Capital Flows, Financial Derivatives and Interventions in the Exchange Markets

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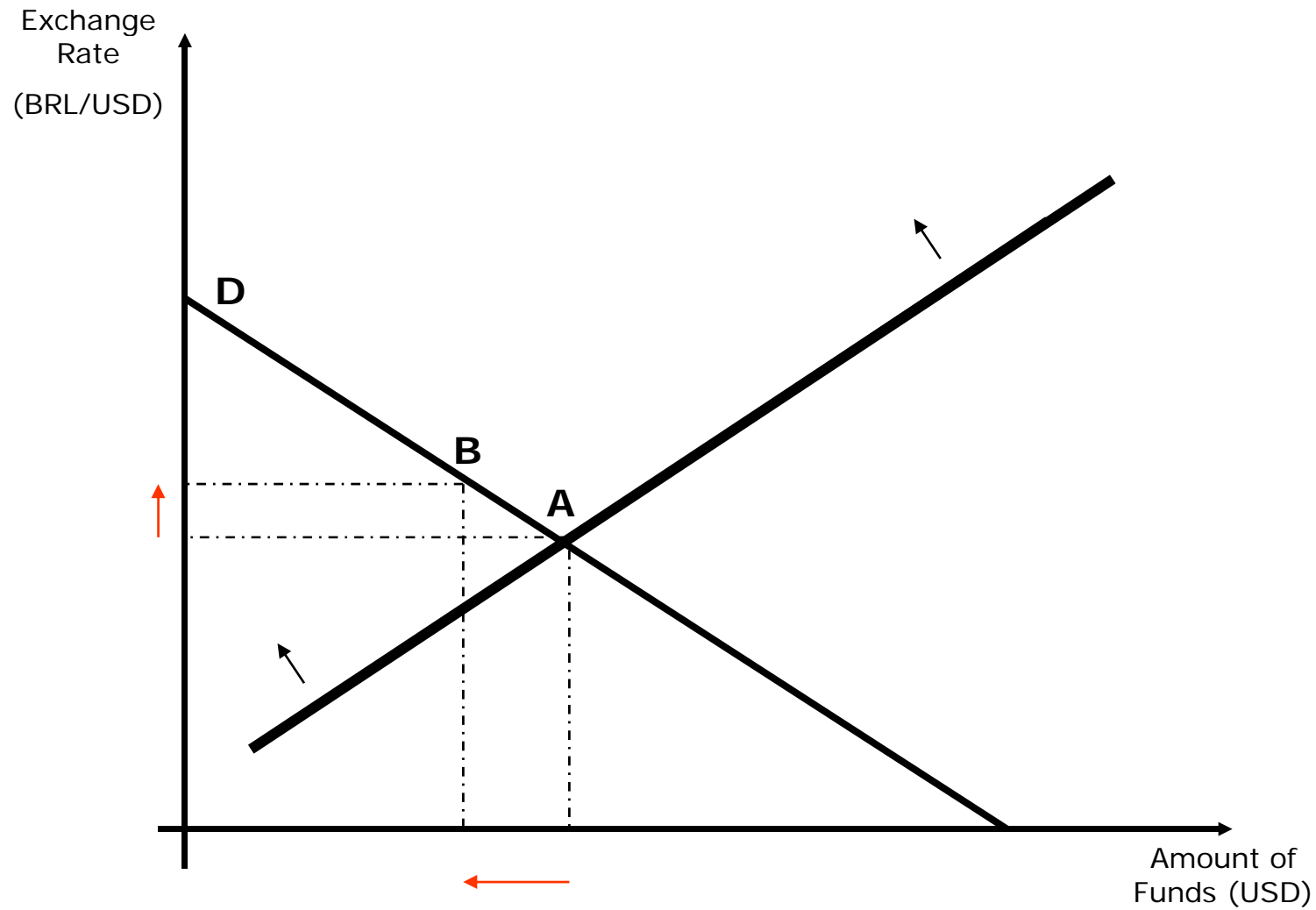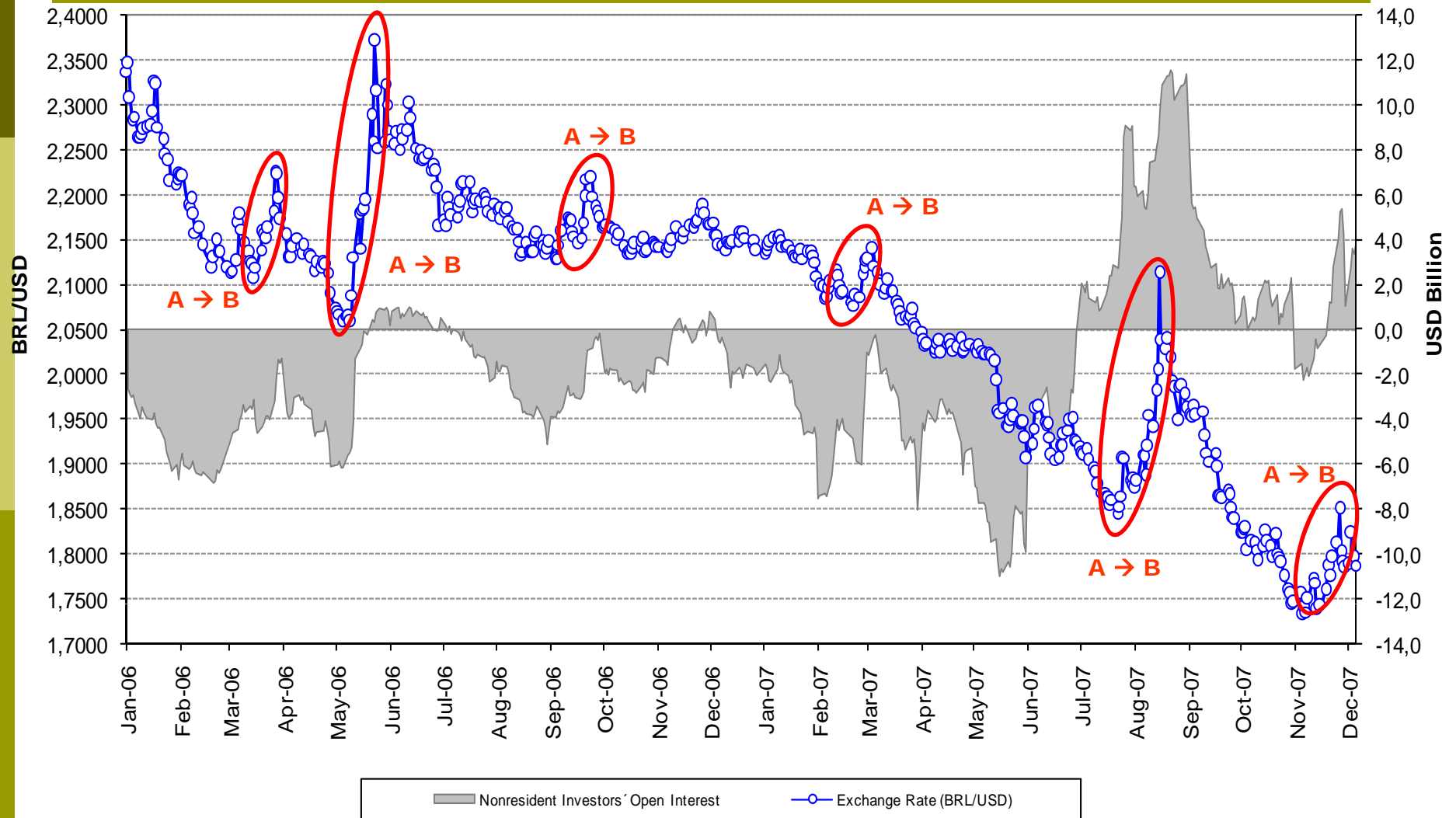
Central Bank of Chile

Tuesday, December 18th, 2007

1. Interest Differential, Capital Flows and Derivatives

- The high interest rate differential attracts capitals through derivatives (*NDF*s of BRL, sale of exchange rate derivatives—USD futures—at BM&F), and this impacts the spot exchange rate.

