

# Central Bank Interventions in the Peso Dollar Market

BIS CCA Research Working Group on FX Market Operations

November 29 and 30, 2012

Cartagena, Colombia



BANCO DE MÉXICO

The views expressed in this presentation are those of the authors and do not necessarily reflect the views of Banco de México.

# Outline

**1** Introduction

**2** Interventions in the Peso Dollar Exchange Rate Market

**3** The Liquidity of Foreign Exchange Market Measured by Bid Ask Spread

**4** On the Effectiveness of Interventions

**5** Final Remarks

# Introduction

- Central banks' interventions in the foreign exchange markets have been a key economic policy tool throughout the Americas. Banco de México has not been the exception in this regard.
- A question of keen interest to policy makers and researchers alike is to what extent have these interventions been effective?
- The objective of our paper is two-fold. First, to document some general facts of the peso dollar exchange rate, in particular the dynamics of its bid ask spread. Second, and centrally, to analyze the extent to which one specific type of intervention has been effective. To do so, we follow Dominguez (2003) and Dominguez (2006).
- This particular intervention aims to provide liquidity to the exchange rate market. Thus, we use the bid ask spread of the exchange rate to measure liquidity and, thus, as a yardstick for the interventions' effectiveness.

# Main Results

- Our initial estimations suggest that the type of intervention that we are considering has increased liquidity effectively, as measured by the bid ask spread. Nonetheless, there are several comments in place.
- First, when the three auctions that take place during the day are bundled in the estimation and no controls are considered, its effects are not economically significant.
- Second, if controls are considered, then the effect is negative, and it is statistically and economically significant.
- Third, when the three interventions during the day are considered separately in the estimation, regardless of the inclusion of controls, only in some cases the effect is negative and statistically significant.

# Outline

**1** Introduction

**2** Interventions in the Peso Dollar Exchange Rate Market

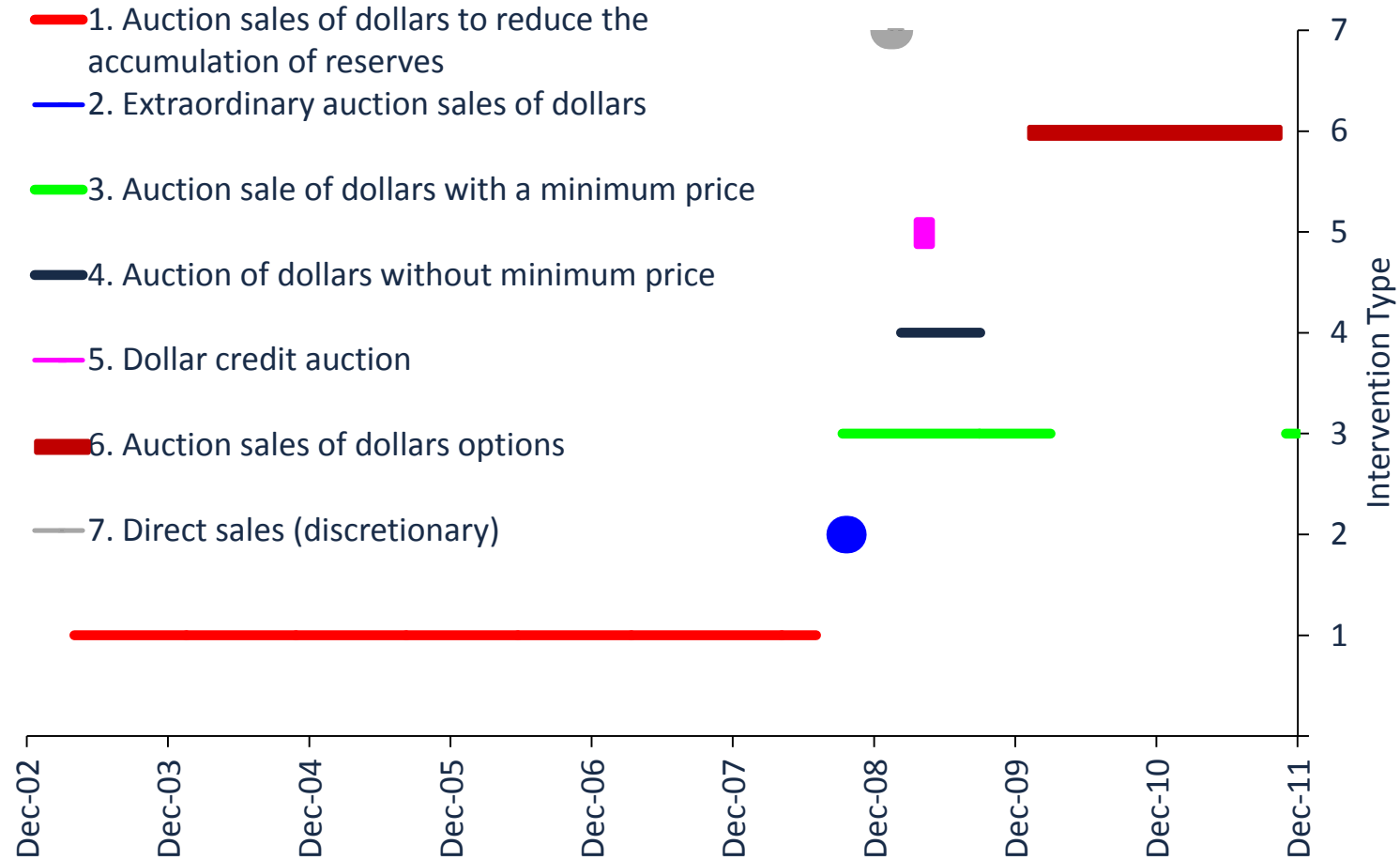
**3** The Liquidity of Foreign Exchange Market Measured by Bid Ask Spread

