OTC Derivatives: Impacts of Regulatory Changes in the Non-Financial Sector

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The views expressed in this work are those of the authors and do not necessarily reflect those of the Banco Central do Brasil or its members.

- In the aftermath of the recent financial crisis, a series of measures has been proposed to regulate the OTC derivatives market.
  - The motivation is to increase the disclosure of the OTC operations aiming to decrease the probability of crisis.

- The main objective of this paper is to investigate how regulatory changes in the OTC derivatives market affect the non-financial sector.

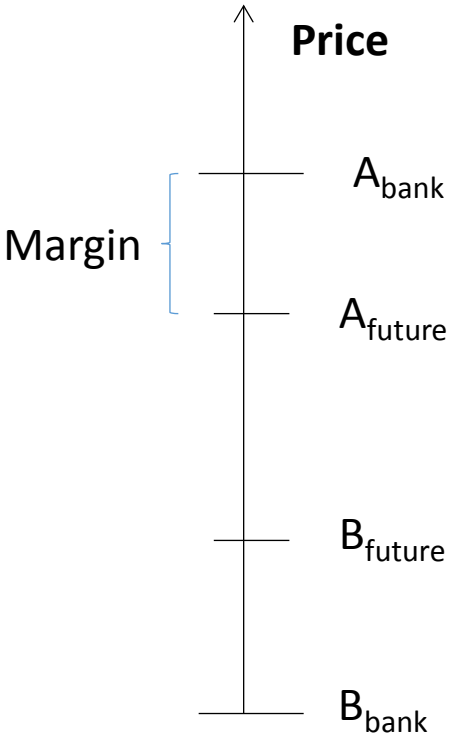
- The Brazilian FX derivatives market provides a **natural experiment** for the issue: in 2011 the Brazilian government taxed short positions in FX derivatives (the aim was to reduce the incentive to carry trade strategies).

- if the banks pass through the **extra cost** to its clients, this tax may affect the FX hedges of non-financial firms.

- This paper investigates whether and how much of this increase in the cost of OTC derivatives is transferred to the non-financial sector.

- For estimating the effect of the tax on non-financial firms, we compare the **Margin** between FX NDF transactions and the FX Brazilian future market before and after the entry of the tax.

- We interpret the change in this **Margin** as a change in the cost of hedging for non-financial firms.



What is this Margin?

An importer that wants to hedge its CFs buys NDF contracts at A_{bank}.

A bank can hedge its short position buying FX futures contracts at A_{future}.

The margin of the bank is $A_{bank} - A_{future}$

- A larger margin after the tax means that the banks passed at least some part of the regulatory costs on to firms.
- Comparing the OTC FX market with the FX futures market allows us to control for macro and micro-economic shocks that influence the FX prices.
- Using firm fixed effects, we control for time invariant firm-specific characteristics that influence firm demand for FX derivatives.
- Using bank fixed effects, we guarantee that our results are not driven by bank selection in our sample.

Related Literature

Regulation

- Acharya & Bisin (2014)
- Mello & Parsons (2012)
- BIS (2013)

Capital Controls and Foreign Exchange Intervention

- Blanchard et al (2013)
- Eichengreen (2013)
- Jeanne (2012)
- Chamon and Garcia (2013)
- Forbes et al (2012)
- Jinjarak et al (2013)
- Forbes (2007)

Contribution

- To the best of our knowledge, this article is the first to estimate the costs of regulatory changes in the OTC derivatives markets with a microeconomic approach.

