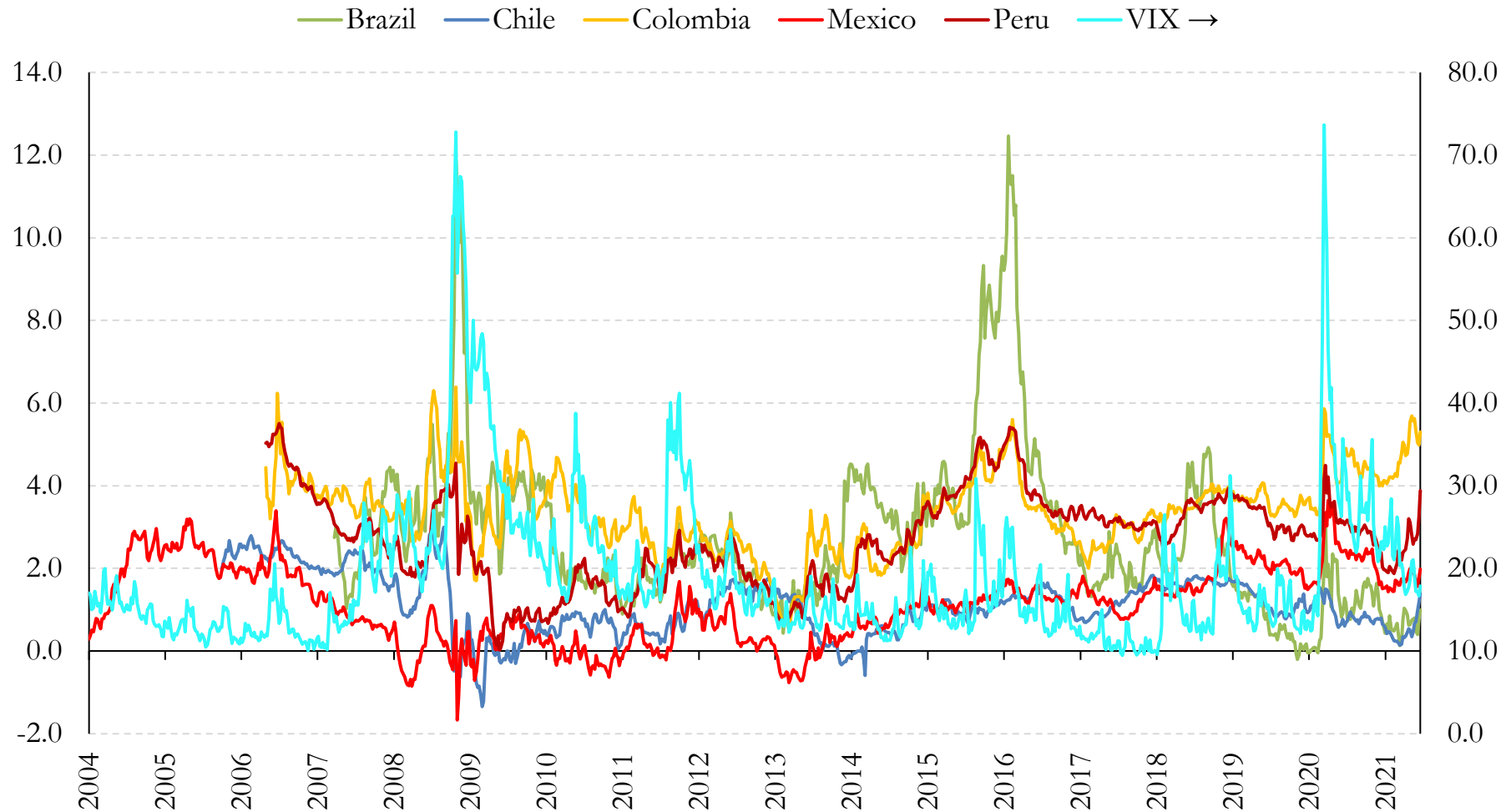
LATAM Bond Flows (EPFR) and VIX



Notes: Weekly aggregate of the bond flows of Brazil, Chile, Colombia, Mexico and Peru.

