The Effects of Foreign Exchange Market Operations in Latin America: Common Methodology Analysis

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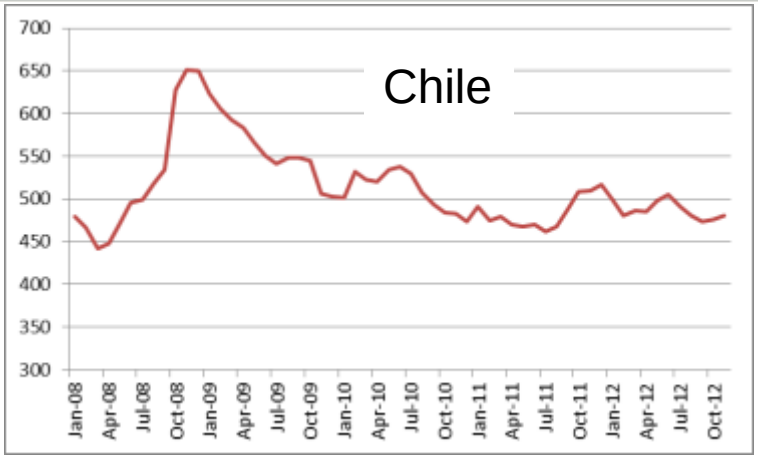
Goals of Common Methodology Study

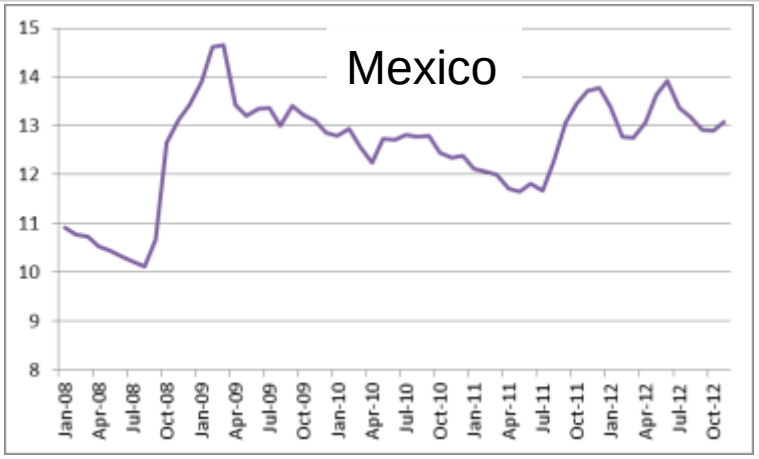
- Provide evidence on effectiveness of recent forex interventions in Chile, Colombia, Mexico and Peru.
- Compare effects across the different countries (esp. interesting given the different objectives and approaches)
- If we find intra-day effects of intervention – consider whether there might be longer term implications?

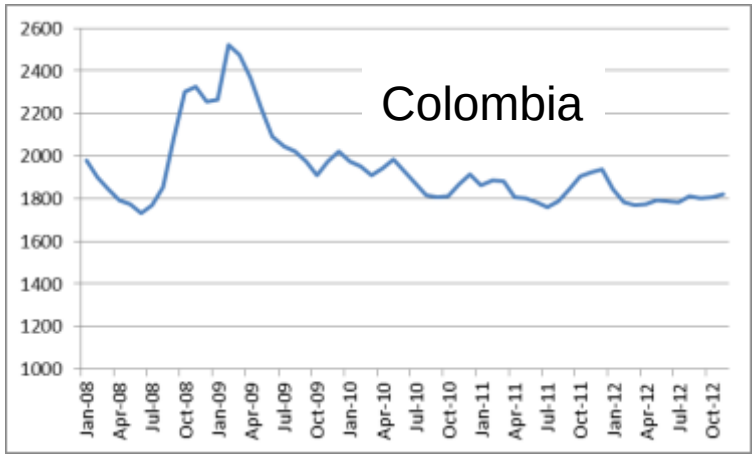
Broad Policy Questions We Hope to Answer