- Evidence: changes in the open interest in USD futures (short position) of the nonresident (foreign) investors present strong correlation with the exchange rate.

- When foreigners' open interest rises, the USD falls, and vice-versa. This is compatible with a shift of the funds supply curve over a stable demand curve.
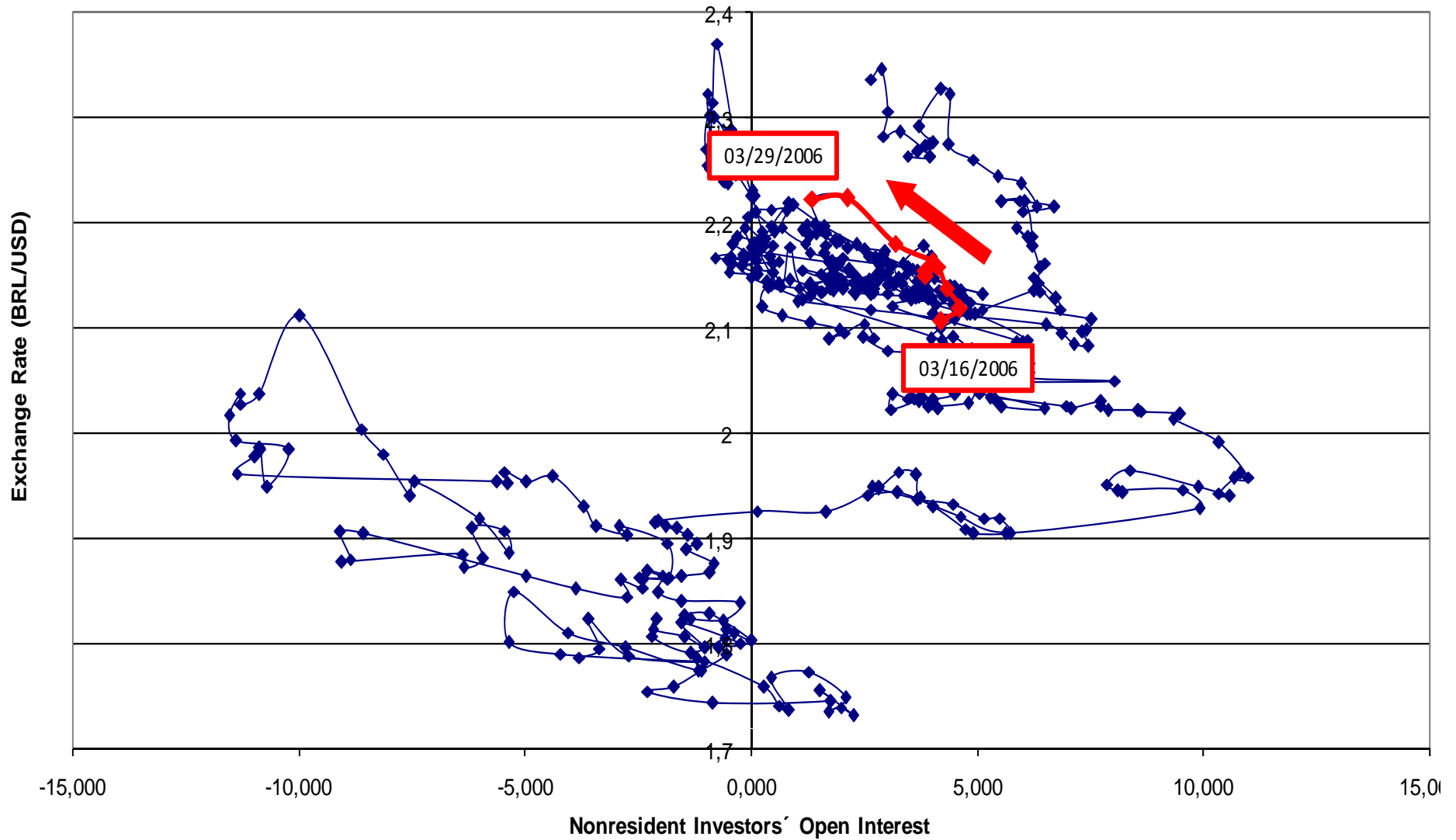
Interaction Between Funds Supply and Stable Demand