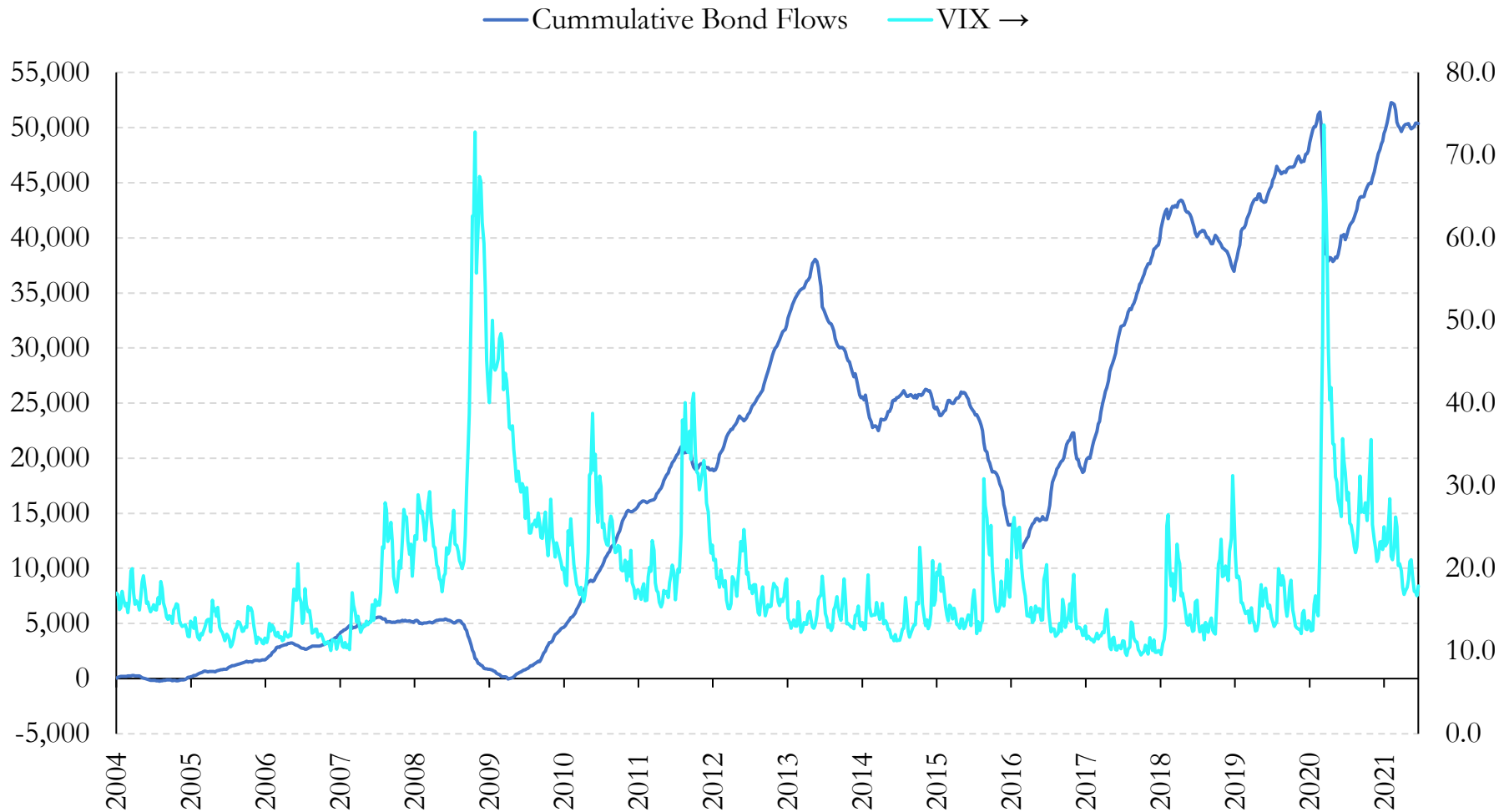
Sample: January 7, 2021 – June 23, 2021. **Source:** With data from EPFR Global and Bloomberg.

