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Best Master's Thesis

Liquidity loss during financial stress times: The case of the Colombian and other six Emerging Stock Markets

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1. Motivation

Why study liquidity in Emerging Markets?

- The low liquidity of the emerging financial markets has important implications:

ARTICLES	FINDINGS
Amihud (2002)	It is a key driver for their high volatility.
Chuhan (1992)	It discourages foreign investment.
Bekaert & Harvey (1995)	It partially explains the substantial segmentation with developed markets.
Lesmond (2005)	The substantial returns of emerging economies from 1990 to 2000, could have been greater if not for their high illiquidity.

  - Liquidity on emerging markets has been little studied, mostly due to the lack intraday trading data (Bekaert et al., 2007; Fong, Holden, & Trzcinka, 2016).

1. Motivation

Why study liquidity in financial stress times?

- Liquidity in financial markets tends to “evaporate” in times of high financial uncertainty.
  - Nagel (2012) reports that the inventory-absorption capacity is strained for the NYSE market, during the 2007-2008 crisis.

THEORY	ARTICLES	FINDINGS
Demand	Hameed, Kang, & Viswanathan (2010)	Panic impels investors to demand immediacy in execution, consuming the available liquidity.
Supply	Brunnermeier & Pedersen (2009)	Markets markers face greater risks and capital restrictions.
	Nagel (2012)	Market makers demand larger margins on providing liquidity.

- The Emerging Markets’ liquidity has not been explored in those periods.

2. Contribution

- This is the first study to test for the role of different types of investors on the liquidity of emerging markets, during financial stress episodes.
  - Scarce empirical evidence on these differential effects on the Emerging Markets' liquidity. The only one is Lee, Liu, Roll, & Subrahmanyam (2004).

3. Research question

- What is the role of three types of investors: Local individuals, Local institutions and Foreigners, on the liquidity in an emerging market, especially in financial stress times?

4. Hypotheses

- In summary, we consider three hypotheses by type of investor in financial stress times:
  - **H1:** Foreign investors decrease liquidity by actively demanding it.
  - **H2:** Local institutional investors decrease liquidity by actively demanding it.
  - **H3:** Local individual investors increase liquidity acting as liquidity suppliers.

5. Data and variables definition

5.1. Flows by type of investor

- We scale the net buys by the previous-day market capitalization (Bekaert, Harvey, & Lumsdaine, 2002; Griffin et al., 2004; Richards, 2005), as follows:

$$NET\_BUY_{ij,t} = (Buy_{ij,t} - Sell_{ij,t})/Mkcap_{i,t-1} \quad [1]$$

$$NET\_BUY_{ij,t} = (OIB_{ij,t} + Pas\_NET\_BUY_{ij,t})/Mkcap_{i,t-1} \quad [2]$$

$$NET\_BUY_{ij,t} = ((BuysInit_{ij,t} - SellsInit_{ij,t}) + (PasBuys_{ij,t} - PasSells_{ij,t}))/Mkcap_{i,t-1} \quad [3]$$

- **Sample markets:** Colombia (Colcap), Korea (Kospi, Kosdaq), Thailand (SET50), Indonesia (JCI), Philippines (PSEi) and Taiwan (TWSE).
- **Sample period:** 2008-2016

5. Data and variables definition

5.2. Daily illiquidity proxies

- The daily value-weighted average bid-ask is the best daily liquidity proxy of the effective bid-ask spread (Fong et al., 2016).

$$VWA\_BidAsk_{i,t} = \frac{\sum_{k=1}^{K} SPREAD_{ik,t} * Mtkcap_{ik,t-1}}{\sum_{k=1}^{K} Mtkcap_{ik,t-1}} \qquad [4]$$

$$SPREAD_{ik,t} = \frac{Ask_{ik,t} - Bid_{ik,t}}{\frac{Ask_{ik,t} + Bid_{ik,t}}{2}} \qquad [5]$$

5.2. Control variables in liquidity

- We use Trading Volume, Volatility and Returns as usual liquidity covariates (Benston & Hagerman,1974;Stoll,1978).