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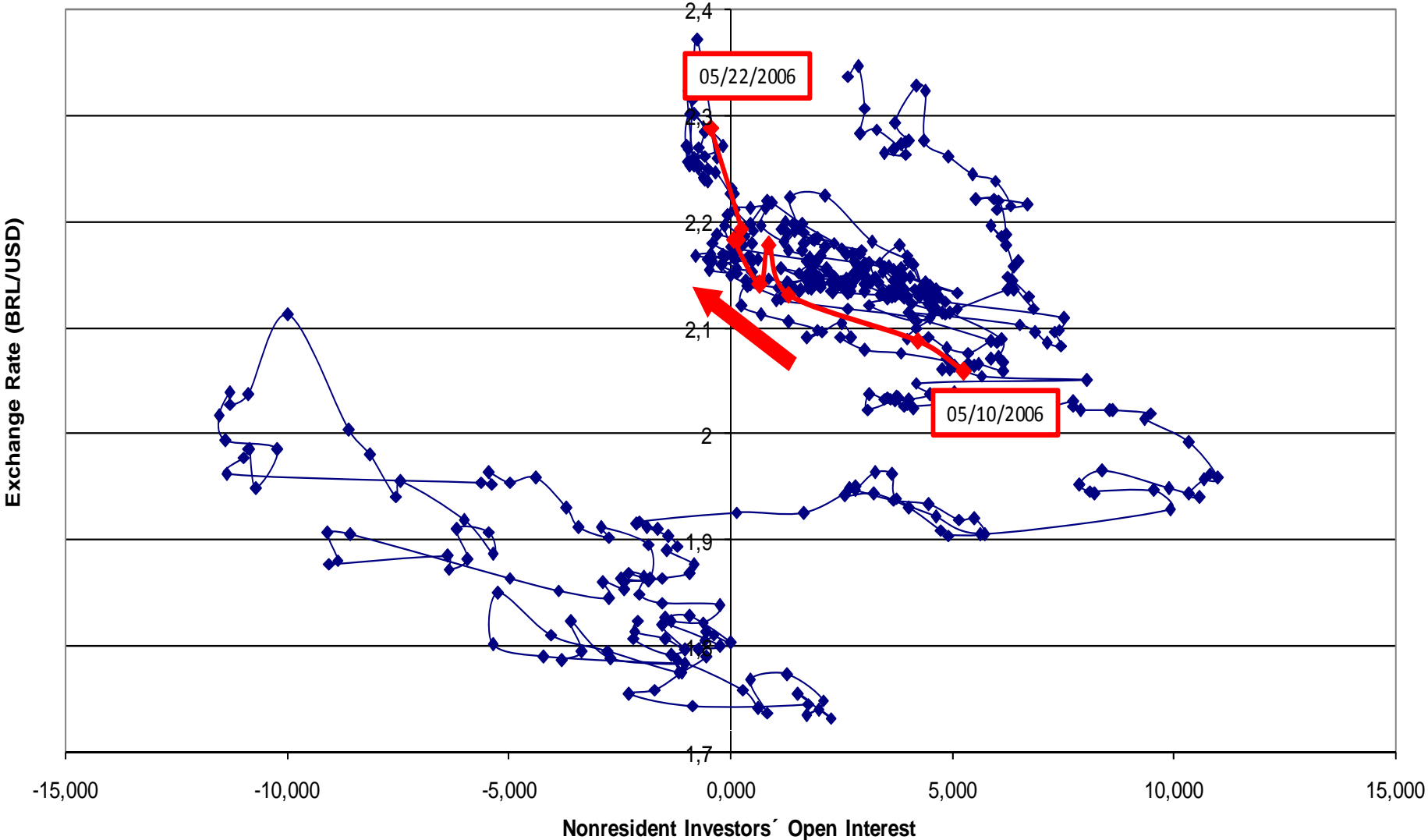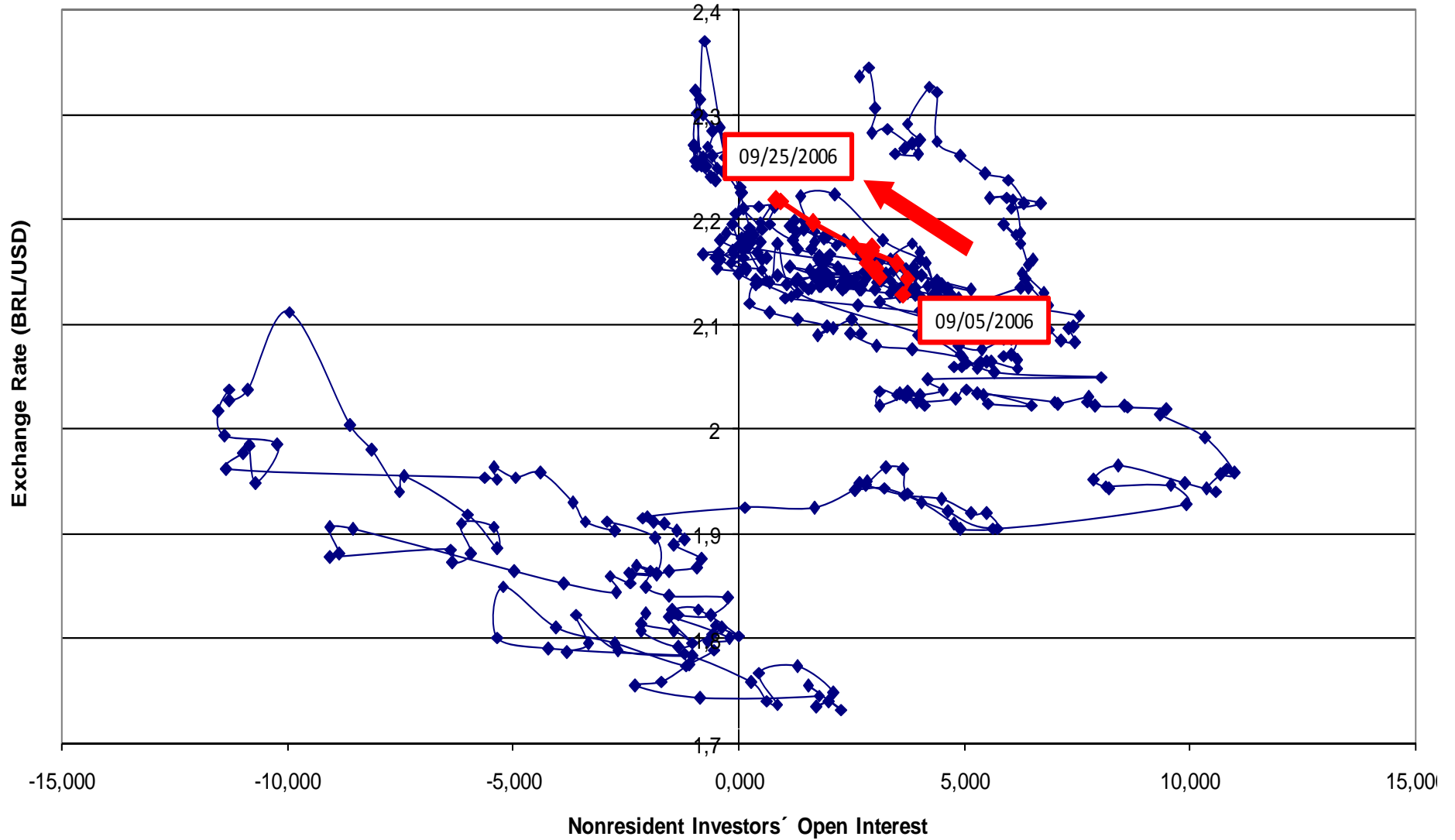# Interaction Between Funds Supply and Stable Demand