Local minus U.S. Term Premiums and VIX



Notes: Weekly averages. 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 23, 2021. **Source:** With data from Valmer, Bloomberg, and Adrian, Crump and Moench (2013).

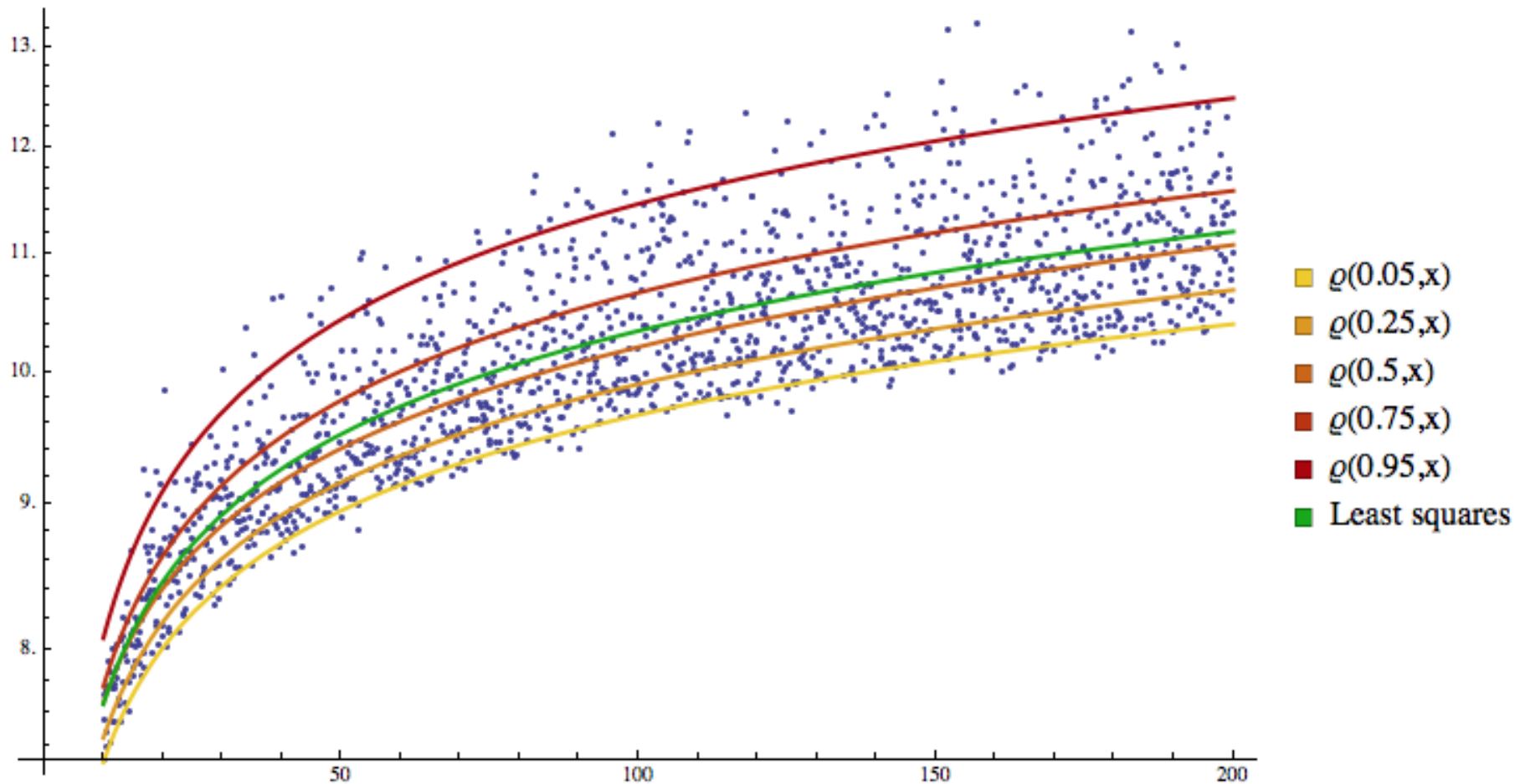
LATAM Bond Flows (EPFR) and VIX



Notes: Bond flows accumulated since 2004. Weekly aggregate of the bond flows of Brazil, Chile, Colombia, Mexico and Peru.