Carry Trade

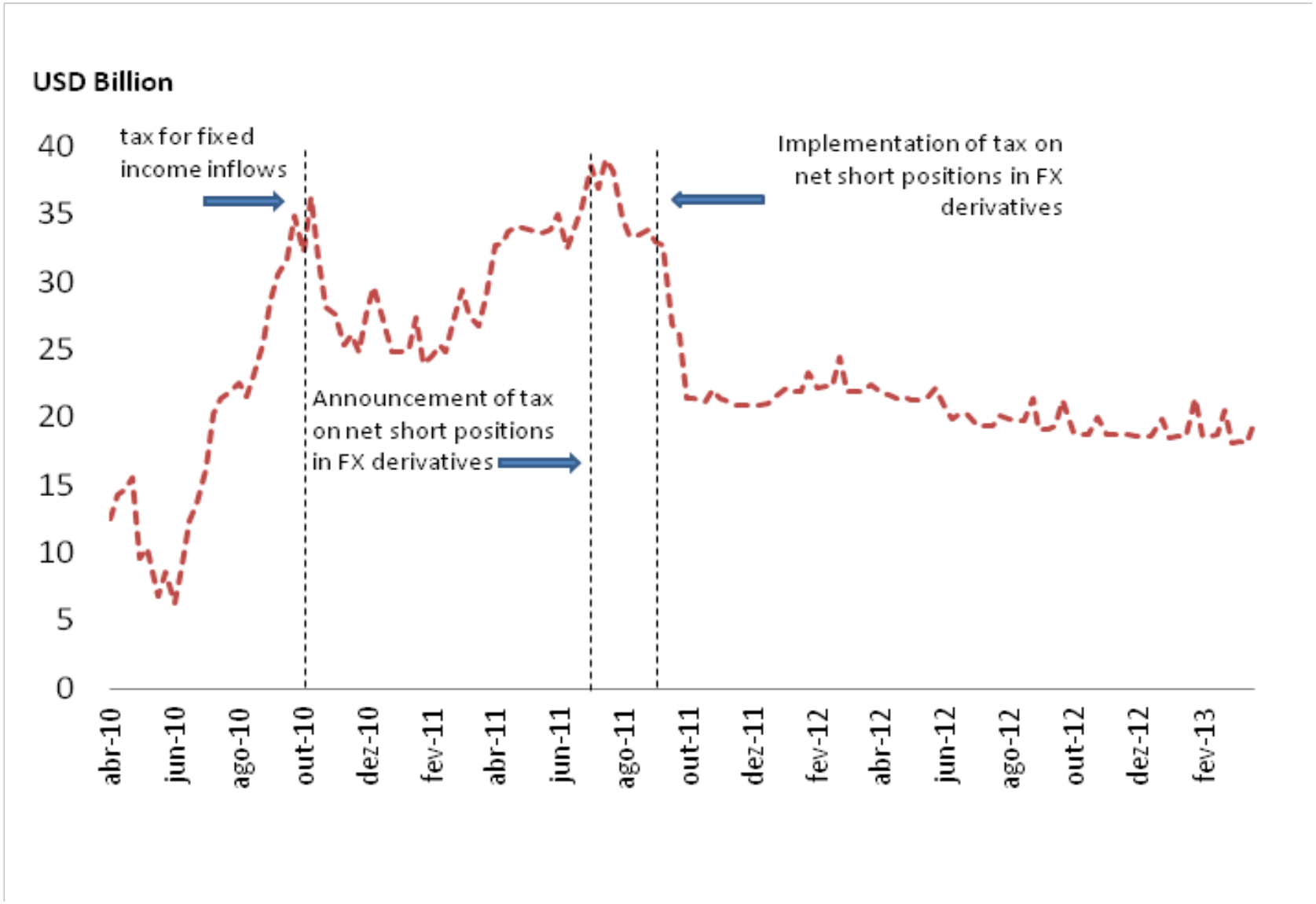
- Traditional carry trade:
  - Financing themselves in the strong currency: + r*
  - Applying the resources in the local currency : - S , - r

- Carry Trade with short position in NDF (- F)
  - Covered Interest rate parity:

$$F = \frac{S \times (1 + r)}{(1 + r^*)}$$

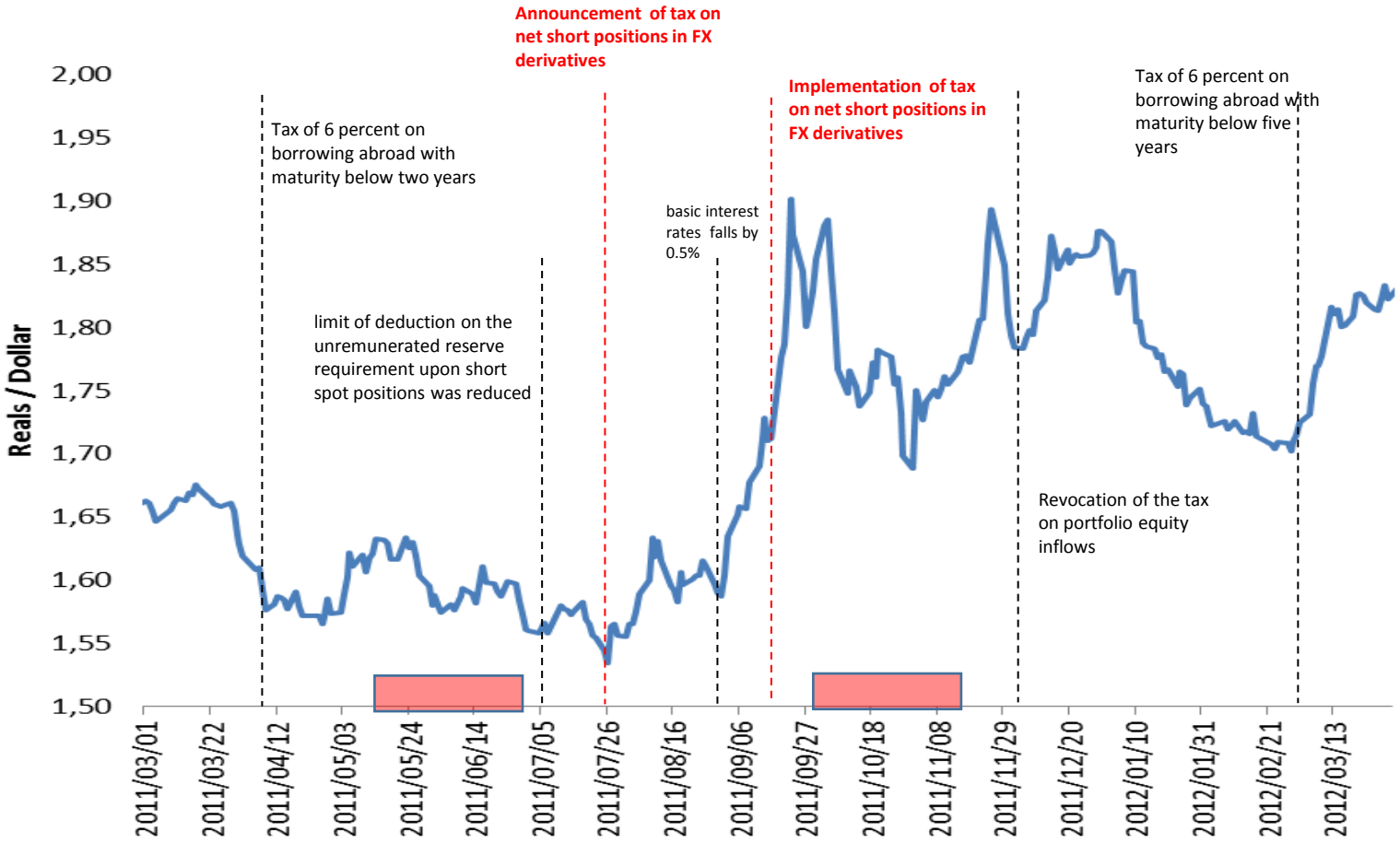
  - - F : -S , - r , +r*

Short Positions of Non-Resident Investors on FX Derivatives



Database

- Our **main** sample restricts the analysis to the period May-June, 2011 (before the tax) and October-November, 2011 (after the tax).



Database

- All NDF transactions (notional, currencies traded, maturity, forward price and identification of counterparts).

- The final sample comprises **5,172 NDF contracts,** with 999 firms and 34 banks.

- In order to calculate the margin between forward and future prices we used **settlement daily prices of BRL-USD future contracts** (as we don’t know the exact time the NDF contract was agreed)

Panel A - NDF Contracts Characterisitcs		Before Taxation			After Taxation			Mean Difference
	Variable	median	mean	sd	median	mean	sd	
Firms with Long Position in USD NDF	Margin (Forward - Future)[1/]	0,0020	0,0048	0,0140	0,0040	0,0073	0,0136	0,0025 ***
	Margin %	0,0012	0,0029	0,0082	0,0022	0,0041	0,0076	0,0012 ***
	Notional (USD million)	1,1	4,6	10,5	1,0	4,4	12,6	-0,2
	Maturity (days)	60	99	110	57	82	75	-17 ***
	Number of Firms		415			421		
	Observations		1309			1276		

Panel B - Market Characterisitcs		Before Taxation			After Taxation			Mean Difference
	Variable	median	mean	sd	median	mean	sd	
	USD Spot (Ptax)	1,5969	1,6006	0,0194	1,7662	1,7815	0,0500	0,1809 ***
	Implied volatility (3 month maturity)	0,1010	0,1037	0,0080	0,1514	0,1555	0,0190	0,0518 ***
	USD Future Turnover (USD MM)	19.118	19.215	4.319	18.059	19.134	5.436	-82
	Asymmetry	5,6000	5,9165	0,4844	14,2000	14,0284	2,4147	8,1119 ***
	Observations		43			40		

* significante at 10%,** significant at 5%,*** significant at 1%

Empirical Methodology

- Banks$\{1, \ldots\ldots, B\}$ trade NDF contracts with non-financial firms$\{1, \ldots\ldots, I\}$ at instant $\tau$of the day$t$.