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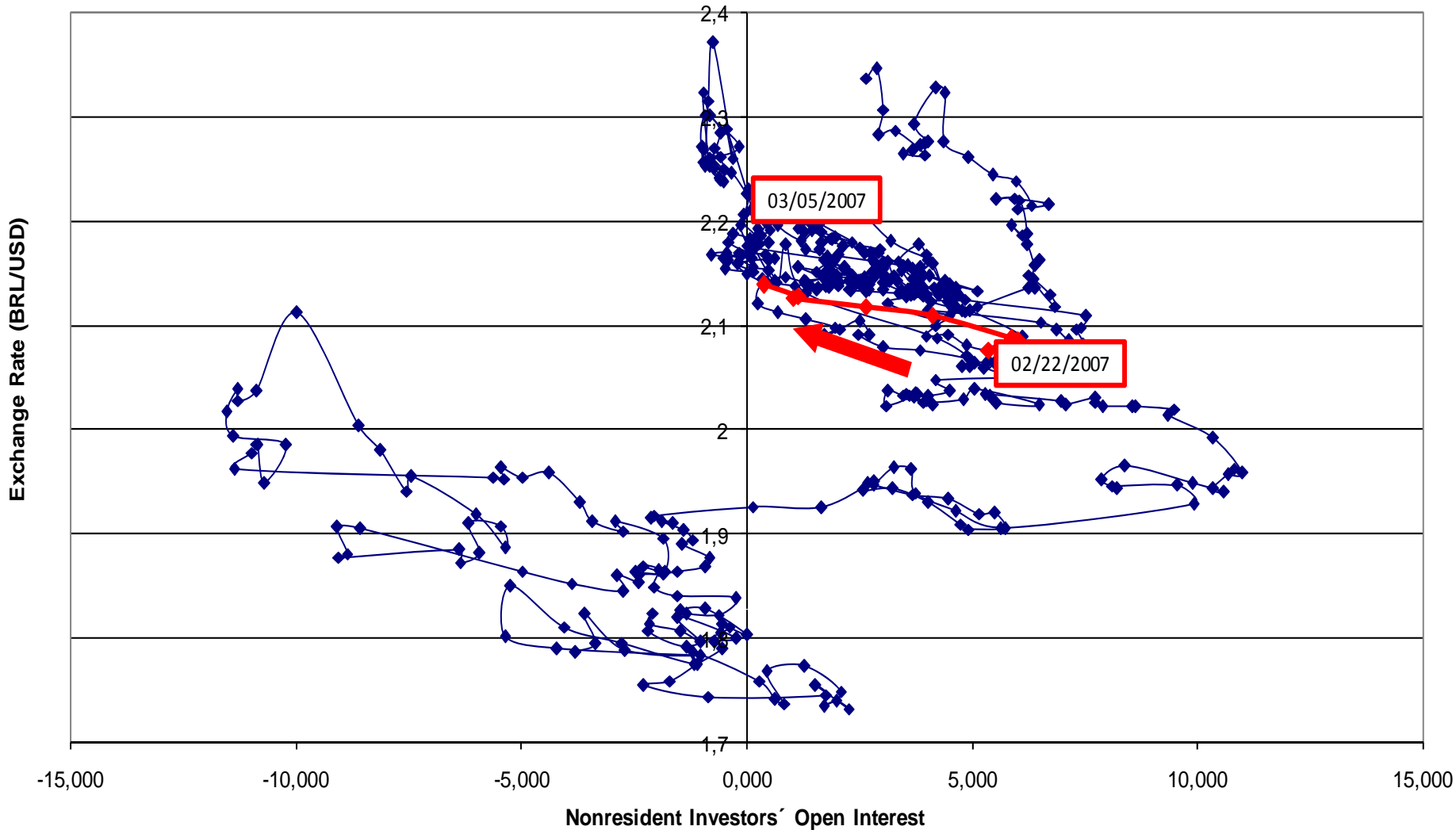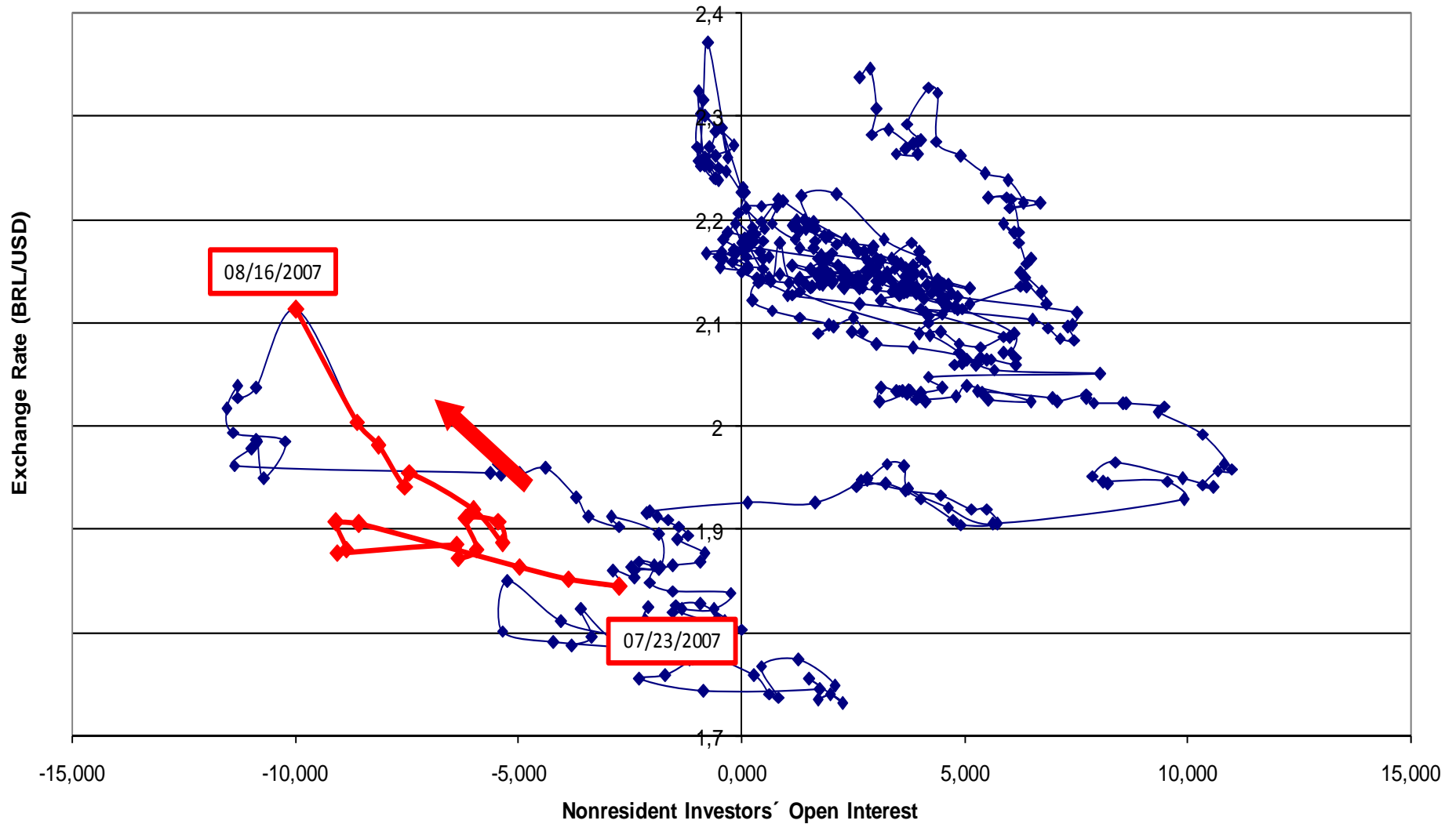# NONRESIDENT INVESTORS´ OPEN INTEREST IN USD FUTURES CONTRACTS X EXCHANGE RATE

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This movement of appreciation, which preceded the subprime crises, is the only one that occurs with the shift of the foreigners' open interest from short to long.