**4** On the Effectiveness of Interventions

**5** Final Remarks

# Interventions in the Peso Dollar Exchange Rate Market

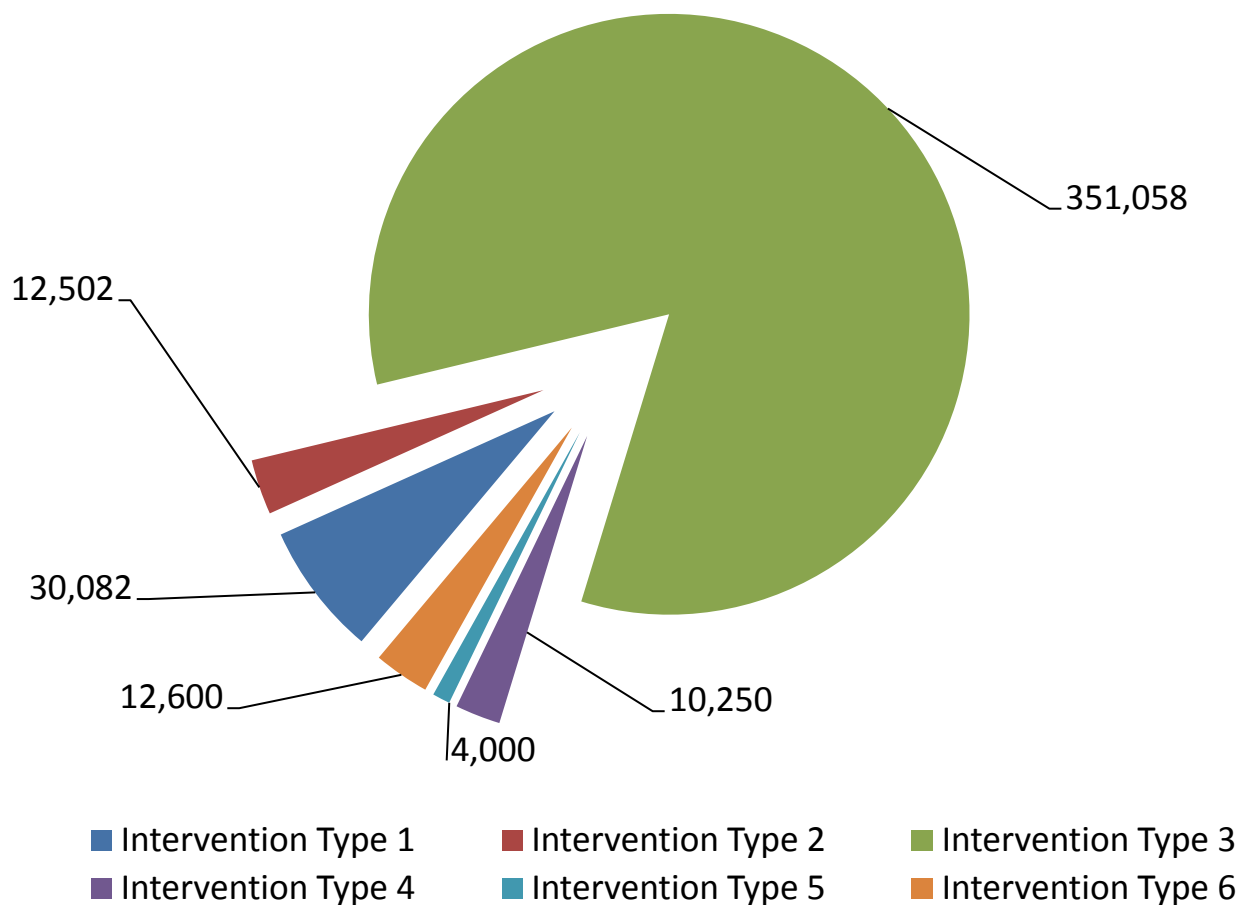
## Interventions' Calendar



Source: Banco de México.

# Interventions in the Peso Dollar Exchange Rate Market

Total Amount Tendered in Each Intervention Type  
(Million USD)



Source: Banco de México.



# Interventions in the Peso Dollar Exchange Rate Market

- The FX data we use is from Reuters and the rest of the data is from Banco de México.
- The sample for the estimations is from October 9, 2008 to November 29, 2011. The period from November 30 to December 31, 2011 is excluded, as interventions Type 3 took place at different times of the day in this period. Hitherto, data from 2012 has not been included.
  - ✓ *The intervention sample (treatment sample) runs from October 9, 2008 to April 11, 2010.*
  - ✓ *The non-intervention sample (control sample) is between April 12, 2010 to November 29, 2011, on those days for which no interventions occurred.*

Number of Observations	
Total sample	622,367
Estimation sample	215,424
Intervention (Treatment)	102,240
Non-intervention (Control)	113,184

Source: Banco de México.

