



**FX  
Intervention**

Choy, Lahura  
and Vega

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# Measuring the effects of FX intervention using intraday data: Evidence from Peru

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## Summary

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### Question

*Do FX interventions have any effect on the level of the exchange rate?*

### Preliminary answer

*Yes . . . and they have asymmetric effects on the level of the exchange rate.*



## Summary

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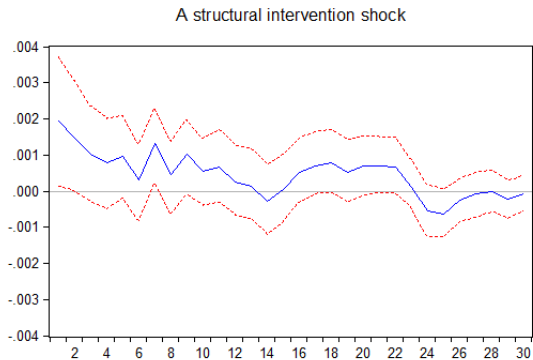
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Figure: Response of log of exchange rates to intervention (net purchases) using intraday data





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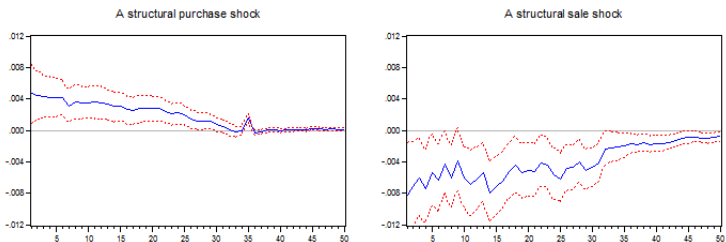
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Figure: Accumulated responses of five-minute changes in exchange rates





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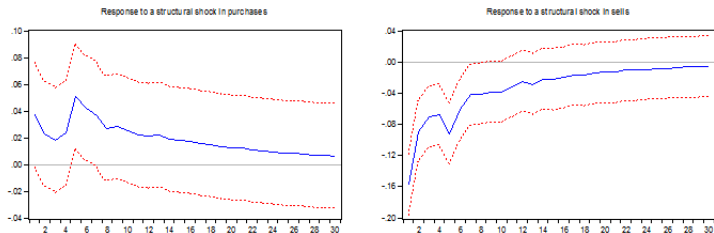
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Figure: Response of log of exchange rates (daily data)





# Motivation

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- Central Bank of Peru is perceived to have low quantitative constraints to perform FX spot operations in either direction.
  - Net International reserves currently stand at 33% of GDP (USD 63,2 billions).
  - Net International position is around 23% of GDP (USD 44,8 billions).
  - Daily interbank FX turnover approx. USD 0,5 billions.
- Then, what are the effects of interventions?
  - Do interventions affect the level of the exchange rate? Volatility?
  - Are these effects symmetric?



## Main features of the paper

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- Main question: Does FX intervention have any effect on the **level of the exchange rate**?
- Effectiveness of FX interventions (to reduce volatility)?
- Intraday data (first time for Peru).
- Identification of exogenous changes in intervention using a SVAR model:
  - 1 Intervention shocks are identified using long-run restrictions.
  - 2 The approach allows us to deal with the endogeneity problem that arises when fx interventions are discretionary.





## FX market in Peru

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- A local market primarily based on spot transactions (very small market of forwards and options).
- Spot transactions are traded primarily in a private electronic trading platform operated by the company DATATEC.
- Blind system: the bidders are known only to those involved in the transaction and after the transaction is closed.
- FX market operates between 9:00 am and 1:30 pm, Monday - Friday.



## FX market in Peru

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- The settlement of transactions is done on the same day through a real time gross settlement (RTGS) system in a payment vs payment platform (payments are made on each bank's account held at the central bank).
- Participants are commercial banks and the Central Bank. Five banks are the major players (in terms of average amount traded).
- Currently, the average amount traded in the interbank spot FX market is around US700 million.
- The largest amount traded in one day was approximately US 1,700, almost 1 percent of GDP.



# Central Bank interventions

## FX Intervention

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- Objective: to reduce excessive interday volatility in the exchange rate.
  - ① to avoid an negative balance-sheet effect that can be generated by drastic changes in the exchange rate.
  - ② 43% of financial assets are dollarized.
  - ③ No exchange rate target: exchange rate is determined by fundamentals (cannot be altered permanently).
- Part of open market operations to regulate daily liquidity.
- FX operations (and open market operations) are decided everyday by a committee that meets roughly between 11:30 am and 1 pm.