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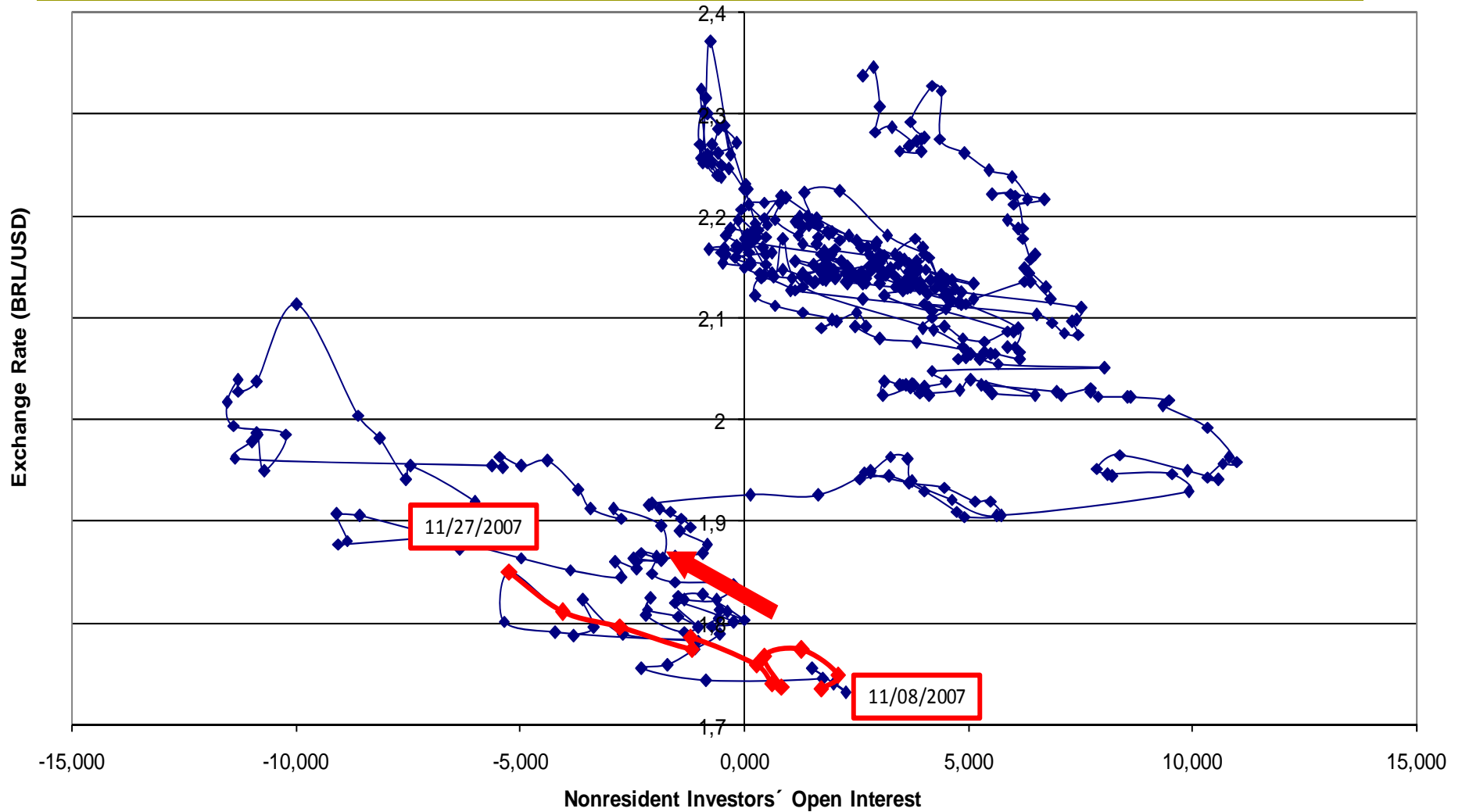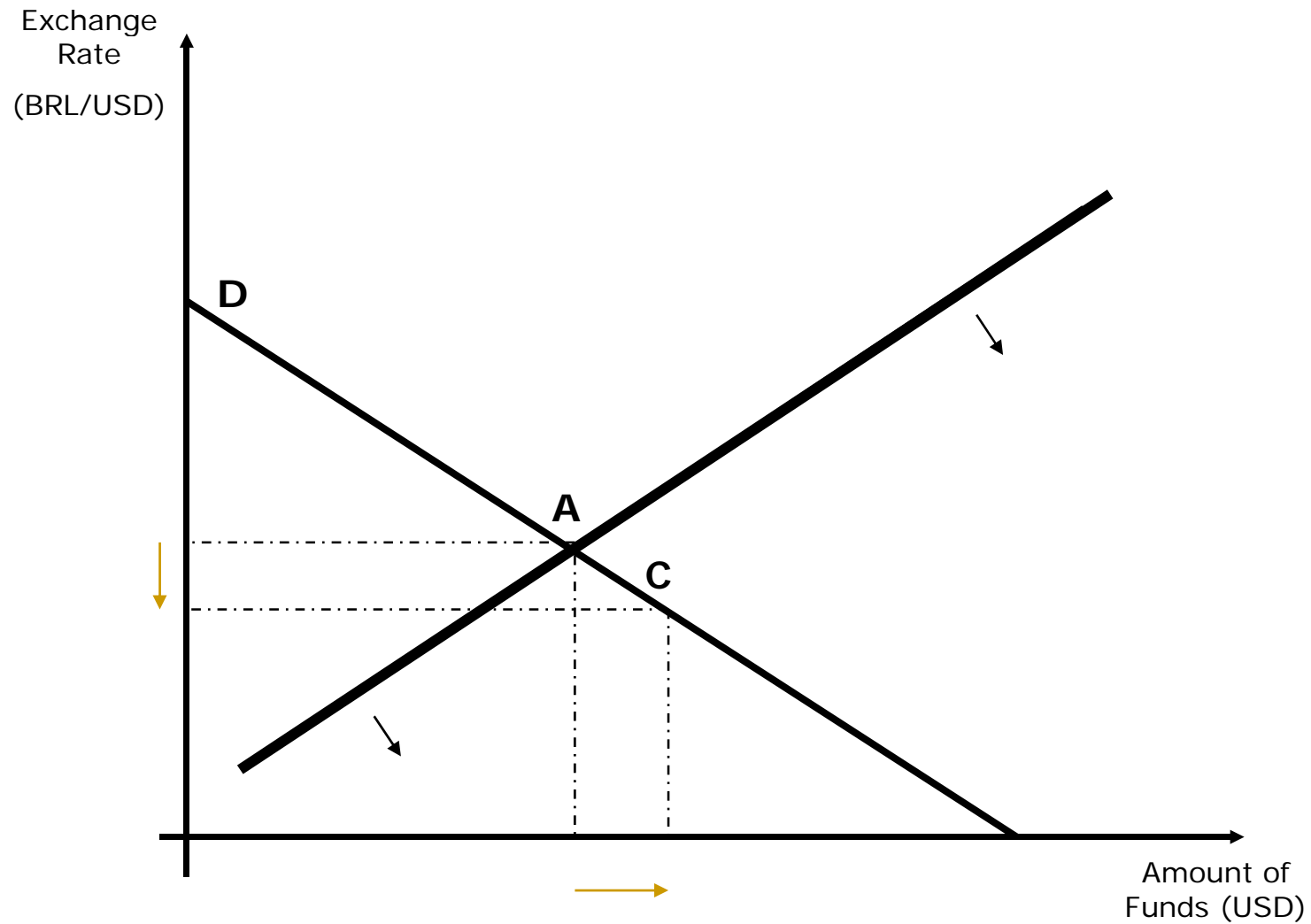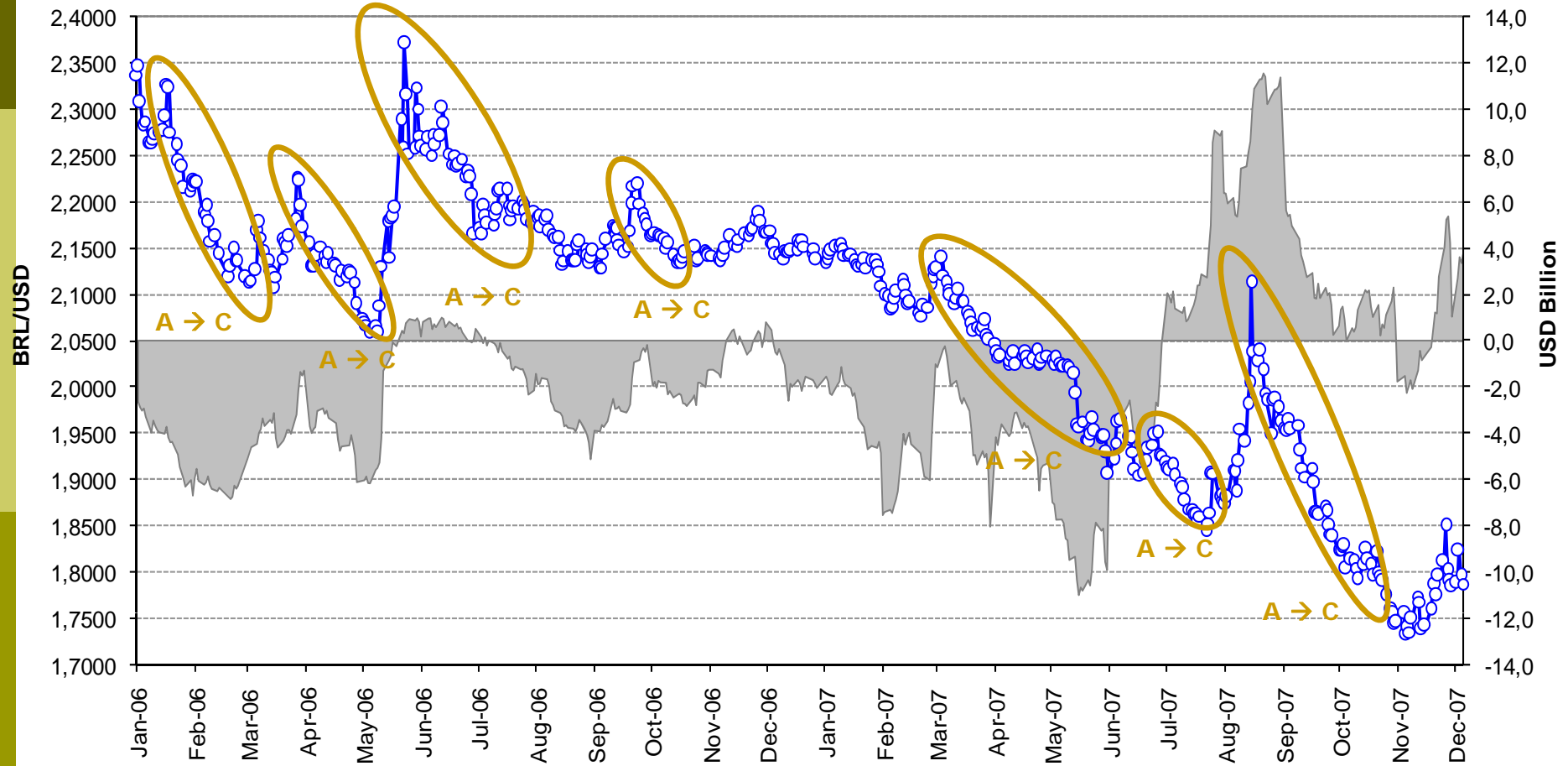# Interaction Between Funds Supply and Stable Demand