# Interventions in the Peso Dollar Exchange Rate Market

- As mentioned, in some cases, we want to differentiate the effects of the intervention depending on the time it is implemented: 9:30 hrs., 11:30 hrs. and 13:00 hrs. The auction's logistics are relevant for our purposes.
- The auction is summoned if the exchange rate devaluates more than 2% with respect to an average exchange rate price of the prior business day ( $p_{t-1}$ ). The auction has as a minimum price  $1.02 \times p_{t-1}$ .
- There is a maximum daily amount of dollars to be allocated. This amount is initially auctioned at 9:30 hrs. If there is an amount left, then it is tendered at 11:30 hrs. Likewise with the 11:30 hrs. auction. Whatever is left from the 13:00 hrs. auction is not considered for the next day.

# Interventions in the Peso Dollar Exchange Rate Market

- Each player provides his sealed bid with a price and a quantity. The dollars are first allocated to the player with the highest price, then to the player with the second highest price, and so forth, until the maximum amount is depleted.
- If some of the players have no dollars assigned, the marginal price is announced and bids can be submitted once again.
- It is a multi-price auction. Thus, each player gets the price he bided for as long as he is allocated some dollars.
- The auction ends if the 5 minute limit is over or the amount available is allocated.

# Interventions in the Peso Dollar Exchange Rate Market

- To get a sense of the market size and the intervention's magnitudes consider the following statistics.
- The average daily operation turnover in the spot market is 4,770 million dollars.
- In the case of the interventions, the daily average auctioned amounts are around 304.8, 293.30 and 288.42 million dollars, respectively, for the 9:30 hrs., 11:30 hrs., and the 13:00 hrs. auctions.
- Thus, the auctioned amounts are on average 6% of the market turnover. Yet, we would expect a lower turnover under adverse liquidity conditions.
- In addition, note that on average the auctioned quantities do not decrease significantly through the day.

# Outline

**1** Introduction

**2** Interventions in the Peso Dollar Exchange Rate Market

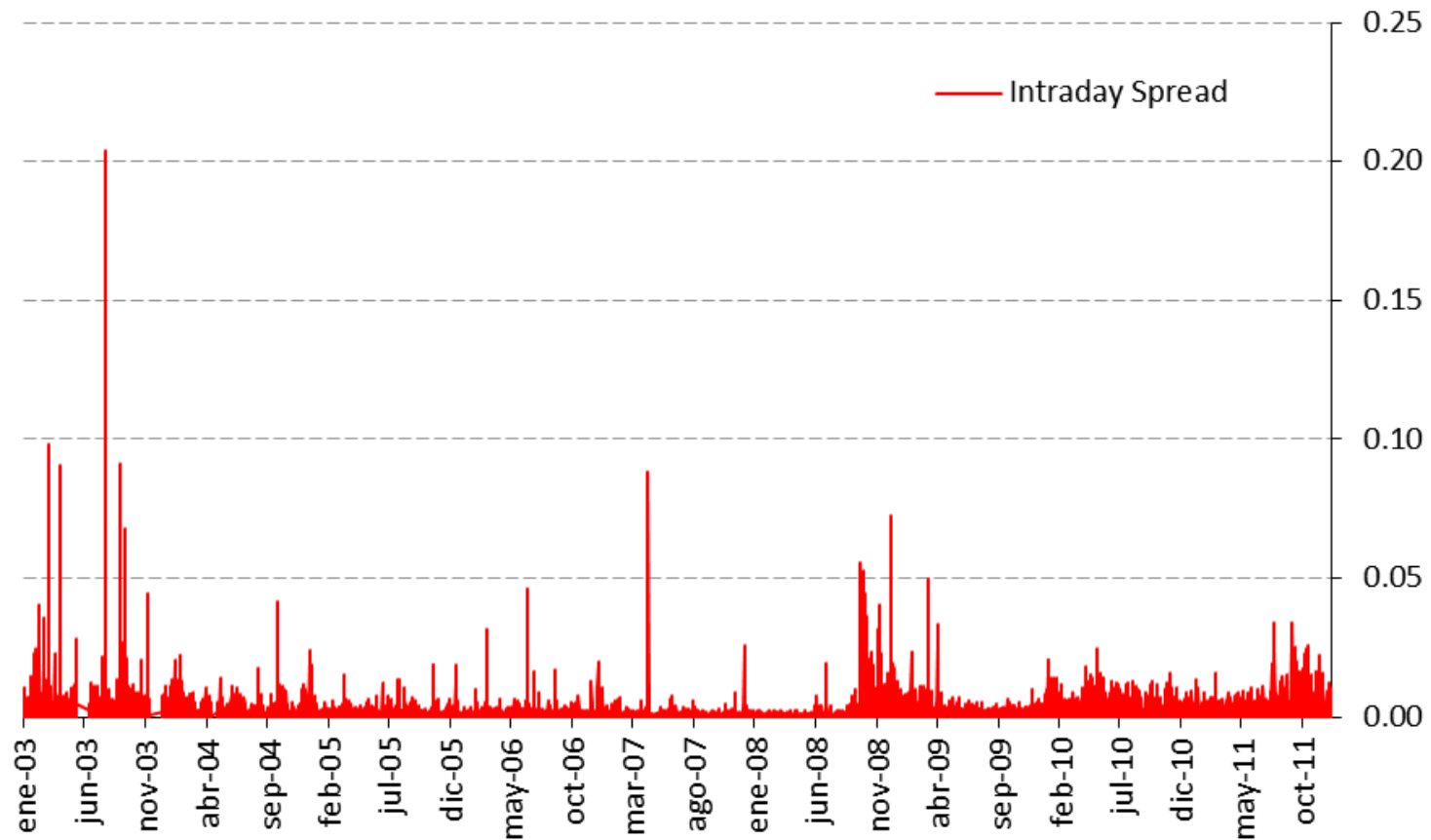
**3** The Liquidity of Foreign Exchange Market Measured by Bid Ask Spread