6. Methodology

- **VAR models**

  - This method has been used by previous market-wide liquidity studies (Agudelo, 2010; Chordia et al., 2005; Fujimoto, 2003; Goyenko & Ukhov, 2009).

$$For\ each\ i\ and\ j\colon\ Z_{ij,t} = \sum_{k=1}^{K} \beta_{ij,k} Z_{ij,t-k} + \varepsilon_{ij,t} \qquad [6]$$

6-SVAR

$$Z_{ij,t} = \begin{pmatrix} \Delta VIX_t \\ NET\_BUY_{ij,t} \\ VOLUME_{i,t} \\ R_{i,t} \\ \sigma_{i,t} \\ VWA\_BidAsk_{i,t} \end{pmatrix} \qquad [7]$$

6. Methodology

- **VAR analyses**

5-SVAR

- Excluding $\boldsymbol{NET\_BUY_{ij,t}}$, the contemporaneous response (IRF) of $\boldsymbol{VWA\_BidAsk_{i,t}}$ to a shock in $\boldsymbol{\Delta VIX_t}$, controlling for the dynamics of the control variables of liquidity.
  - ✓ Is there a liquidity "evaporation" (unconditional effect) in financial stress times?

6-SVAR

- The contemporaneous response (IRF) of $\boldsymbol{NET\_BUY_{ij,t}}$ to a shock in $\boldsymbol{\Delta VIX_t}$, and $\boldsymbol{VWA\_BidAsk_{i,t}}$ to a shock in $\boldsymbol{NET\_BUY_{ij,t}}$.
  - ✓ Does the investors' demand explains the liquidity drop in high uncertainty times?

7-SVAR

- The contemporaneous response (IRF) of $\boldsymbol{VWA\_BidAsk_{i,t}}$ to an unexpected positive innovation in $\boldsymbol{\Delta VIX_t}$, controlling for the other variables, including $\boldsymbol{NET\_BUY_{ij,t}}$.
  - ✓ Does liquidity evaporates not through demand or flows, but via supply, in financial stress times?

6. Methodology

- **Data Adjustment**

We adjust the original data (spreads, volume, return and volatility) for deterministic time-series variations, following Gallant, Rossi, and Tauchen (1992), and Chordia et al. (2005).

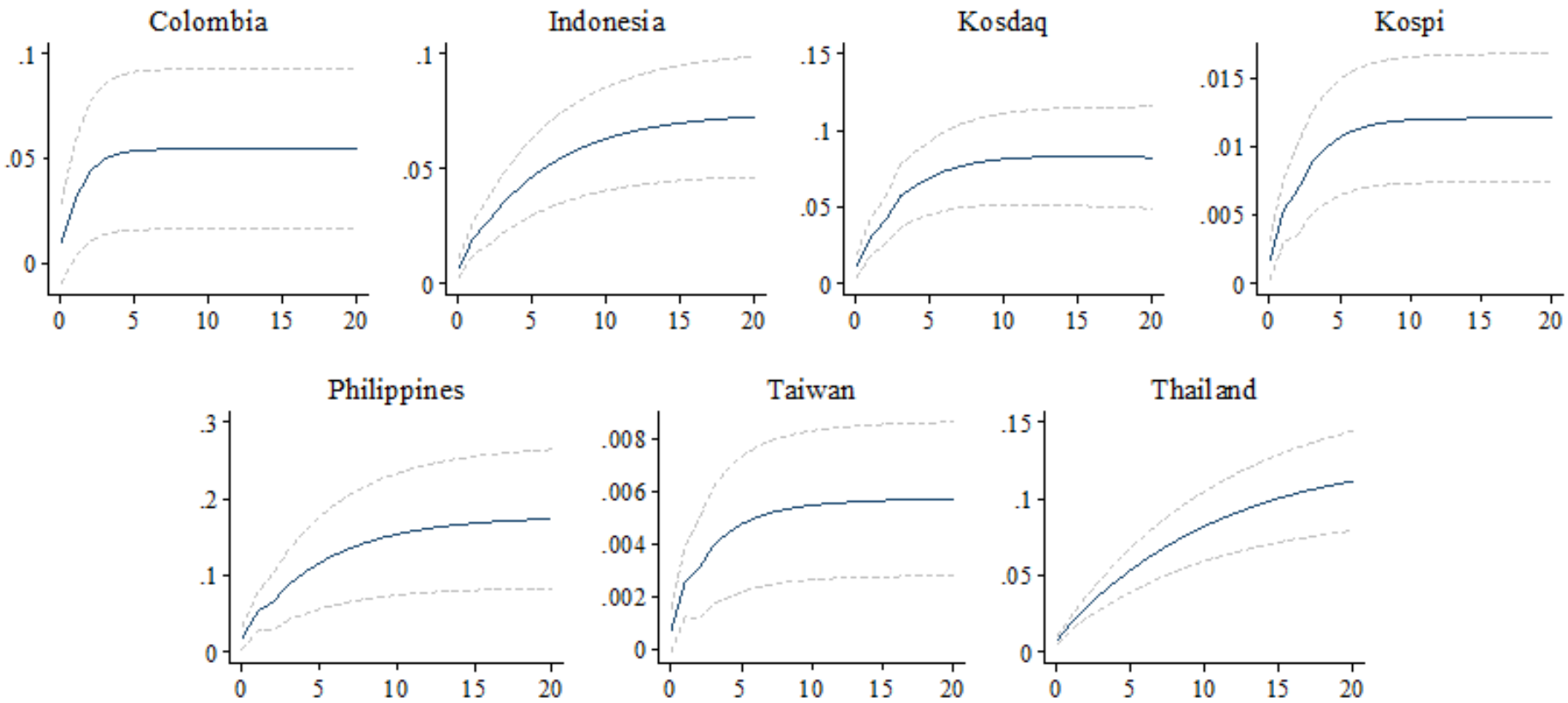
- The adjustment procedures are designed to remove long-run trends, external and systematic calendar effects, that we are not seeking to explain.