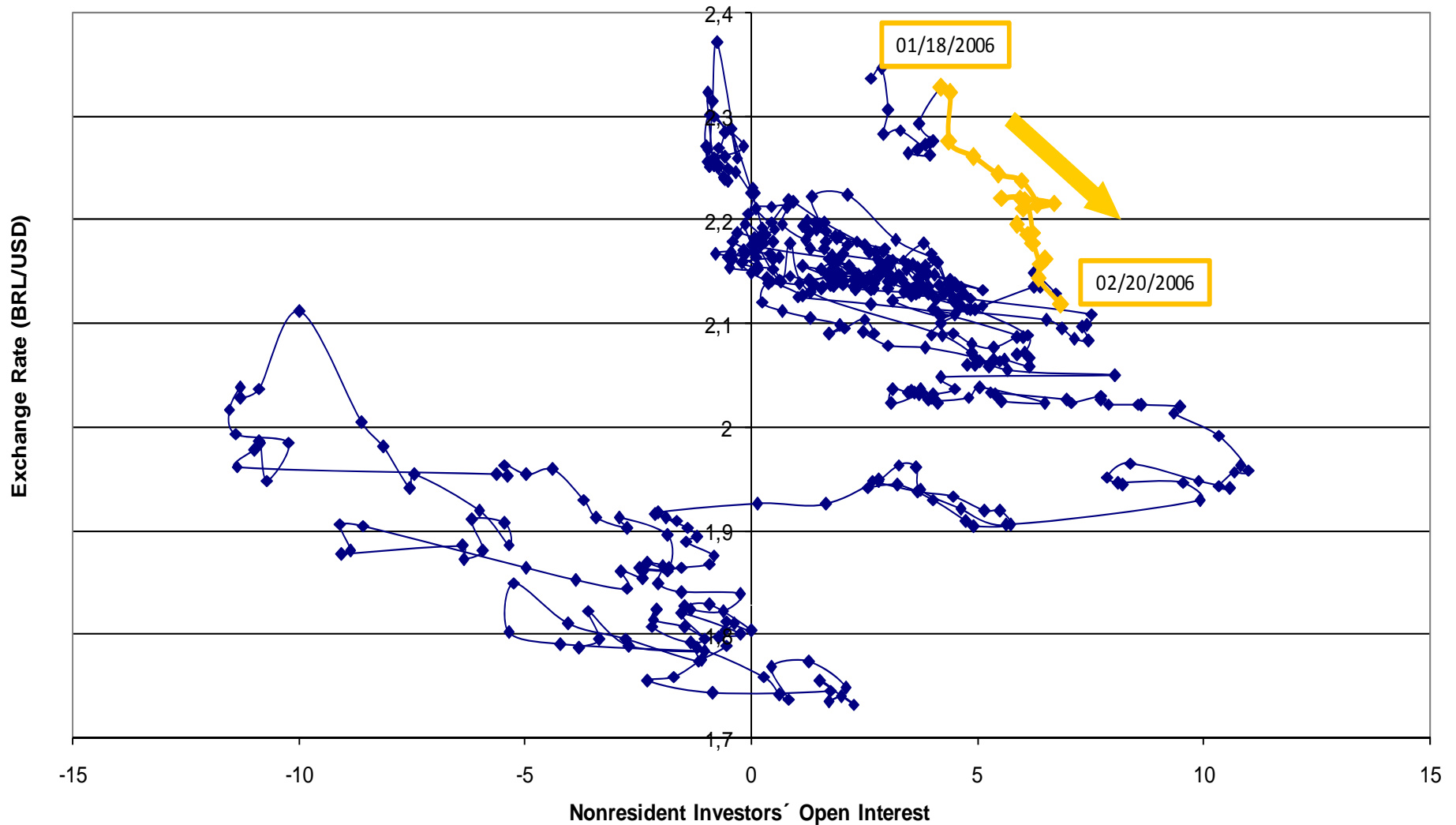NONRESIDENT INVESTORS´ OPEN INTEREST IN USD FUTURES CONTRACTS X EXCHANGE RATE

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Legend: Nonresident Investors´ Open Interest — Exchange Rate (BRL/USD)
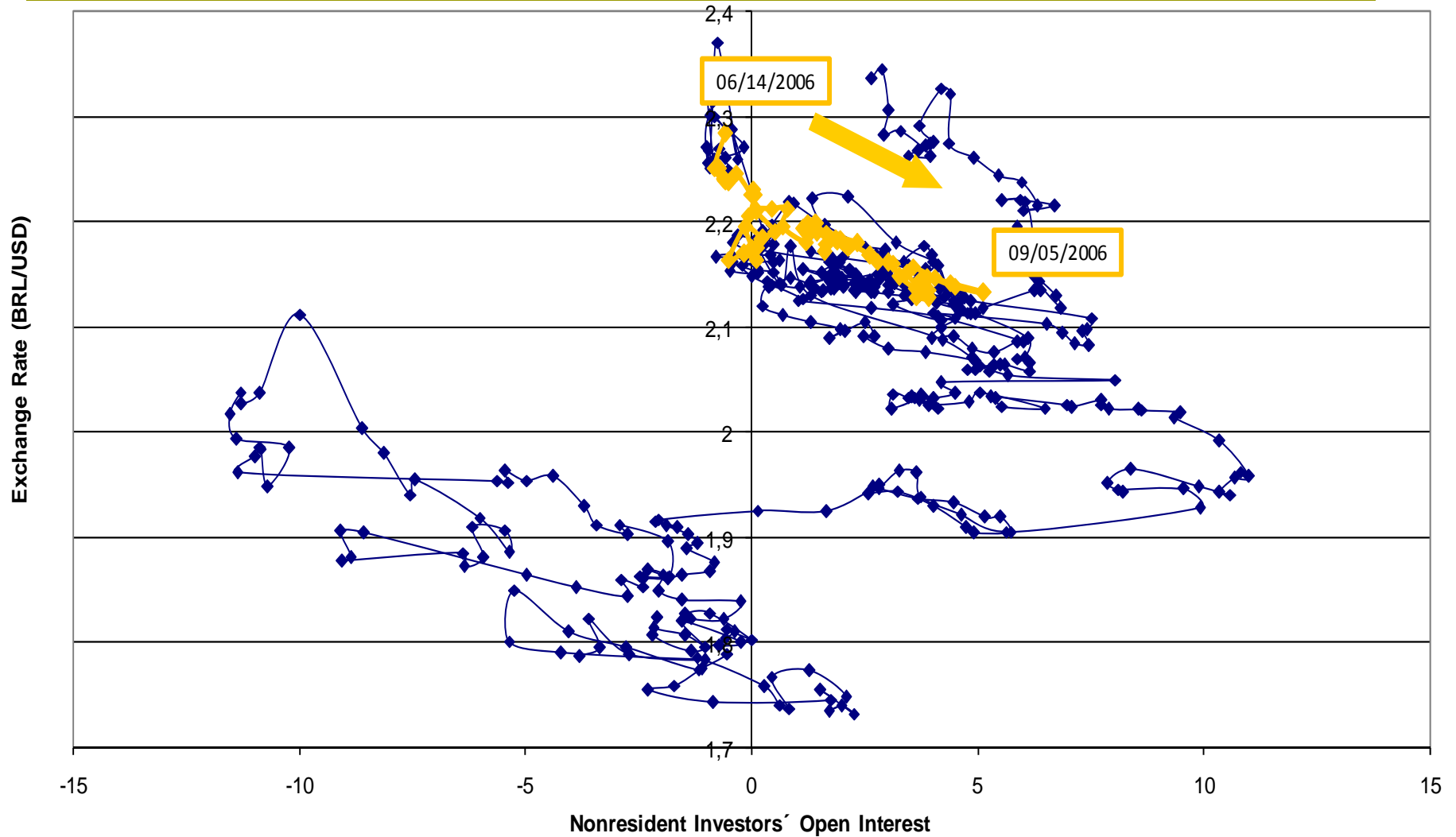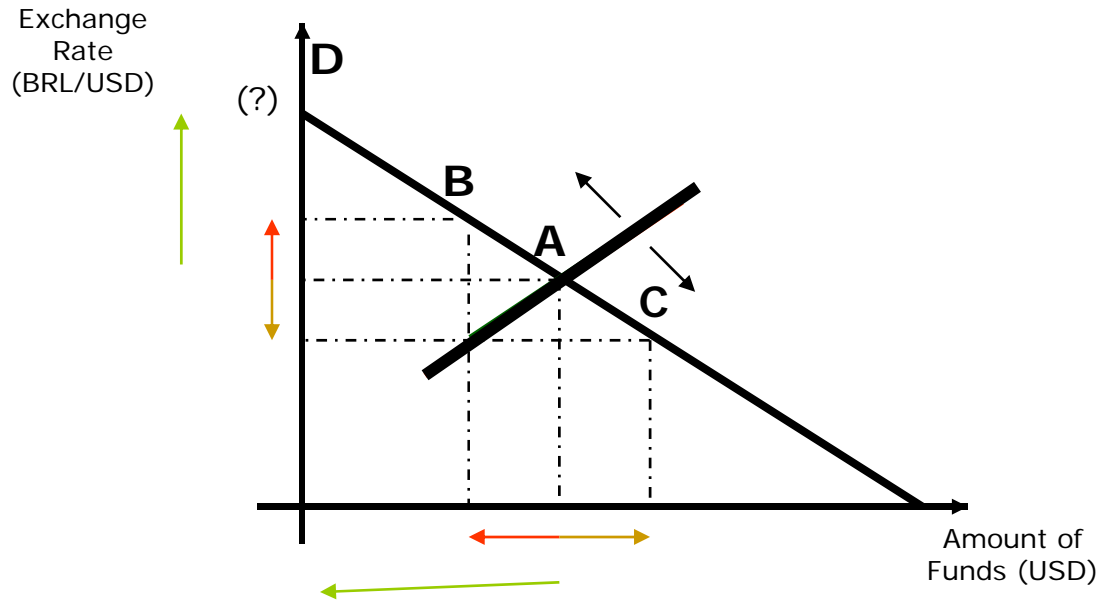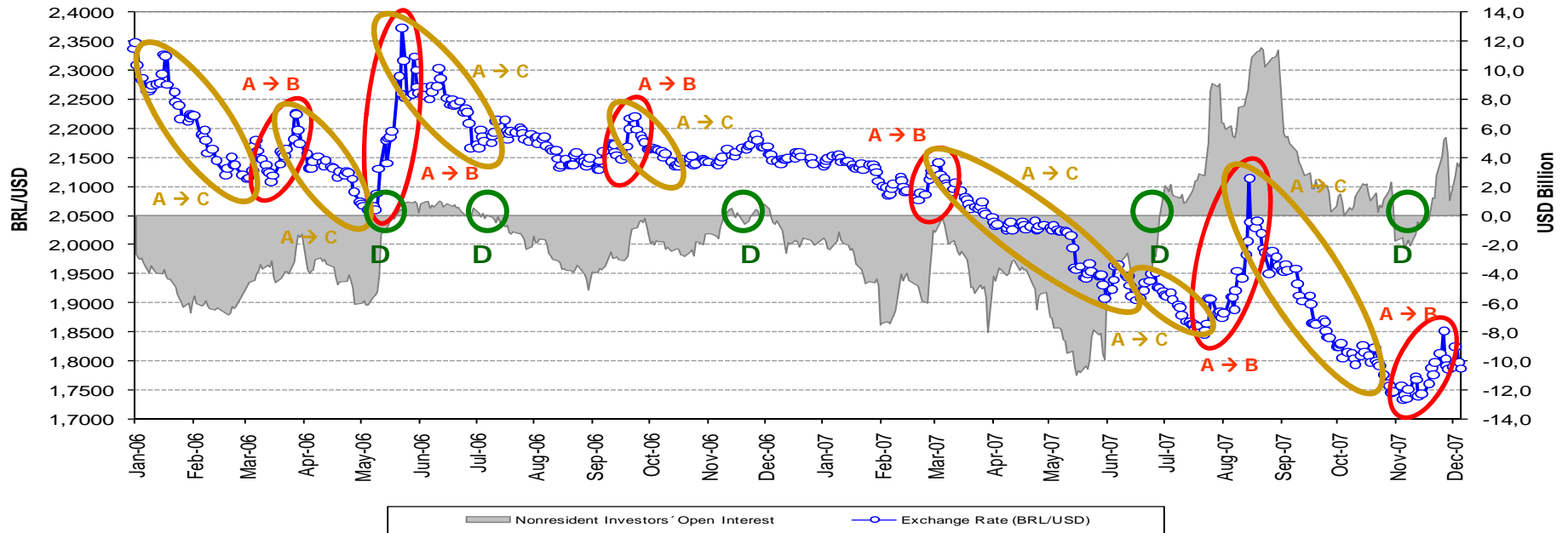
1. Interests, Capital Flows and Derivatives