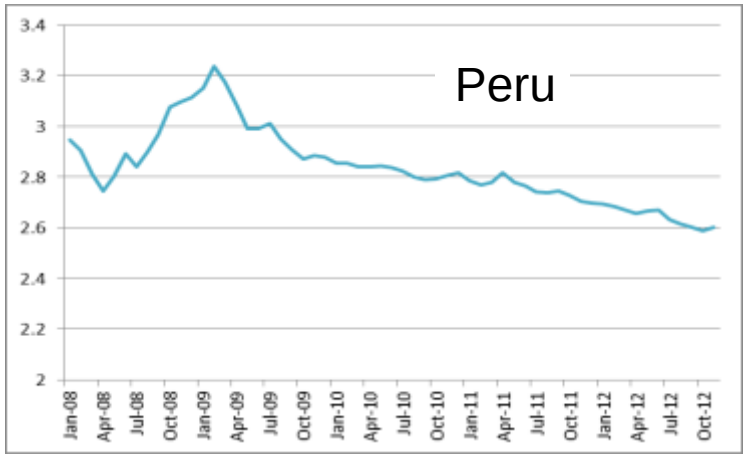
- When does intervention work?
  - where “work” may involve no impact on the level of the exchange rate,
  - lower volatility (Peru) or narrower bid-ask spreads (Mexico)
  - Or, if the goal is only to accumulate or reduce reserve levels, no effect on either the level or volatility of the exchange rate (Colombia and Chile)
- What circumstances are likely to lead intervention not to work?
- When is intervention a useful policy tool?

Currency Movements against the USD, 2008-2012









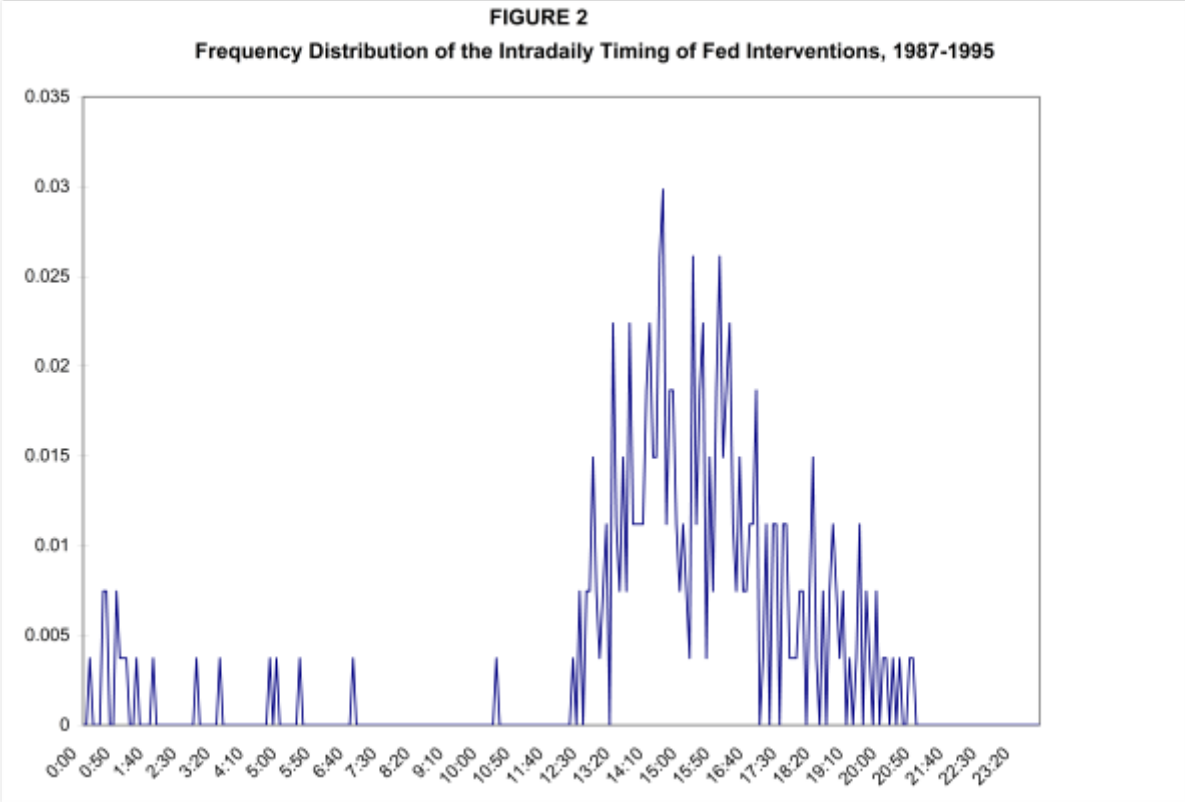
Market Microstructure Approach

- Can potentially reconcile observed short-term currency movements and longer-term exchange rate behavior.
- Market microstructure theory provides a framework for understanding the process by which sterilized central bank interventions are observed and interpreted by traders, and how this process, in turn, might influence exchange rate levels, bid-ask spreads, turnover and volatility.