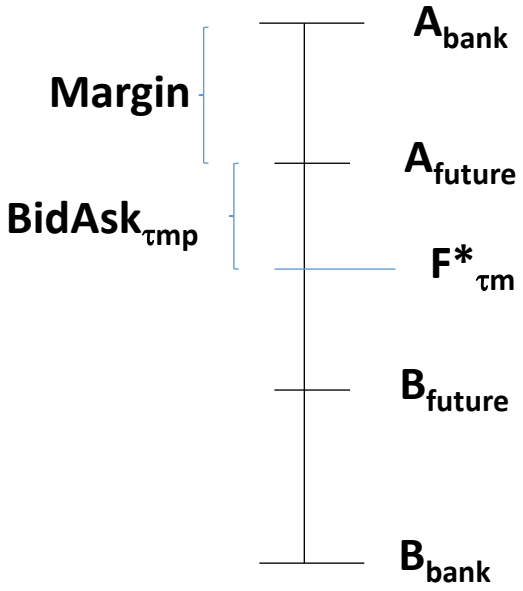
- Define *p* as the position assumed by firm *i* on the NDF transaction;

- $E_{ib\tau mp}$ denotes the NDF price of a trade between the bank *b* and firm *i* at instant τ with settlement at *m* when the firm assumes position *p*;

- Let *N* be the notional value of the forward contract; and

- Let $F^*_{\tau m}$be the "true" FX future price(non-observable) at instant τ.

Empirical Methodology



$$E_{ib\tau mp} = F^*_{\tau m} + BidAsk^{F^*}_{\tau mp} \times F^*_{\tau m} + margin(N, X_b, Y_i, Z_\tau, m\ )$$

$BidAsk^{F^*}_{\tau mp}$ is the spread (in percentage) of the quotation of the "true" future price at instant τ with maturity *m*.

X_b is the set of bank characteristics;

Y_i is the set of firm characteristics;

Z_τ is the set of micro and macroeconomic variables that affect the FX market at instant τ (such as FX quotation, volatility, FX asymmetry, etc.); and

$margin(N, X_b, Y_i, Z_\tau, m\ )$ is the value charged by the bank *b* for offering the OTC Market services to the firm *i*

Empirical Methodology

As the FX future market have high liquidity, especially for low maturities, we can simplify the model by assuming that $BidAsk_{\tau mp}^{F^*}$ is small relative to the difference between the quotations of the forward and the future trades.

As we don't know the instant τ that the forward contract was agreed (we only know the day of the trade, *t*), we use the settlement daily price of the future contract for $F_{\tau m}^*$

$$Spread_{ib\tau mpt} = E_{ib\tau mp} - F_{tm} = margin(N, X_b, Y_i, Z_\tau, m) + \varepsilon_{tm}$$

where F_{tm} is the settlement future price with maturity *m* on day *t*.

Empirical Methodology

Define π = {0,1}, where 0 is the period before the entry of the tax and 1 the period after the tax.

$$Spread_{ib\tau mpt}(\pi = 1) = Spread_{ib\tau mpt}(\pi = 0) + \boldsymbol{\gamma}\pi$$

We are interested in the value of coefficient $\boldsymbol{\gamma}$

For long positions of the firms, if $\boldsymbol{\gamma}$ is positive (negative) the margin increases (decreases) with the taxation.

Table 3 - Effect of IOF over Short Position on FX Derivatives on the Spread between Forward and Future Prices