## Central Bank interventions

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- The main FX intervention is through direct operations with commercial banks in the spot market at the prevailing exchange rate (swap transactions have been used very rarely).
- Interventions are sterilized to achieve the prevailing interest rate target (using Central Bank Securities (CDs-Central Bank Certificate of Deposits), and Treasury's deposits at the Central Bank).
- FX operations are discretionary (do not respond to any pre-announced rule). They can be done any day and at any time while the fx market is in operation.



# Central Bank interventions

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- Blind system: the other participants do not know the Central Bank's positions, and only after an operation has been closed they can identify it as the counterpart.
- However, the Central Bank announces when it starts to intervene, so that all participants become aware of it even if they do not perform transactions with the Central Bank.
- The amount of intervention is published when the market closes.



## Data analysis

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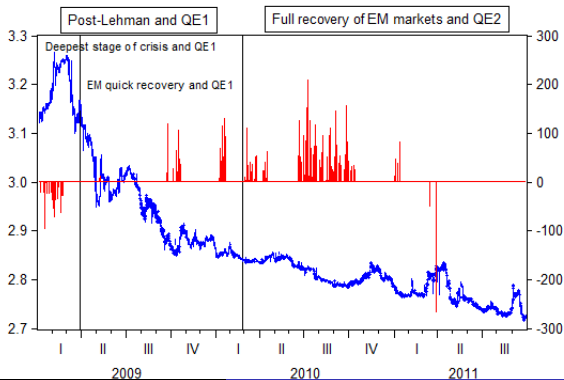
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Sample includes: purchases and sales, intervention and non intervention days, international crisis and recovery period.

Figure: Exchange rates and FX interventions: 2009-2010





# Data analysis

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**Table:** Size of Intervention Data. Sample period goes from January 5, 2009 to April 27, 2011

	2009	2010	2011 <sup>a/</sup>
Number of observations (5-min. intervals)	13209	13311	9894
Number of transactions	1933	5050	487
Number of transactions (5-min. intervals)	181	505	38
Number of purchases	89	504	23
Number of sales	91	0	14

<sup>a/</sup> Intervention data up to 27 April



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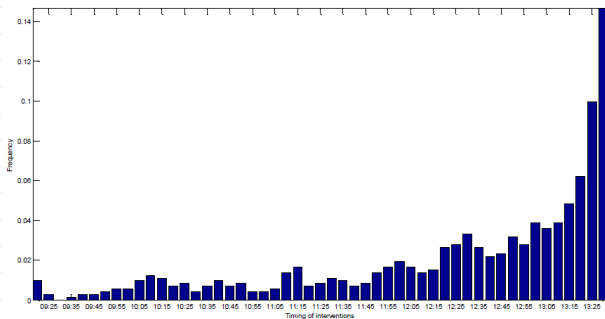
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FX intervention is discretionary and is done around the closing time of the FX market:

**Figure:** Timing of interventions: intraday frequency distribution







# Methodology: Structural VAR approach

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$$\begin{bmatrix} e_t \\ P_t \\ S_t \end{bmatrix} = \sum_{i=0}^{\infty} \begin{bmatrix} \phi_{11}(i) & \phi_{12}(i) & \phi_{13}(i) \\ \phi_{21}(i) & \phi_{22}(i) & \phi_{23}(i) \\ \phi_{31}(i) & \phi_{32}(i) & \phi_{33}(i) \end{bmatrix} \begin{bmatrix} \varepsilon_{t-i}^F \\ \varepsilon_{t-i}^P \\ \varepsilon_{t-i}^S \end{bmatrix} \quad (1)$$

where:

- $E$  is the log interbank exchange rate,  $e_t \equiv E_t - E_{t-1}$  rate of growth of the exchange rate.
- $P_t$  is the amount of dollars purchased by the Central Bank in the foreign exchange market.
- $S_t$  the amount of dollars sold by the central bank.