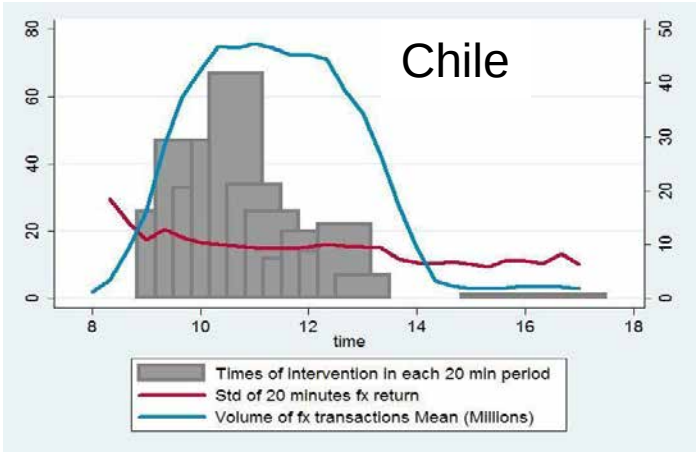
Simultaneity Problem

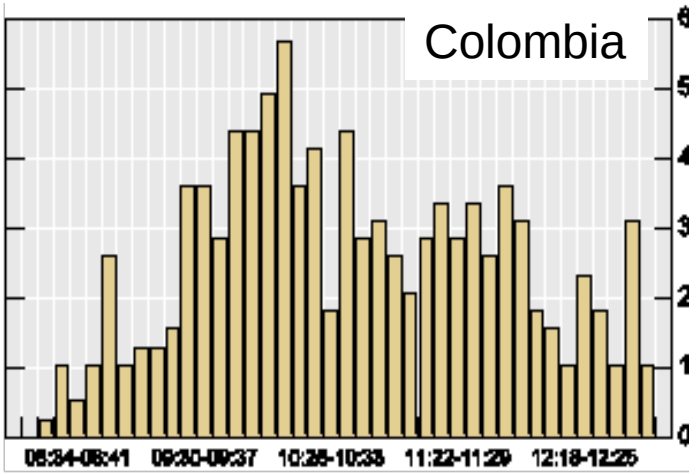
- If intervention operations are triggered by exchange rate movements, both variables may appear correlated even if there is no causal relationship.
- Rules-based intervention programs (Chile, Colombia, Mexico) are unlikely to suffer from simultaneity bias.
- In discretionary intervention programs (Peru) intra-day operations are less likely to be directly influenced by immediately preceding exchange rate movements (esp. if CBs base intervention decisions on longer term exchange rate objectives)

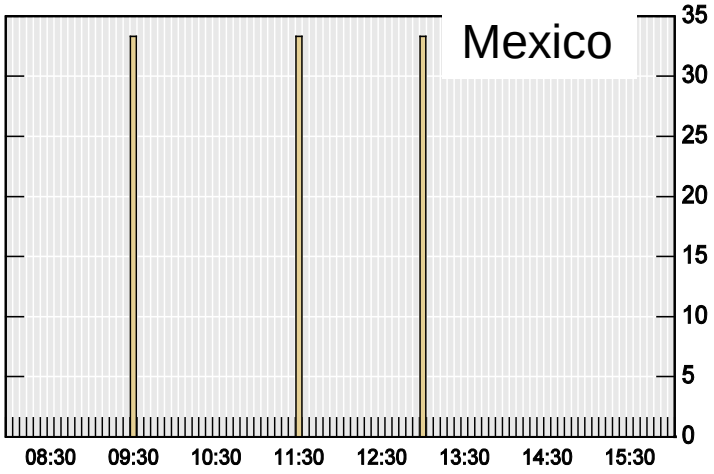
Intraday Intervention Timing (Fed)