Firms buy NDF contracts

Dependent Variable:	Forward Price-Future Price								
	All Sample	Firms in both periods							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
After incidence of IOF over Short Position in FX Derivatives	0.0029***	0.0025***	0.0024***	0.0052***	0.0059***	0.0072***	0.0088***	0.0067***	0.0079***
	(0.0006)	(0.0005)	(0.0005)	(0.0011)	(0.0011)	(0.0021)	(0.0020)	(0.0021)	(0.0020)
log(notional)	-0.0125***	-0.0095**	-0.0059**	-0.0063**	-0.0058**	-0.0063**	-0.0057**	-0.0064**	-0.0058**
	(0.0037)	(0.0038)	(0.0028)	(0.0028)	(0.0026)	(0.0028)	(0.0026)	(0.0028)	(0.0026)
$\log(\text{notional})^2$	0.0004***	0.0003**	0.0002**	0.0002**	0.0002**	0.0002**	0.0002**	0.0002**	0.0002**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
log(maturity)	-0.0151**	-0.0093	-0.0115*	-0.0110*	-0.0094	-0.0111*	-0.0095	-0.0110*	-0.0093
	(0.0070)	(0.0062)	(0.0062)	(0.0061)	(0.0061)	(0.0061)	(0.0062)	(0.0062)	(0.0062)
$\log(\text{maturity})^2$	0.0022***	0.0012	0.0013*	0.0012*	0.0011	0.0013*	0.0011	0.0012*	0.0011
	(0.0008)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
implied volatility				-0.0533***	-0.0714***	-0.0590***	-0.0797***	-0.1141**	-0.1931***
				(0.0191)	(0.0179)	(0.0208)	(0.0193)	(0.0575)	(0.0544)
log(USD future turnover)					0.0076***		0.0078***		0.0080***
					(0.0010)		(0.0010)		(0.0010)
volatility asymmetry (3 month option)						-0.0002	-0.0003**	-0.0003	-0.0005***
						(0.0002)	(0.0001)	(0.0002)	(0.0002)
dollar spot								0.0215	0.0441**
								(0.0210)	(0.0195)
Observations	2,585	1,861	1,861	1,861	1,861	1,861	1,861	1,861	1,861
R-squared	0.1321	0.0821	0.3753	0.3812	0.4195	0.3825	0.4221	0.3832	0.4248
Firm Fixed Effect	NO	NO	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effect	NO	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table reports the effect of the incidence of IOF over short posititions in FX Derivatives market on the difference between the prices in the Forward (OTC) and Futures (Exchanges) Market for the same maturity.We compare the Forward Contracts traded in 2011 from May, 1st to Jun, 30th with those agreed from Oct,1st to Nov,30th of the same year. There are 645 firms that buy USD forward in the sample, 191 buy in both periods, 224 only before the incidence of IOF and 230 only after. There are 32 banks in this sample, 25 sell contracts in both periods and 2 banks appear only in the second period.The announcement of the IOF was in July, 26th but the effectiveness of the new tax only took place in September, 16th. Standard-Errors reported in parentheses are clustered at firm level. *** significant at 1% ** significant at 5% * significant at 10%

- The results show that the **Margin** more than doubled for companies exposed to devaluation of the local currency.
- Comparison to trades in May/2011 (R$/$1,000):

May 2011		
FX Spot Price	1618,18	"cost of hedging" for importers (6-months)
NDF Price (6-months)	1679,23	61,05

Increase in Margin with Taxation (γ)	5.5
Increase in the "cost of hedging" for importers	9.01%

- As the NDF quotation of some EMEs is high due to the interest rate differentials, this cost increase may be worrisome to the extent that it may prevent firms from hedging their FX positions