- Also, this adjustment allows to work in a better way with stationary time series models.

7. Results

Liquidity on Financial Stress Times

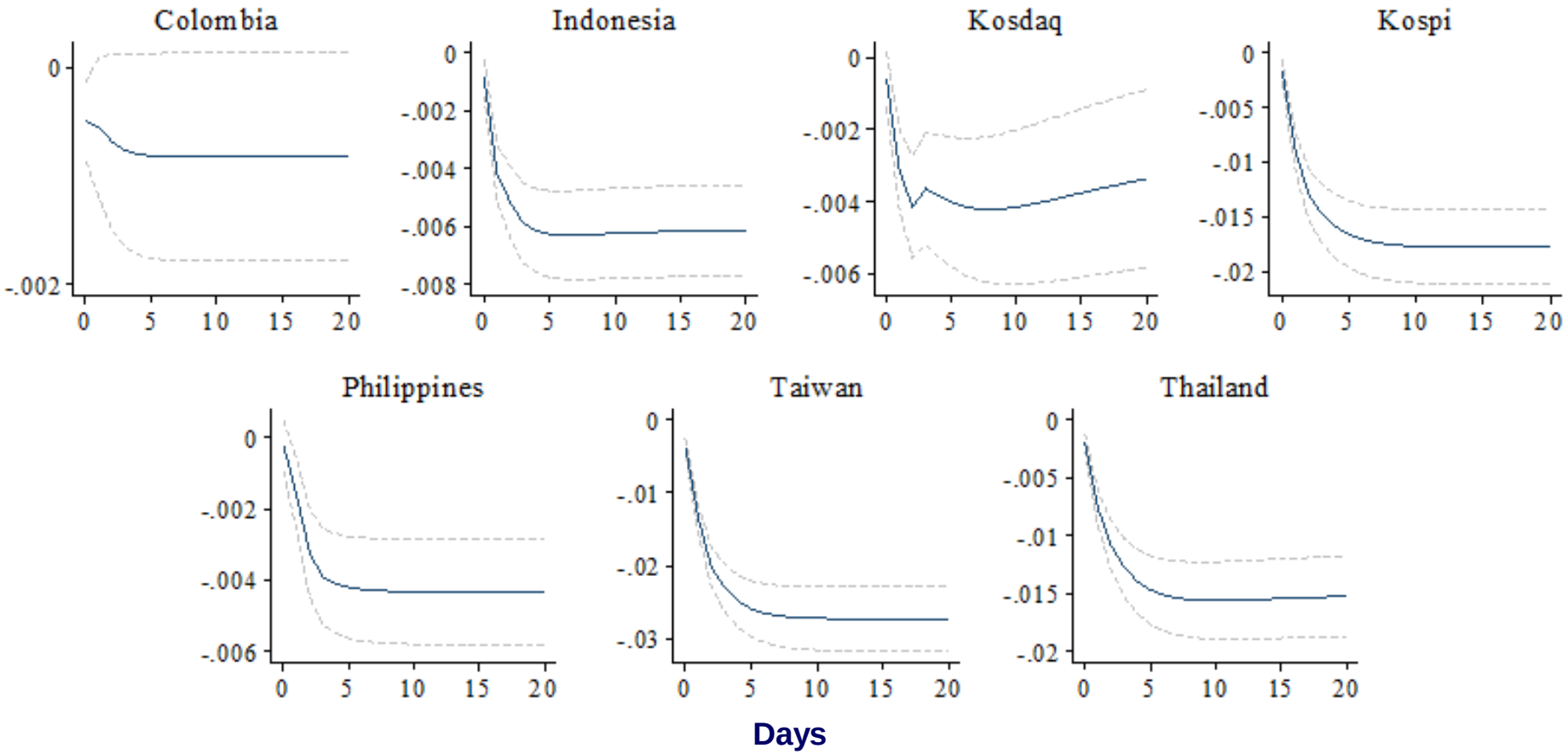
- **5-SVAR:**
- **Impulse:** ΔVIX_t
- **Response:** VWA_BidAsk_t