**4** On the Effectiveness of Interventions

**5** Final Remarks

# The Liquidity of Foreign Exchange Market Measured by Bid Ask Spread

Peso dollar Bid-Ask Spread <sup>1/</sup>  
(Percent)

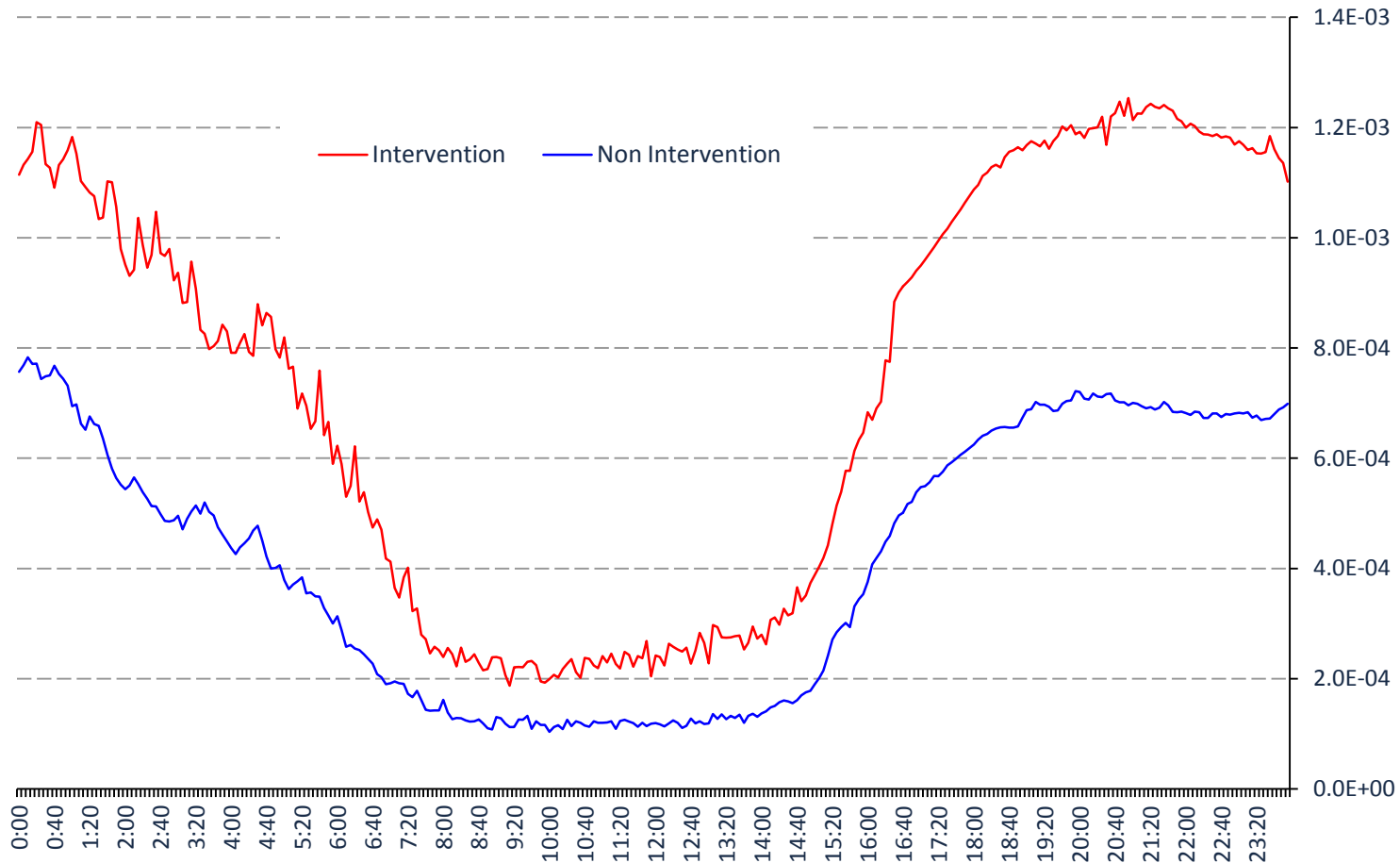


1/ Period January 2003 – December 2011.