Sample: January 7, 2021 – June 23, 2021. **Source:** With data from EPFR Global and Bloomberg.

Representation of Quantile Regressions



Shock Accounting

Typical Deviations by Country

	Bond Flows (mill. USD)	Diff. TP (%)	VIX (points)	Non-Res. Holdings (%)	Change in Reserves (mill. USD)	Trading Volume (Bill. USD)
Brazil	138.06	1.96		3.9	4,426.7	
Chile	28.26	0.72		6.2	976.5	
Colombia	119.88	0.93	9.07	10.5	395.9	224.4
Mexico	118.25	0.92		8.4	2,506.0	
Peru	33.15	1.12		10.7	951.4	

	Average Conditions	Diff. TP - 1 s.d. Shock	VIX - 1 s.d. Shock	Non-Res. Holdings - 1 s.d. Shock	Change in Reserves - 1 s.d. Shock	Trading Volume - 1 s.d. Shock
Prob. Outflows	0.39	0.43	0.48	0.42	0.35	0.39
		9%	23%	8%	-10%	-1%
5% BaR (extreme outflows)	-1.27	-1.37	-1.57	-1.57	-1.07	-1.32
in s.d. units		8%	24%	24%	-16%	4%

5% BaR in Bond Flows units (mill. USD)

Brazil	-175.7	-189.5	-217.2	-217.2	-148.0	-182.6
Chile	-36.0	-38.8	-44.5	-44.5	-30.3	-37.4
Colombia	-152.6	-164.6	-188.6	-188.6	-128.5	-158.6
Mexico	-150.5	-162.3	-186.0	-186.0	-126.8	-156.4
Peru	-42.2	-45.5	-52.1	-52.1	-35.5	-43.8

Source: Own estimates with data from EPFR Global, Bloomberg, IFS, and the corresponding Finance Ministries and Central Banks.

Quantile Panel Regressions

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

$$\begin{aligned} & Q_{BF_{t+h} | VIX_t, TP_{i,t} - TP_{US,t}}(\tau | VIX_t, TP_{i,t} - TP_{US,t}, \mathbf{P}_{i,t}) \\ &= \alpha_i(\tau) + D_{t,high} \beta_{1,s1}(\tau) VIX_t + D_{t,low} \beta_{1,s2}(\tau) VIX_t \\ &+ \beta_2(\tau) (TP_i - TP_{US})_t + \boldsymbol{\beta}'_3(\tau) \mathbf{P}_{i,t} + \epsilon_{i,t}(\tau), \end{aligned}$$

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

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

$$\begin{aligned} \hat{\boldsymbol{\beta}}(\tau) &= \operatorname{argmin}_{\boldsymbol{\beta} \in R^k} \sum_{t=1}^T \rho_{\tau}(BF_{t+h} - \mathbf{X}_t \boldsymbol{\beta}(\tau)) \\ &= \operatorname{argmin}_{\boldsymbol{\beta} \in R^k} \sum_{t=1}^T \tau \left(BF_{t+h} - \mathbf{X}_{i,t} \boldsymbol{\beta}(\tau) \right)_{BF_{t+h} > \mathbf{X}_{i,t} \boldsymbol{\beta}(\tau)} + (1 - \tau) \left(BF_{t+h} - \mathbf{X}_{i,t} \boldsymbol{\beta}(\tau) \right)_{BF_{t+h} < \mathbf{X}_{i,t} \boldsymbol{\beta}(\tau)} \end{aligned}$$