7. Results

Foreign Flows on Financial Stress Times

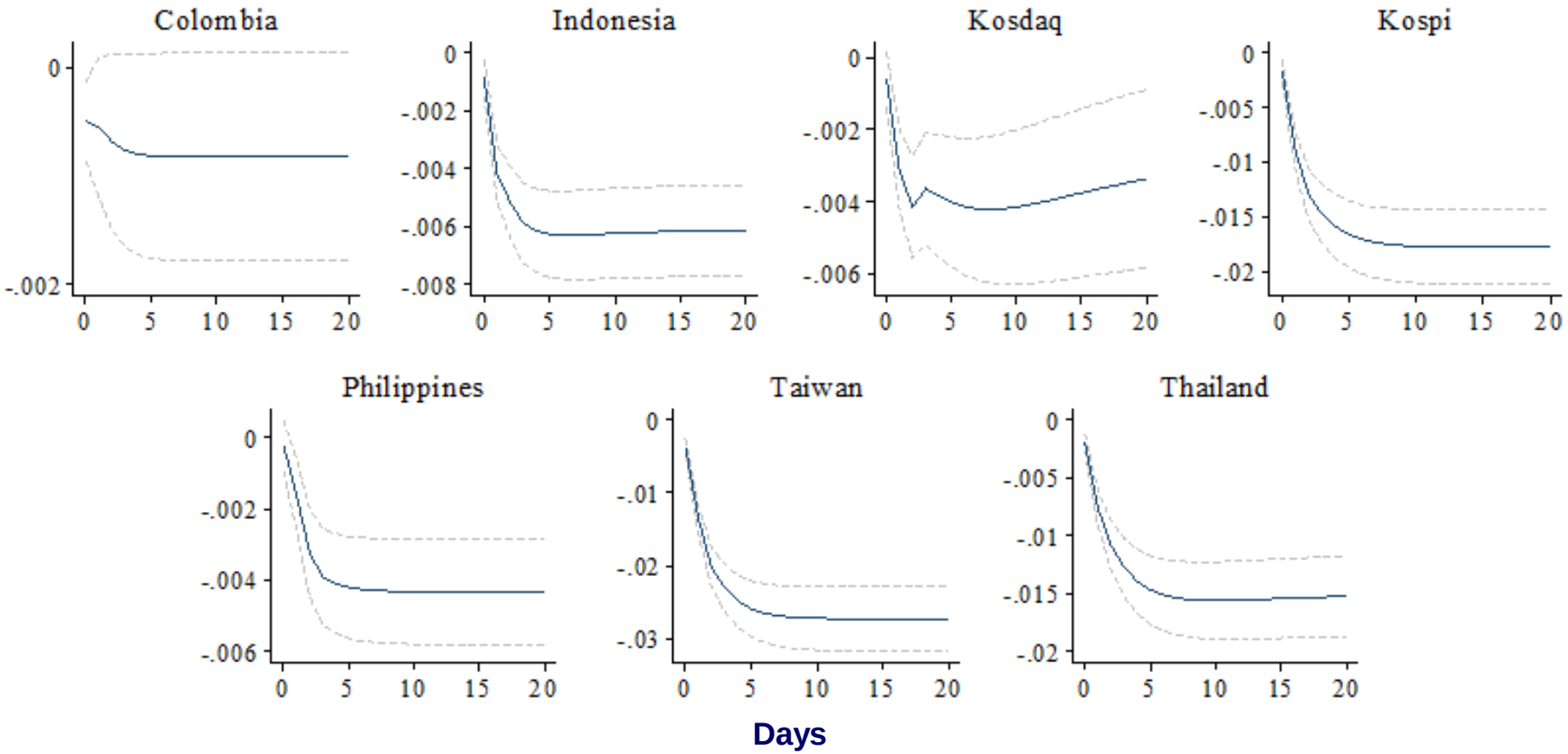
- **6-SVAR:**
- **Impulse: ΔVIX_t**
- **Response: Foreigners' NET_BUY_t**