Source: Reuters.

# The Liquidity of Foreign Exchange Market Measured by Bid Ask Spread

## Average Peso Dollar Intraday Bid Ask Spread for Different Samples



Source: Own estimations with data from Reuters

# Outline

**1** Introduction

**2** Interventions in the Peso Dollar Exchange Rate Market

**3** The Liquidity of Foreign Exchange Market Measured by Bid Ask Spread

**4** On the Effectiveness of Interventions

**5** Final Remarks



# On the Effectiveness of Interventions

- We first consider the following regression which quantifies the behavior of the bid ask spread when an intervention takes place, more specifically:

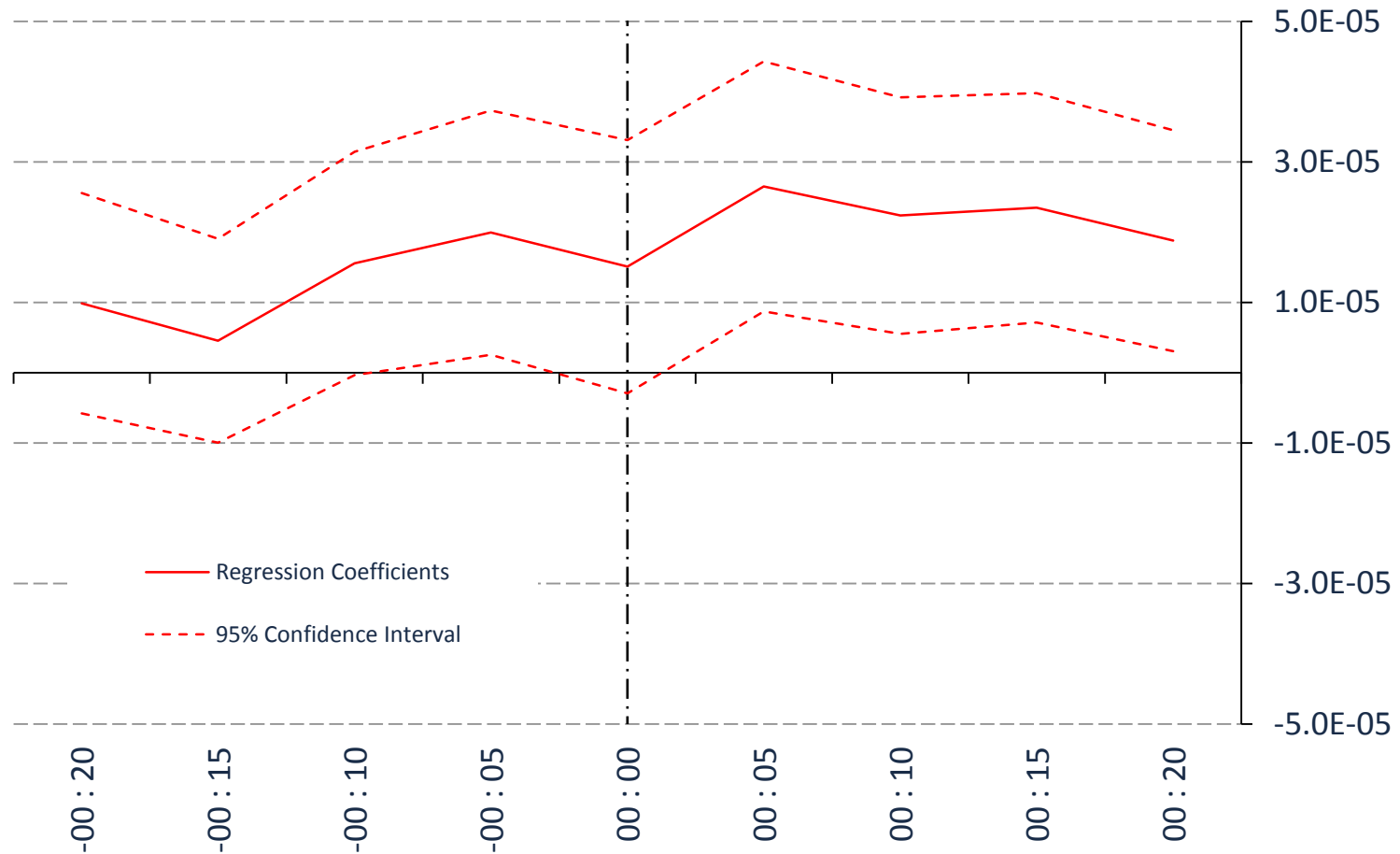
$$S_{t,i+m} = c + \sum_m \beta_m D_{t,i+m} + \varepsilon_{t,i+m}$$

where:

- ✓  $S_{t,i+m}$  is the 5 minute interval bid ask spread on day t and at time i+m.
- ✓  $D_{t,i+m}$  is the intervention dummy. Thus, if an intervention takes place on day t at time i, m then determines the lag and lead with respect to the intervention time going from -20 minutes to +20 minutes, in 5 minute intervals.
- ✓  $D_{t,i+m} = 1$  if there was an intervention on day t and at time i.
- ✓  $D_{t,i+m} = 0$  if there was no intervention on day t.