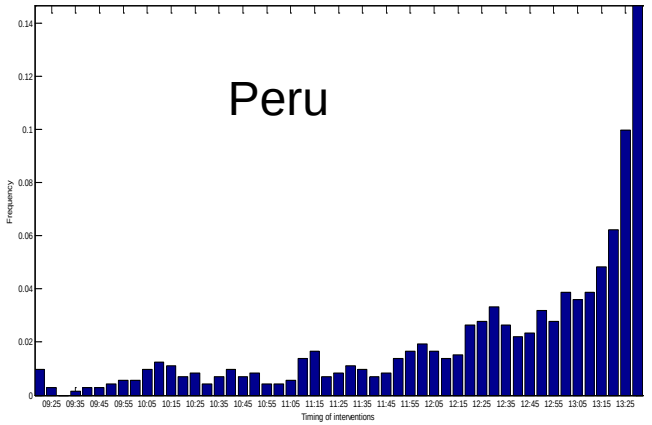


Intraday Intervention Timing





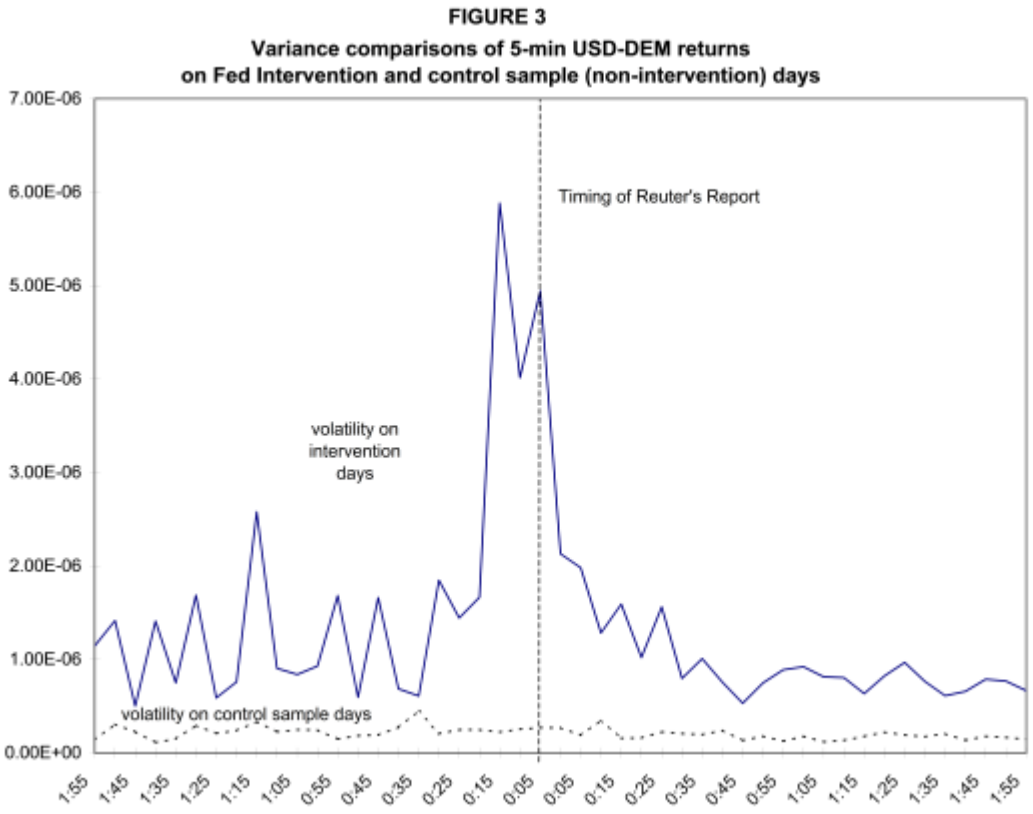




Intervention vs. non-Intervention days

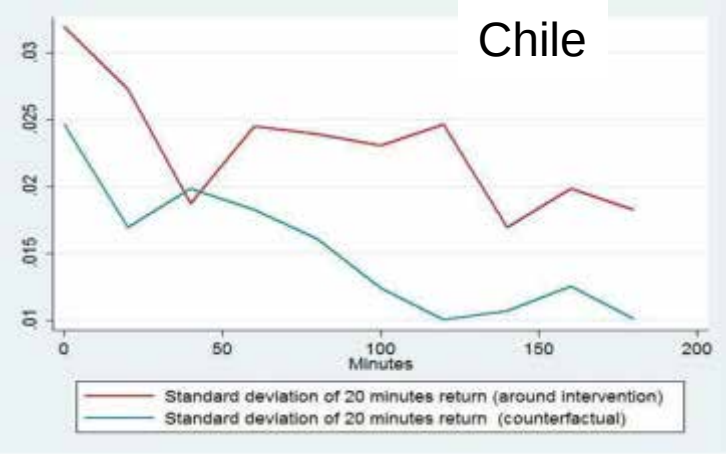
- One way to examine the influence of intervention on volatility involves arranging squared returns around interventions according to the intervention event rather than clock time.
  - A narrow (before and after) window is selected to surround each intervention operation in the currency market