Robustness

1. We replace the spread (forward minus future) price by the percentage spread.

Table 5 - Robustness: Percentage Spread
Firms buy NDF contracts

Dependent Variable:	(Forward Price-Future Price)/Future Price								
	All Sample	Firms in both periods							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
After incidence of IOF over Short Position in FX Derivatives	0.0014***	0.0013***	0.0012***	0.0030***	0.0035***	0.0043***	0.0053***	0.0041***	0.0048***
	(0.0003)	(0.0003)	(0.0003)	(0.0007)	(0.0006)	(0.0012)	(0.0011)	(0.0012)	(0.0011)
log(notional)	-0.0073***	-0.0055**	-0.0033**	-0.0035**	-0.0032**	-0.0035**	-0.0032**	-0.0035**	-0.0032**
	(0.0022)	(0.0022)	(0.0016)	(0.0016)	(0.0015)	(0.0016)	(0.0015)	(0.0016)	(0.0015)
$\log(\text{notional})^2$	0.0002***	0.0002**	0.0001**	0.0001**	0.0001**	0.0001**	0.0001**	0.0001**	0.0001**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
log(maturity)	-0.0077**	-0.0048	-0.0062*	-0.0059*	-0.0050	-0.0059*	-0.0050	-0.0059*	-0.0049
	(0.0039)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0034)
$\log(\text{maturity})^2$	0.0011**	0.0006	0.0007*	0.0007*	0.0006	0.0007*	0.0006	0.0007*	0.0006
	(0.0005)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
implied volatility				-0.0352***	-0.0455***	-0.0388***	-0.0506***	-0.0671**	-0.1123***
				(0.0107)	(0.0102)	(0.0118)	(0.0109)	(0.0324)	(0.0307)
log(USD future turnover)					0.0044***		0.0045***		0.0046***
					(0.0006)		(0.0006)		(0.0006)
volatility assimetry (3 month option)						-0.0001	-0.0002**	-0.0002*	-0.0003***
						(0.0001)	(0.0001)	(0.0001)	(0.0001)
dollar spot								0.0110	0.0239**
								(0.0119)	(0.0111)
Observations	2,585	1,861	1,861	1,861	1,861	1,861	1,861	1,861	1,861
R-squared	0.1259	0.0767	0.3775	0.3854	0.4239	0.3870	0.4269	0.3875	0.4294
Firm Fixed Effect	NO	NO	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effect	NO	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table reports the effect of the incidence of IOF over short posititions in FX Derivatives market on the percentage difference between the prices in the Forward (OTC) and Futures (Exchanges) Market for the same maturity.We compare the Forward Contracts traded in 2011 from May, 1st to Jun, 30th with those agreed from Oct,1st to Nov,30th of the same year. There are 645 firms that buy USD forward in the sample, 191 buy in both periods, 224 only before the incidence of IOF and 230 only after. There are 32 banks in this sample, 25 sell contracts in both periods and 2 banks appear only in the second period.The announcement of the IOF was in July, 26th but the effectiveness of the new tax only took place in September, 16th. Standard-Errors reported in parentheses are clustered at firm level. *** significant at 1% ** significant at 5% * significant at 10%

Robustness

1. We replace the spread (forward minus future) price by the percentage spread.
2. We extend the period analyzed.

Table 7 - Robustness of the Effect of IOF over Short Position on FX Derivatives on the Spread between Forward and Future Prices

Firms buy NDF contracts - Period Before the IOF (Apr, 12th to Jul, 7th) and Period After the IOF (Sep, 22th to Nov 30th)

Dependent Variable:	Forward Price-Future Price								
	All Sample	Firms in both periods							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
After incidence of IOF over Short Position in FX Derivatives	0.0018***	0.0017***	0.0013**	0.0102***	0.0107***	0.0179***	0.0195***	0.0129***	0.0145***
	(0.0006)	(0.0005)	(0.0005)	(0.0011)	(0.0011)	(0.0019)	(0.0019)	(0.0022)	(0.0022)
log(notional)	-0.0125***	-0.0089**	-0.0053	-0.0068**	-0.0068**	-0.0068**	-0.0067**	-0.0066**	-0.0065**
	(0.0036)	(0.0036)	(0.0033)	(0.0032)	(0.0031)	(0.0032)	(0.0031)	(0.0032)	(0.0030)
$\log(\text{notional})^2$	0.0004***	0.0003**	0.0002*	0.0003**	0.0002**	0.0003**	0.0002**	0.0002**	0.0002**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
log(maturity)	-0.0169**	-0.0084	-0.0125	-0.0118	-0.0108	-0.0125*	-0.0114	-0.0119*	-0.0108
	(0.0070)	(0.0073)	(0.0076)	(0.0073)	(0.0073)	(0.0074)	(0.0074)	(0.0069)	(0.0070)
$\log(\text{maturity})^2$	0.0024***	0.0011	0.0015*	0.0014*	0.0013	0.0015*	0.0014	0.0014*	0.0013
	(0.0008)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0008)	(0.0008)
implied volatility				-0.1592***	-0.1777***	-0.1623***	-0.1846***	-0.3431***	-0.3674***
				(0.0190)	(0.0191)	(0.0187)	(0.0187)	(0.0437)	(0.0437)
log(USD future turnover)					0.0044***		0.0051***		0.0052***
					(0.0007)		(0.0007)		(0.0007)
volatility asymmetry (3 month option)						-0.0009***	-0.0010***	-0.0012***	-0.0013***
						(0.0002)	(0.0002)	(0.0002)	(0.0002)
dollar spot								0.0876***	0.0884***
								(0.0172)	(0.0170)
Observations	5,263	4,088	4,088	4,088	4,088	4,088	4,088	2,591	2,591
R-squared	0.1496	0.0864	0.3930	0.3993	0.4013	0.3994	0.4013	0.4120	0.4288
Firm Fixed Effect	NO	NO	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effect	NO	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table reports the effect of the incidence of IOF over short posititions in FX Derivatives market on the difference between the prices in the Forward (OTC) and Futures (Exchanges) Market for the same maturity.We compare the Forward Contracts traded in 2011 from Apr, 12th to Jul, 7th with those agreed from Sep,22th to Nov,30th of the same year. There are 773 firms that buy USD forward in the sample, 233 buy in both periods, 328 only before the incidence of IOF and 212 only after. The announcement of the IOF was in July, 26th but the effectiveness of the new tax only took place in September, 16th. Standard-Errors reported in parentheses are clustered at firm level. *** significant at 1% ** significant at 5% * significant at 10%