7. Results

Effects of Foreign Flows on Liquidity

- **6-SVAR:**
- **Impulse: Foreigners' NET_BUY_t**
- **Response: VWA_BidAsk_t**



7. Results

- **Summary Results**

Flows' effects on liquidity in financial stress times

6-SVAR

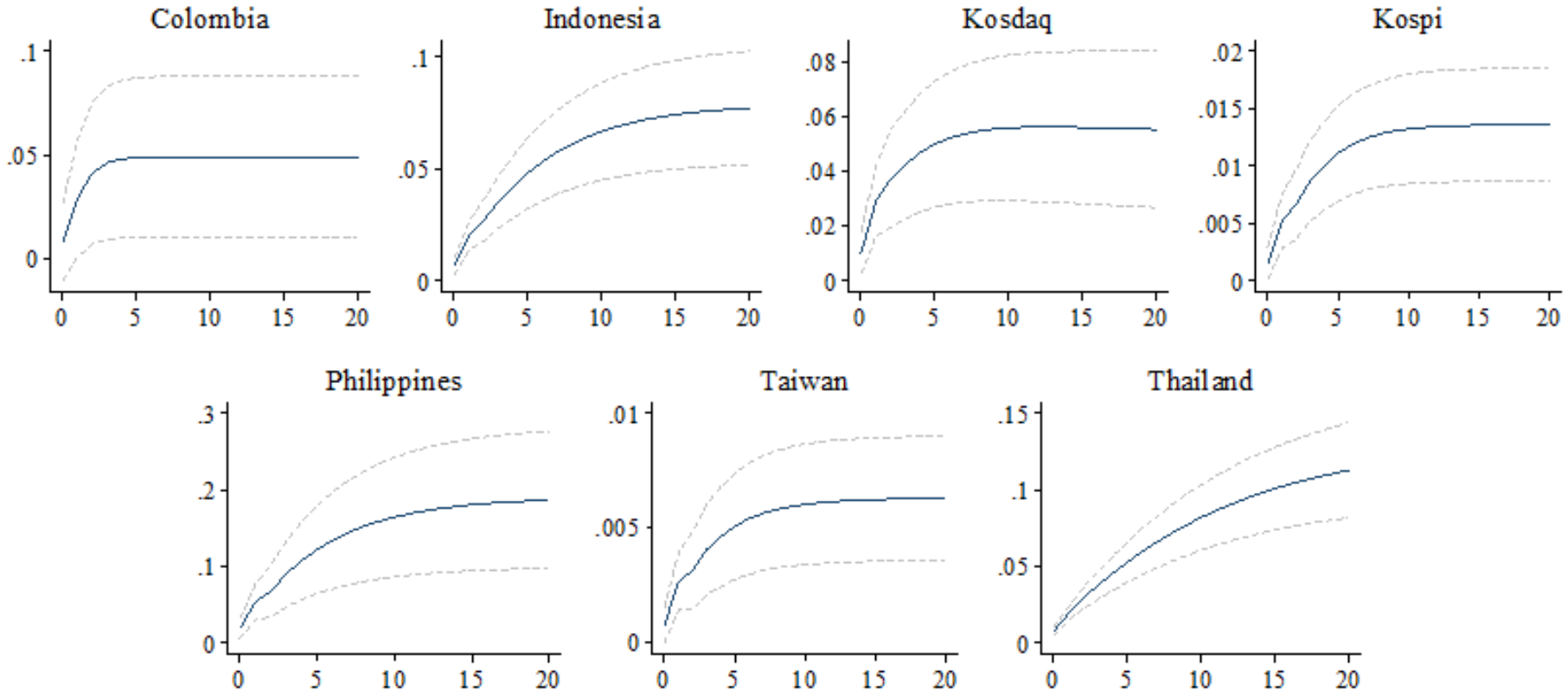
- $\uparrow \Delta VIX_t \Rightarrow$
  - ✓ (-) Foreign Net Buys ⇒
    - ○ ↓ Liquidity ($\uparrow VWA\_BidAsk_t$) **: Active**
  - ✓ (NA) Local Institutional Net Buys ⇒
    - ○ (NA) Liquidity
  - ✓ (+) Local Individual Net Buys ⇒
    - ○ ↓ Liquidity ($\uparrow VWA\_BidAsk_t$) **: Passive**