  - The squared x-minute returns from this "intervention sample" are then compared against a control sample of matched x-minute volatility observations when no interventions took place
- In order to test the equality of return variances through time in the period surrounding the intervention event versus the matched non-intervention sample a Brown-Forsythe (1974) modified Levene test was used.

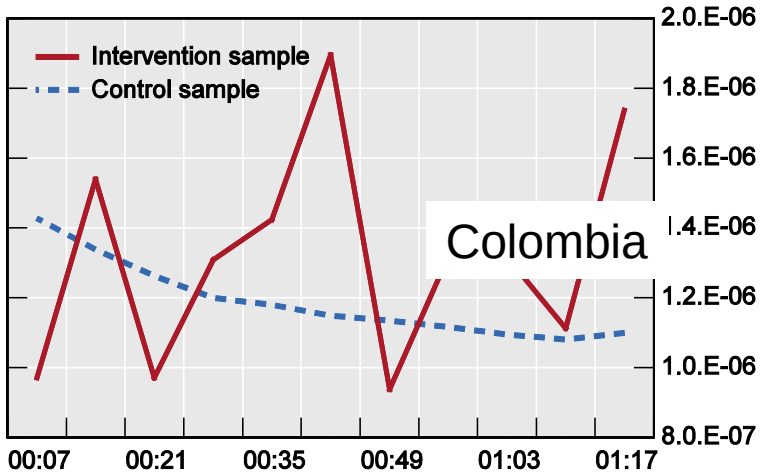
Volatility on Fed Intervention and non-Intervention Days



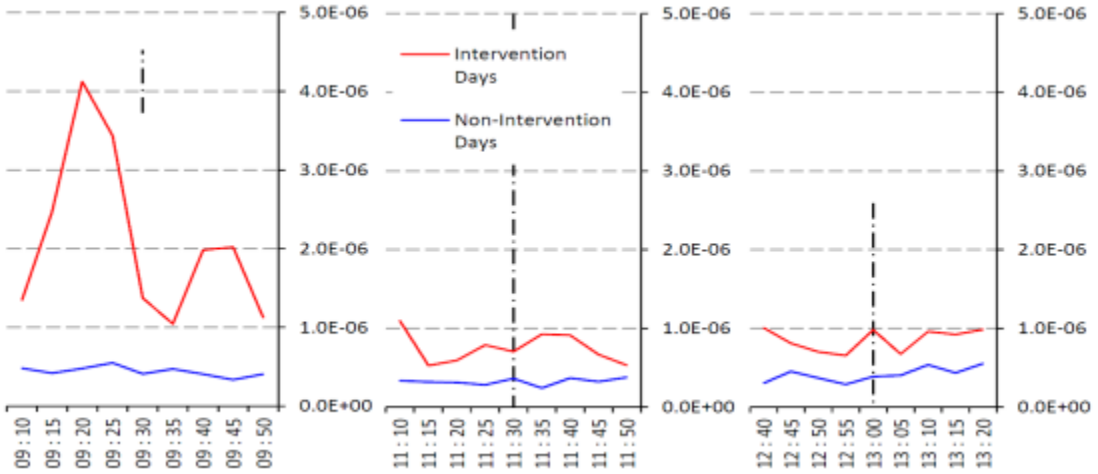
Volatility on Intervention and non-Intervention Days