# On the Effectiveness of Interventions

## Estimated Coefficients Event Style Regression



Source: Own estimations with data from Banco de México and Reuters.

# On the Effectiveness of Interventions

- Our second estimation is similar to the one just presented but has control variables. These are functions of twelve US macroeconomic indicators, constructed in terms of surprises. The equation is specifically,

$$S_{t,i+m} = c + \sum_m \beta_m D_{t,i+m} + \sum_a \sum_m \gamma_{a,m} \text{Surp}_{a,t,i+m} + \varepsilon_{t,i+m}$$

- We define a surprise as follows:

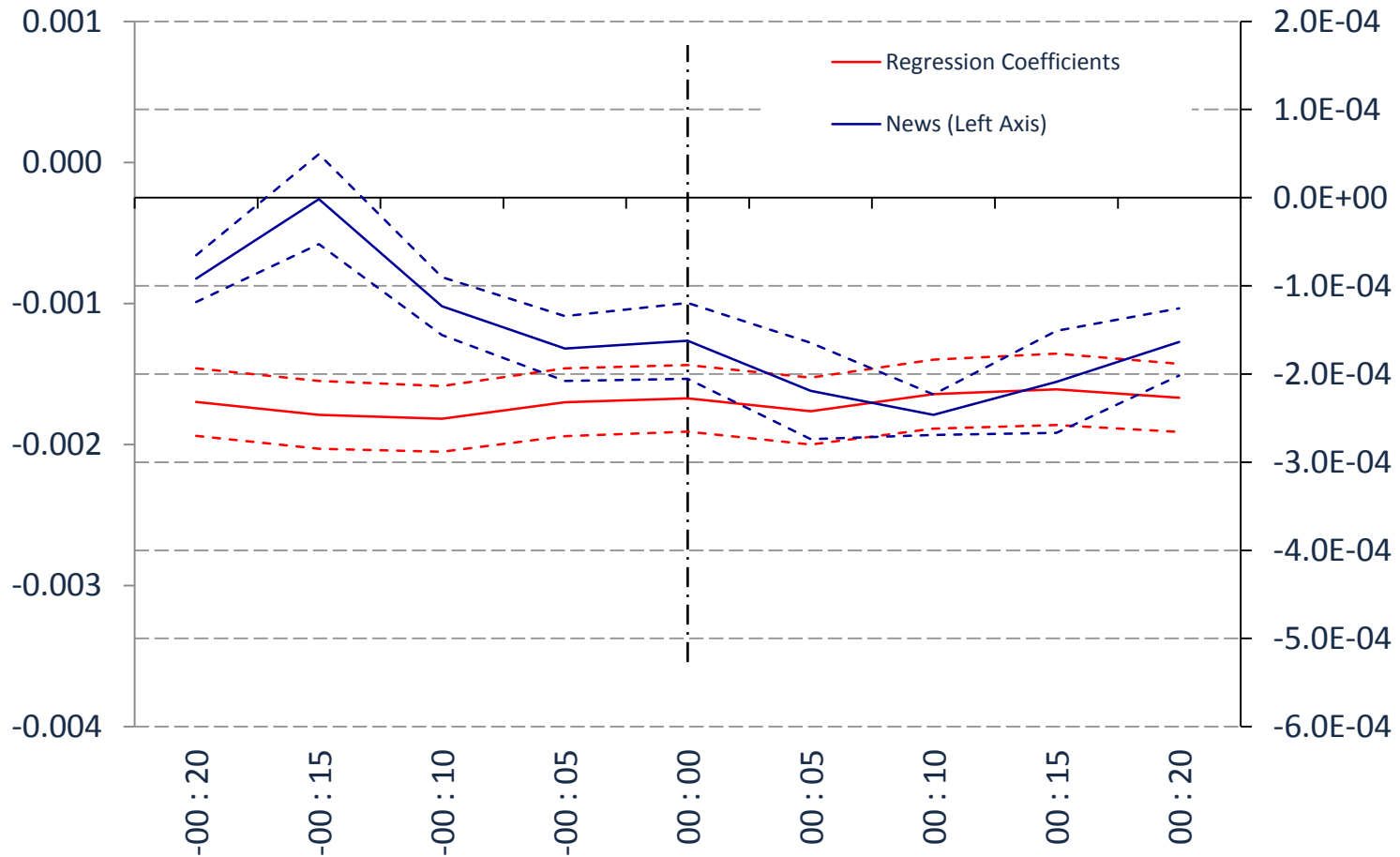
$$\text{Surp}_t \equiv \begin{cases} 1 & \text{if } \text{Ind}_t > \text{Med}_{\text{survey}_t} + \text{SD}_t \\ -1 & \text{if } \text{Ind}_t < \text{Med}_{\text{survey}_t} - \text{SD}_t \\ 0 & \text{otherwise} \end{cases}$$

where:

- ✓  $\text{Surp}_t$  is a variable that identifies a surprise event at time  $t$ ;
- ✓  $\text{Ind}_t$  is the value of one of the macroeconomic variables at the time of its release, denoted by  $t$ ;
- ✓  $\text{Med}_{\text{survey}_t}$  is the median value of the survey associated to the macroeconomic variables at time  $t$ ; and,
- ✓  $\text{SD}_t$  is an approximation to the standard deviation.