Net Buys and VWA_BidAsk_t for all markets

7. Results

Supply factors on Liquidity, during Stress times

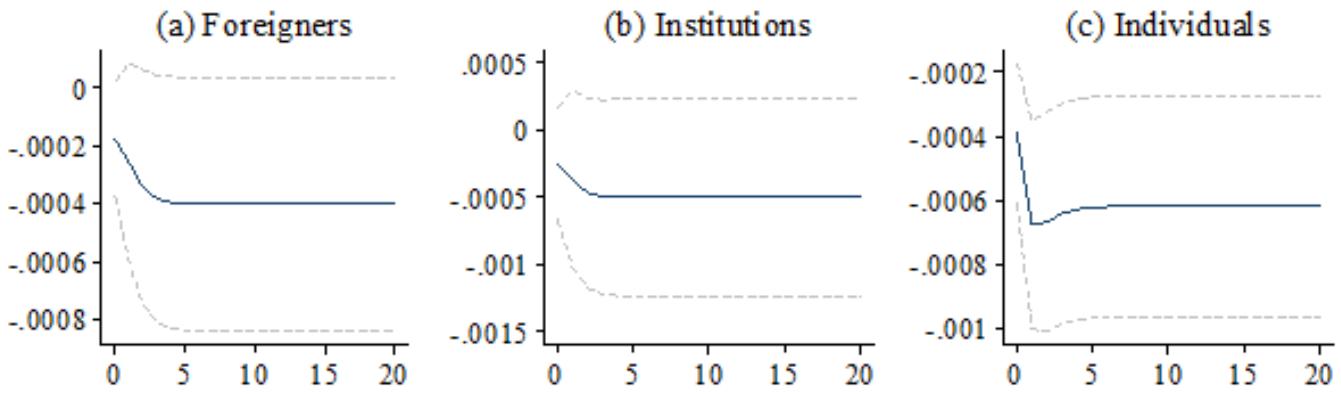
- **7-SVAR:**
- **Impulse:** ΔVIX_t
- **Response:** VWA_BidAsk_t