Chile





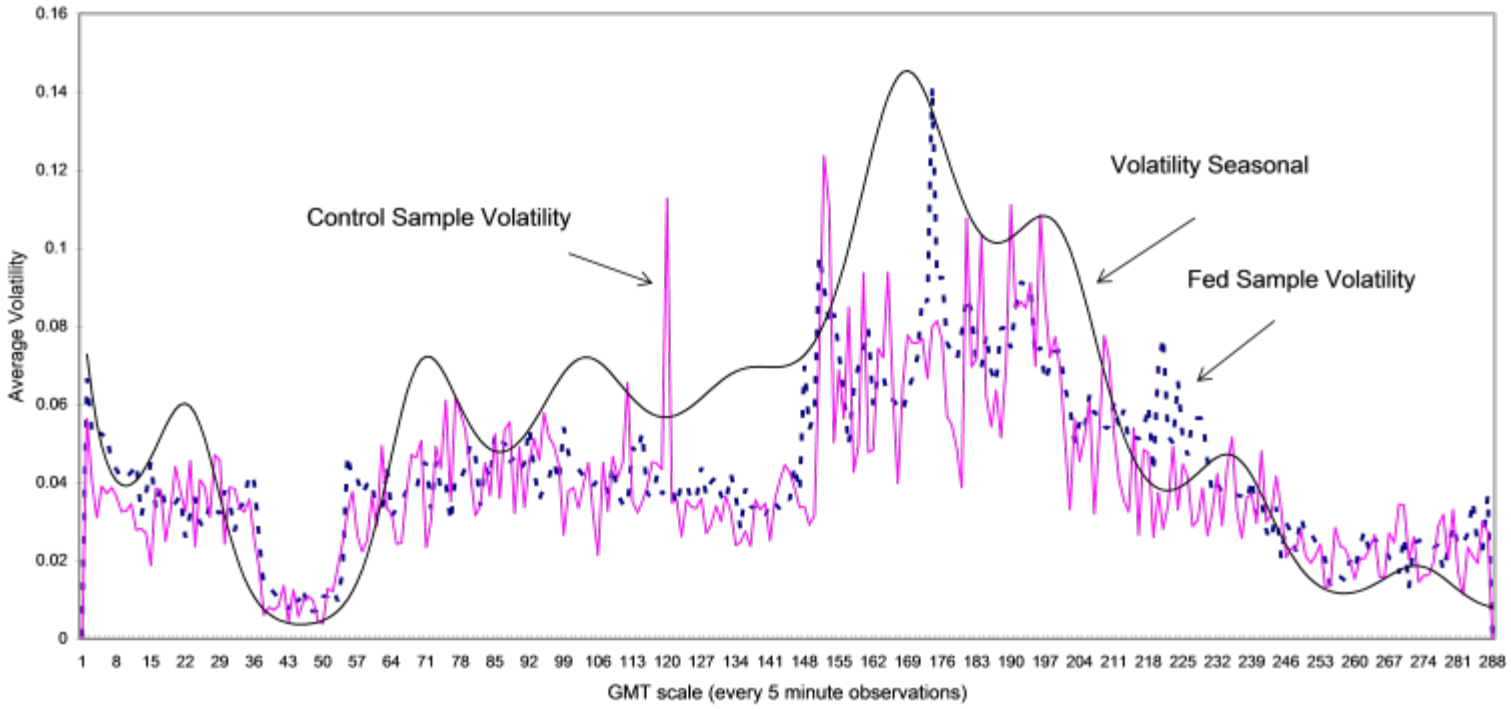
Mexico



Volatility Seasonal

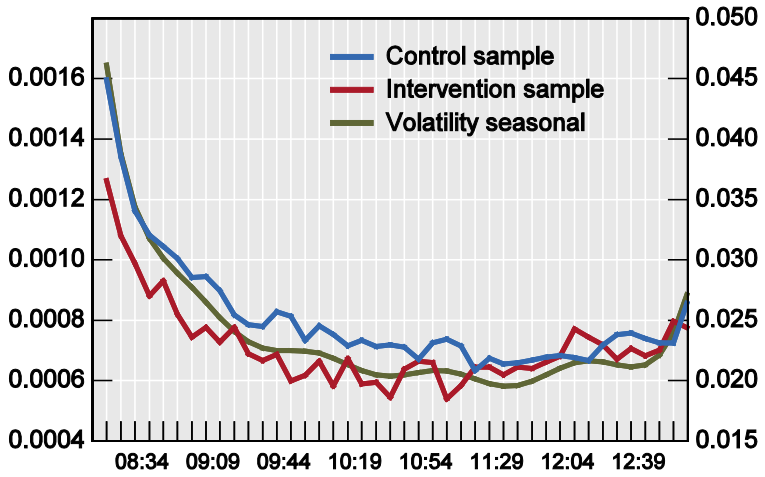
- A number of previous studies have documented a strong seasonal pattern in intra-day exchange rate volatility (see, for example, Bollerslev and Domowitz (1993), Dacorogna et al. (1993) and Guillaume et al. (1997)).
- This seasonality is also readily apparent in the sample of intervention and the control sample days for each of the participating countries.
- Failure to take account of these intra-daily seasonals is likely to result in misleading statistical analyses (especially if interventions occur during high volume times). In this project estimation of the intra-day seasonal follows the Andersen and Bollerslev (1997ab, 1998) version of Gallant's (1981) flexible fourier form regression method.
- Control sample days were used under the assumption that volatility on intervention days may differ from non-intervention days (as just shown), and while it is necessary to control for intra-day cycles, it is also important not to inadvertently explain away what is unusual about intervention days by only using intervention days to calculate the seasonal.

Volatility Seasonal (US)

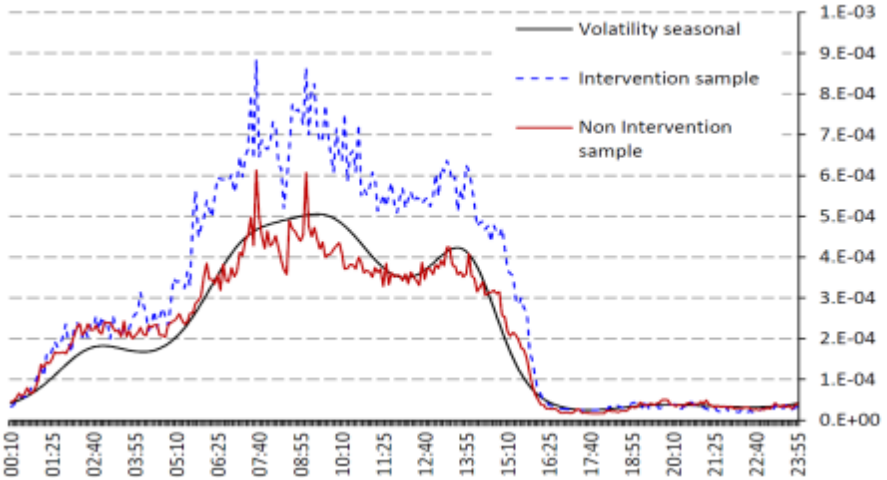


Volatility Seasonal

Colombia



Mexico



Macro Controls