Robustness

1. We replace the spread (forward minus future) price by the percentage spread.
2. We extend the period analyzed.
3. We analyze the episode of the reduction in the limit of deduction on the unremunerated reserve requirement upon FX Short Spot Position on July, 8th 2011.

Database

Announcement of tax on net short positions in FX derivatives
Implementation of tax on net short positions in FX derivatives
Tax of 6 percent on borrowing abroad with maturity below two years
Tax of 6 percent on borrowing abroad with maturity below five years
basic interest rates falls by 0.5%
limit of deduction on the unremunerated reserve requirement upon short spot positions was reduced
Revocation of the tax on portfolio equity inflows
Reals / Dollar
2,00
1,95
1,90
1,85
1,80
1,75
1,70
1,65
1,60
1,55
1,50
2011/03/01
2011/03/22
2011/04/12
2011/05/03
2011/05/24
2011/06/14
2011/07/05
2011/07/26
2011/08/16
2011/09/06
2011/09/27
2011/10/18
2011/11/08
2011/11/29
2011/12/20
2012/01/10
2012/01/31
2012/02/21
2012/03/13

Table 8 - Effect of Change on Reserve Requirements over Short Position on Dollar Spot held by the banks on the Spread between Forward and Future Prices Firms buy NDF contracts - Period Before (Apr, 1st to May, 31th) and Period After (Jul, 11th to Jul, 21th)

Dependent Variable:	Forward Price-Future Price								
	All Sample	Firms in both periods							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
After the Change in Reserve Requirements	0.0001	0.0007*	0.0001	-0.0004	-0.0005	-0.0003	-0.0004	-0.0000	-0.0001
	(0.0007)	(0.0004)	(0.0003)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
log(notional)	-0.0109***	-0.0057**	-0.0008	-0.0012	-0.0011	-0.0012	-0.0010	-0.0009	-0.0008
	(0.0041)	(0.0027)	(0.0021)	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)	(0.0022)
$\log(\text{notional})^2$	0.0003**	0.0002*	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
log(maturity)	-0.0142*	-0.0096	-0.0048	-0.0044	-0.0045	-0.0046	-0.0047	-0.0048	-0.0048
	(0.0081)	(0.0067)	(0.0038)	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0037)	(0.0037)
$\log(\text{maturity})^2$	0.0021**	0.0012	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006
	(0.0010)	(0.0008)	(0.0005)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
implied volatility				-0.0536**	-0.0485**	-0.0794***	-0.0747***	-0.2024***	-0.1923**
				(0.0215)	(0.0216)	(0.0255)	(0.0249)	(0.0760)	(0.0755)
log(USD future turnover)					-0.0006		-0.0007		-0.0004
					(0.0006)		(0.0006)		(0.0006)
volatility asymmetry (3 month option)						-0.0007**	-0.0007**	-0.0015***	-0.0014***
						(0.0003)	(0.0003)	(0.0005)	(0.0005)
dollar spot								0.0433*	0.0408*
								(0.0229)	(0.0227)
Observations	1,549	840	840	840	840	840	840	840	840
R-squared	0.1492	0.1591	0.6048	0.6084	0.6089	0.6097	0.6103	0.6122	0.6124
Firm Fixed Effect	NO	NO	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effect	NO	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table reports the effect of the incidence of Reserve Requirements over short posititions in dollar spot market on the difference between the prices in the Forward (OTC) and Futures (Exchanges) Market for the same maturity.We compare the Forward Contracts traded in 2011 from Apr, 1st to May, 31th with those agreed from Jul,11th to Jul,21th of the same year. There are 461 firms that buy USD forward in the sample, 93 buy in both periods, 321 only before the change on Reserve Requirements and 47 only after. The announcement of the reduction in the limit of deduction on the unremunerated reserve requirement upon FX Short Spot Position was in July, 8th but the effectiveness of the new tax only took place in July 10th. Standard-Errors reported in parentheses are clustered at firm level. *** significant at 1% ** significant at 5% * significant at 10%

Robustness

1. We replace the spread (forward minus future) price by the percentage spread.
2. We extend the period analyzed.
3. We analyse the episode of the reduction in the limit of deduction on the unremunerated reserve requirement upon FX Short Spot Position on July, 8th 2011.
4. We study the impact of the surprise fall of 50 basis points of the Brazilian basic interest rate announced by the Monetary Policy Committee on August, 31th 2011.