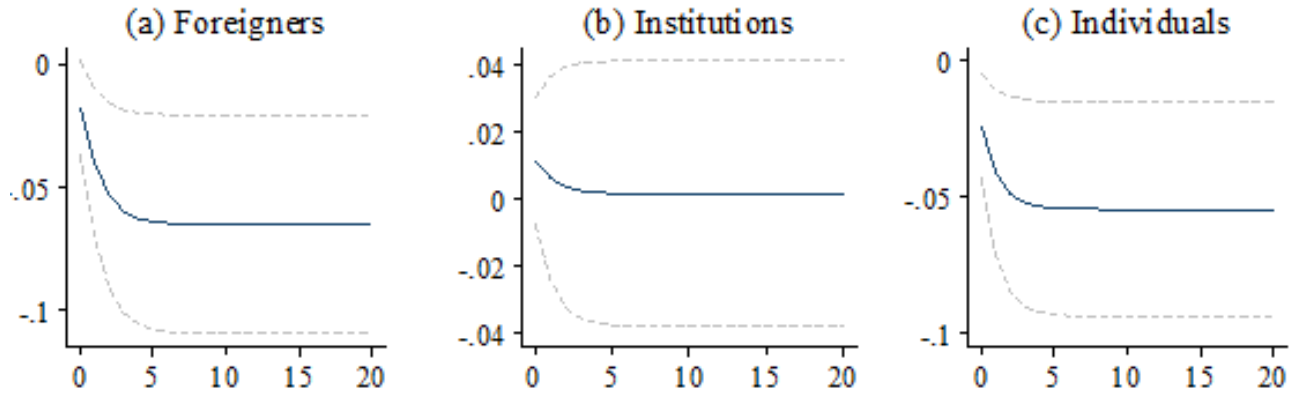
7. Results

Order Imbalances in Colombia, during Stress Times

- **6-SVAR:**
  - **Impulse:ΔVIX_t**
  - **Response:OIB_t**



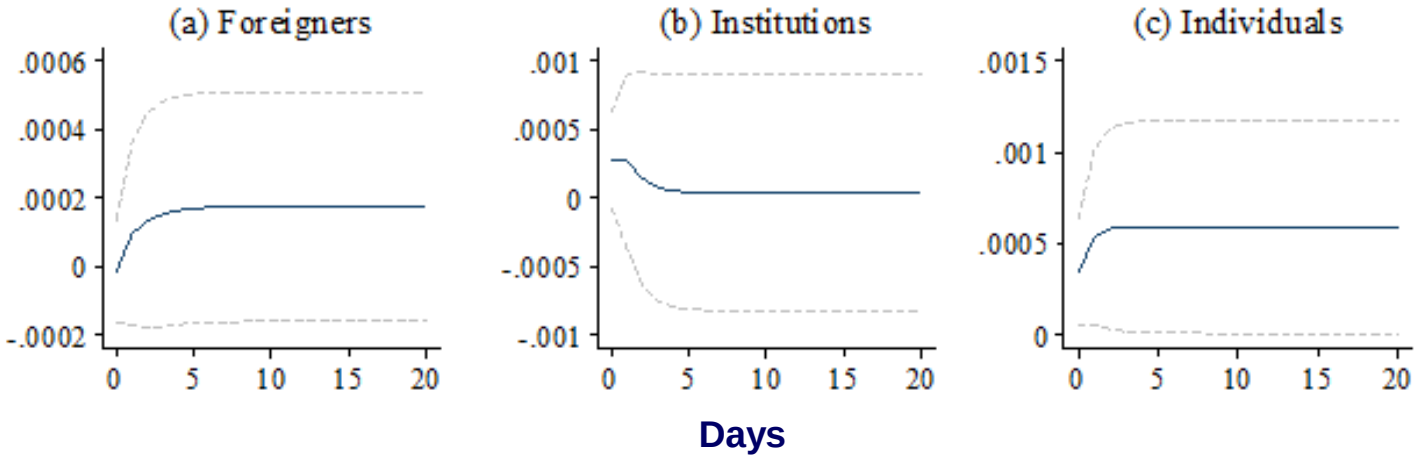
- **6-SVAR:**
  - **Impulse: OIB_t**
  - **Response:$VWA\_Q\_Spread_t$**



7. Results

Passive Buys in Colombia, during Stress Times

- **6-SVAR:**
- **Impulse:** ΔVIX_t
- **Response:** Pas_Buys_t



8. Robustness tests

- All results are qualitatively the same as those when reversing the exogeneity ordering from the last three variables of each equation (i.e., $VWA\_BidAsk_{i,t}, \sigma_{i,t}, Index\_Return_{i,t}$).

- Liquidity in Colombia disappears even when considering the three order imbalances.
  - ✓ Liquidity also disappears by supply factors.

9. Conclusions

- The liquidity of emerging markets is statistically and economically reduced on times of world financial uncertainty. The more illiquid and the smaller the market, the larger the liquidity drops.
- This liquidity “evaporation” persists even after controlling for the liquidity demand of the three groups, consistent with the presence of supply factors.
- Both foreigners and individuals reduce liquidity in distress times, while acting through active sells.
- We do not find a consistent role for institutions across the sampled markets.
- Individuals are also the main liquidity providers during financial stress times.

10. Implications

TARGET AUDIENCE	IMPLICATION
Financial regulators	More sophisticated rules to mitigate the associated liquidity loss in international distress episodes.
Stock Exchanges	Identifying the investors who act as market makers in dire times, to promote the liquidity provision and compensate them via specific incentives (e.g., rebates for competitive limit orders).

Thank you!

All suggestions and comments are welcome!

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