- Exchange rate returns and volatility are likely to be influenced by other macro policy variables which need to be included in the event study specification in order to insure we do not give credit to intervention operations when in fact exchange rate movements are driven by these other policies.
- Included U.S. macro controls: consumer confidence, CPI, durable goods, Fed Funds rate, Unemployment, Housing, Industrial Production, PPI, NAPM, Retail sales, GDP, Trade Balance.

Estimation: Event Study Approach

- *R* and *V* denote the exchange rate return and volatility series, the *D*s denote the intervention and macro control variables, and *s* is the volatility seasonal
- In order to investigate the persistence of intervention's influence, a test for mean reversion can be constructed by checking whether the time lags on the relevant *D*s sum to zero.

$$R_{t,n} = \alpha_0 + \sum_k \sum_i \alpha_{1,i}^k D_{t,n+i}^k + \varepsilon_{t,n}$$

$$V_{t,n} = \alpha_0 + \sum_k \sum_i \alpha_{1,i}^k D_{t,n+i}^k + \alpha_2 \$_{t,n} + \varepsilon_{t,n}$$

Time or Volume of Intervention?

- Intervention is measures in two ways in the study:
  - Indicator (dummy) variable form at time of operation
  - Size of intervention operation (dollar amount)
- Likewise, macro controls are measured as:
  - Indicator (dummy) variables at time of announcement
  - Standardized surprises (announcement relative to expectation) at time of announcement

Cumulative Intra-day Effects of Fed Intervention on Volatility