Table 9 - Effect of the Surprise on the Police Interest Rate (Selic) on the Spread between Forward and Future Prices Firms buy NDF contracts - Period Before (Aug, 16th to Aug, 30th) and Period After (Sep, 2nd to Sep, 14th)

Dependent Variable:	Forward Price-Future Price								
	All Sample	Firms in both periods							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
After the Announcement of the Policy Interest Rate (Selic)	-0.0057***	-0.0029**	-0.0023	0.0018	0.0016	0.0028	0.0031	-0.0159**	-0.0156**
	(0.0011)	(0.0012)	(0.0016)	(0.0024)	(0.0023)	(0.0027)	(0.0027)	(0.0060)	(0.0059)
log(notional)	-0.0129**	-0.0062	0.0019	0.0001	-0.0005	0.0017	0.0011	-0.0021	-0.0027
	(0.0051)	(0.0066)	(0.0082)	(0.0090)	(0.0093)	(0.0091)	(0.0093)	(0.0090)	(0.0091)
$\log(\text{notional})^2$	0.0004**	0.0002	-0.0001	-0.0000	-0.0000	-0.0001	-0.0001	0.0001	0.0001
	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
log(maturity)	-0.0198**	-0.0127**	-0.0062	-0.0078	-0.0073	-0.0065	-0.0030	-0.0070	-0.0036
	(0.0090)	(0.0062)	(0.0091)	(0.0089)	(0.0094)	(0.0088)	(0.0100)	(0.0075)	(0.0086)
$\log(\text{maturity})^2$	0.0027**	0.0015**	0.0007	0.0010	0.0009	0.0008	0.0004	0.0010	0.0006
	(0.0011)	(0.0007)	(0.0010)	(0.0010)	(0.0011)	(0.0010)	(0.0011)	(0.0009)	(0.0010)
implied volatility				-0.2507	-0.2333	-0.2467	-0.1739	-1.1166***	-1.0425***
				(0.1678)	(0.1636)	(0.1653)	(0.1519)	(0.4053)	(0.3821)
log(USD future turnover)					-0.0013		-0.0053		-0.0050
					(0.0026)		(0.0033)		(0.0032)
volatility asymmetry (3 month option)						0.0028	0.0059	-0.0047	-0.0017
						(0.0032)	(0.0038)	(0.0032)	(0.0031)
dollar spot								0.4146***	0.4122***
								(0.1418)	(0.1375)
Observations	386	172	172	172	172	172	172	172	172
R-squared	0.2478	0.1439	0.4691	0.4982	0.4991	0.5028	0.5116	0.5773	0.5853
Firm Fixed Effect	NO	NO	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effect	NO	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table reports the effect of the Surprise on the Police Interest Rate (Selic) on the difference between the prices in the Forward (OTC) and Futures (Exchanges) Market for the same maturity.We compare the Forward Contracts traded in 2011 from Aug, 16th to Aug, 30th with those agreed from Sep,2nd to Sep,14th of the same year. There are 189 firms that buy USD forward in the sample, 39 buy in both periods, 88 only before the incidence of IOF and 62 only after. The announcement of the change in the Policy Interest Rate was in Aug, 31th. Standard-Errors reported in parentheses are clustered at firm level. *** significant at 1% ** significant at 5% * significant at 10%

Final Remarks

- Although effective as macroprudential/capital control measure, the tax over short positions in derivatives had this unintended consequence of increasing the cost of hedging for non-financial firms.

- As some EMEs NDF quotations are high due to the interest rate differentials, this cost increase can be a concern to the extent that it may prevent firms from hedging their FX positions.

Final Remarks

- The international liquidity imposes trade-offs on economies that are recipients of capital flows (the costs associated with macroprudential measures)

- The international community should recognize these trade offs when analyzing the consequences of liquidity measures.

Final Remarks

- As the Margin increase of our study can be seen as an increase in the OTC cost, the international community should recognize the trade off ‘more regulation x higher costs’.

- The trade off for EMEs may be worse because the derivatives market is still incipient in these countries.

Thank you !

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