# On the Effectiveness of Interventions

## Estimated Coefficients Event Style Regression with Controls



Source: Own estimations with data from Banco de México and Reuters.

# On the Effectiveness of Interventions

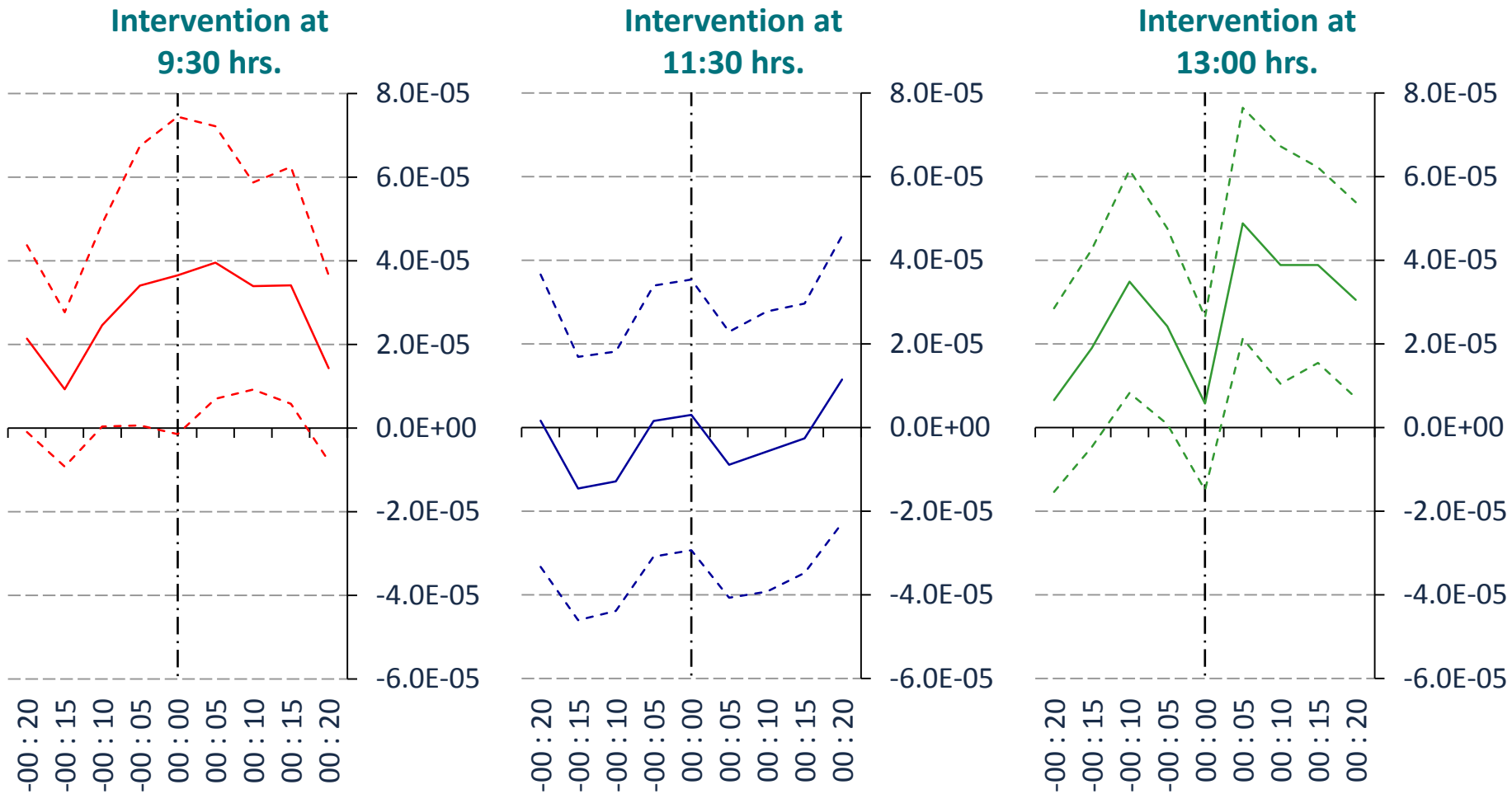
- In this exercise, we want to differentiate the effects of each intervention depending on its time: 9:30 hrs., 11:30 hrs., and 13:00 hrs. Thus, we estimate the following regression:

$$S_{t,i+m} = c_p + \sum_p \sum_m \beta_{m,p} D_{t,i+m,p} + \varepsilon_{t,i+m}$$

- Note that the notation is similar to the last model, except for the fact that the  $\beta_{m,p}$  coefficients and the  $c_p$  constants do depend on the time of the intervention,  $p$ .
- These equations could be estimated as separate regressions for  $p = 1, 2$  and  $3$ ; where, as mentioned,  $p$  is associated to the 9:30 hrs., the 11:30 hrs., and the 13:00 hrs. interventions.
- We conjecture that the errors terms of the referred regressions are correlated. Thus, to increase the efficiency in our estimation, we use Seemingly Unrelated Regressions (SUR).
- When using controls, the macroeconomic announcements are associated to different times of the intervention. Thus, the information set we are conditioning on differs with the time of the intervention.