## Methodology: Structural VAR approach

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- $\varepsilon_t^F$  exogenous changes in fundamentals.
- $\varepsilon_t^P$  and  $\varepsilon_t^S$  exogenous decisions to purchase and sell dollars, respectively.
- $e$ ,  $P$ , and  $S$  are stationary: disturbances have no permanent or long-run effects.
- Disturbances might have long-run effects on  $E_t$  (unit root process).
- Controls: macroeconomic shocks (surprises) for both Peru and USA (interest rate shocks, GDP shocks, CPI shocks).
- Dummy variables: first observation of each day, each week, and each hour.



## Methodology: Identification strategy

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- Blanchard and Quah(1989): long-run restrictions (at least three).
  - 1  $\varepsilon_t^P$  and  $\varepsilon_t^S$  have no long-run effect on the log exchange rate:  $\sum_{i=0}^{\infty} \phi_{12}(i) = 0$  and  $\sum_{i=0}^{\infty} \phi_{13}(i) = 0$ .
  - 2 A sale innovation  $\varepsilon_{t-i}^S$  will have no long-run effect over dollar purchases:  $\sum_{i=0}^{\infty} \phi_{23}(i) = 0$ .
  - 3 By symmetry, a purchase innovation  $\varepsilon_{t-i}^P$  will have no long-run effect on dollar sales:  $\sum_{i=0}^{\infty} \phi_{32}(i) = 0$ .



# Results: intraday data

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Table: Long-run effects and overidentifying restrictions.

## Structural VAR estimates (method of scoring)

	$\sum_{i=1}^{\infty} \phi_{11}(i)$	$\sum_{i=1}^{\infty} \phi_{21}(i)$	$\sum_{i=1}^{\infty} \phi_{22}(i)$	$\sum_{i=1}^{\infty} \phi_{31}(i)$	$\sum_{i=1}^{\infty} \phi_{33}(i)$
<b>estimate</b>	0.05	-0.35	0.87	3.86	7.16
<b>prob.</b>	0.00	0.00	0.00	0.00	0.00

## LR test for over-identification

Chi-square(1)	1.63
Probability	0.20



## Results: intraday data

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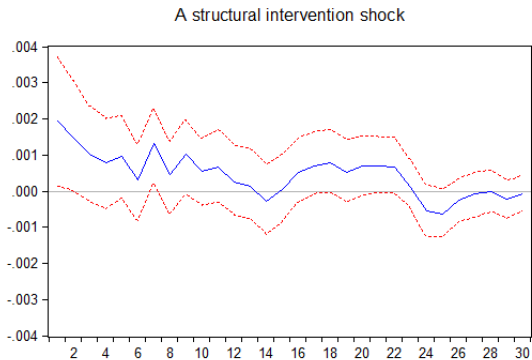
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Figure: Response of log of exchange rates to intervention (net purchases) using intraday data





## Results: intraday data

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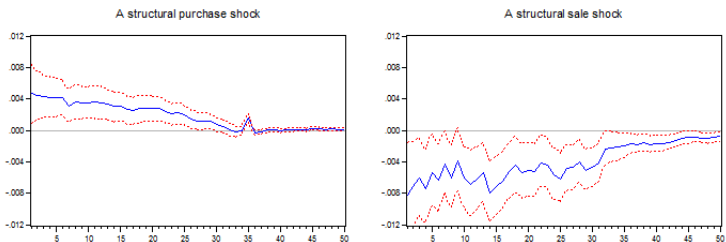
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## Results: daily data

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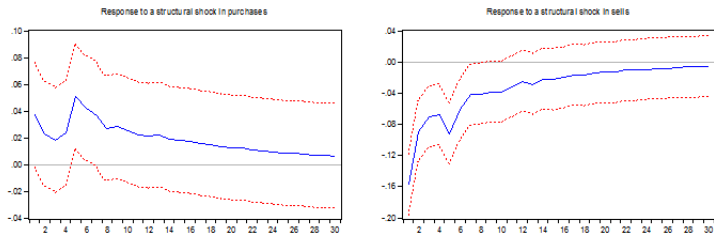
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Figure: Response of log of exchange rates (daily data)





## (Preliminary) Conclusions

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- 1 FX interventions have an asymmetric effect on the level of the exchange rate.
- 2 Central Bank intervention has more impact reducing the interbank exchange rate as opposed to raising it.





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**Thank you very much**

**Grazie mille**

**Muchas gracias**

**Muito obrigado**

**Vielen Dank**

**Merci beaucoup**