# On the Effectiveness of Interventions

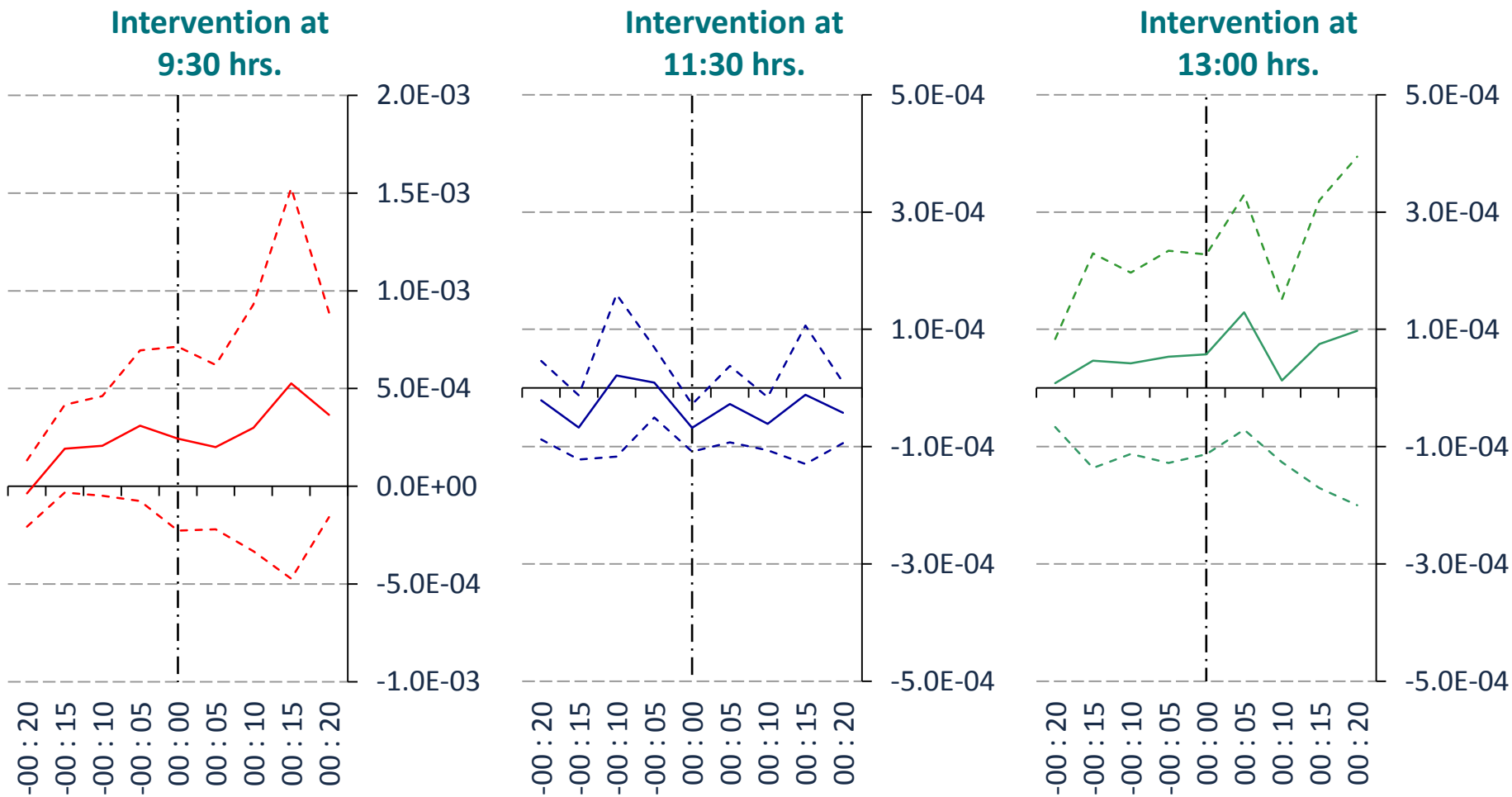
## Estimated Coefficients Event Style Regression with Controls



Source: Own estimations with data from Banco de México and Reuters.

# On the Effectiveness of Interventions

## Estimated Coefficients Event Style Regression with Controls



Source: Own estimations with data from Banco de México and Reuters.

# Outline

**1** Introduction

**2** Interventions in the Peso Dollar Exchange Rate Market

**3** The Liquidity of Foreign Exchange Market Measured by Bid Ask Spread

**4** On the Effectiveness of Interventions

**5** Final Remarks



# Final remarks

- All in all, we find some evidence favorable to the effectiveness of the intervention considered. There are two main pieces of evidence supporting this statement.
  - ✓ *A group of estimations shows economically and statistically significant effects, reducing the bid ask spread.*
  - ✓ *The complementary group of estimations shows effects that are either not statistically significant or hardly economically significant.*
- The use of macroeconomic announcements as controls is crucial. Although, the individual effect of each announcement warrants further research.
- There is some evidence that the effects of the interventions might not be the same at different times of the day, which might have policy implications.
- A plethora of questions remain: What is the role of the auction? What is the role of the minimum price? What are the effects on the turnover?



BANCO DE MÉXICO

[www.banxico.org.mx](http://www.banxico.org.mx)