- Throughout the sample period, what I called demand curve seems to be shifting downwards.

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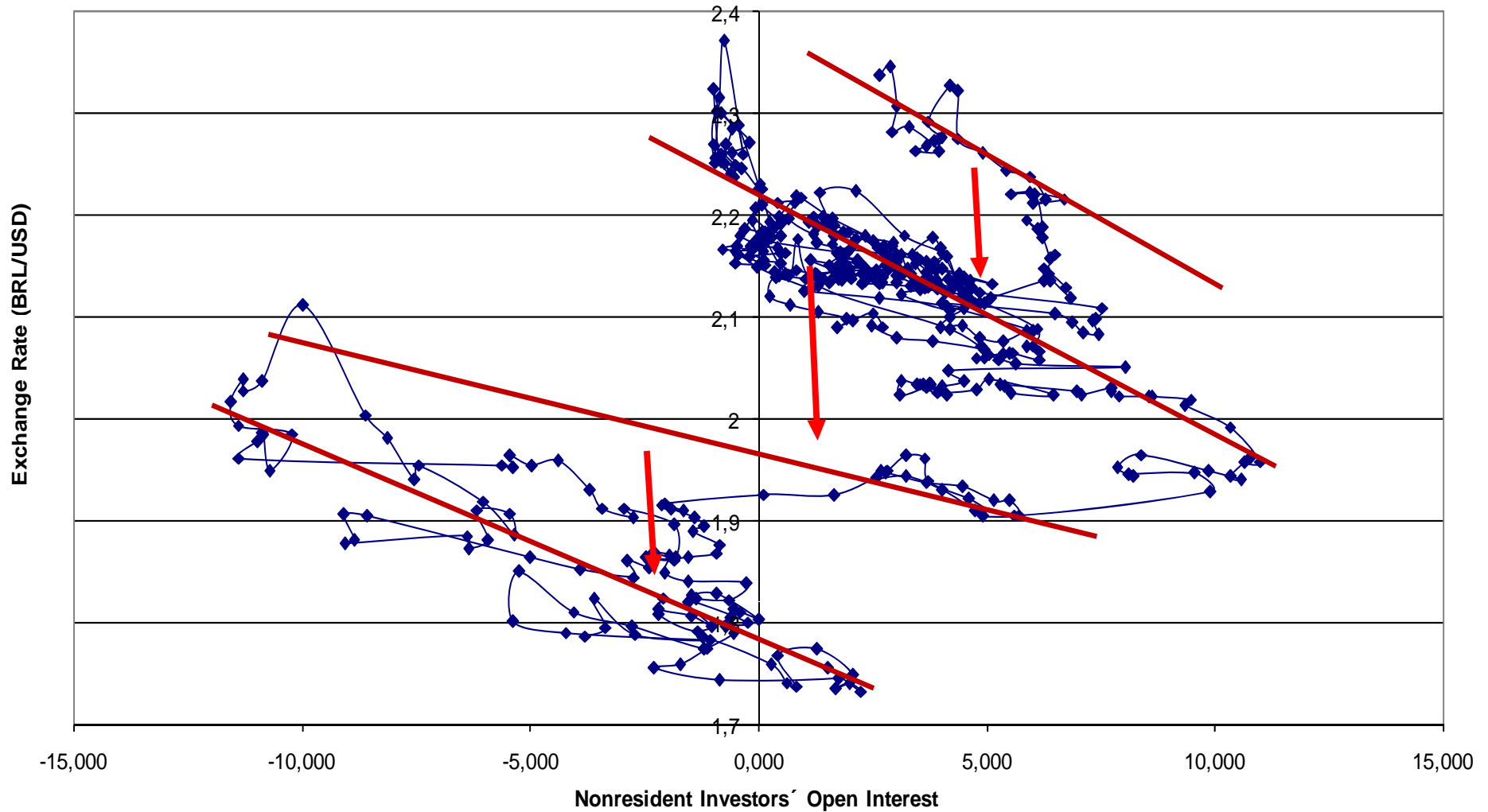
1. Interests, Capital Flows and Derivatives

- Throughout the sample period, what I called demand curve seems to be shifting downwards.

- Such movements are, probably, associated to larger capital inflows not related to the interest arbitrage.

- Those inflows (larger exports payments or financing, FDI, portfolio inflows with longer horizon) are of lower frequency than the carry-trade, thus affecting the "demand" curve.

- That is, although the interest arbitrage is one of factors causing the appreciation of the BRL, it does not seem to have had such a great influence.

2. Costs and Benefits of the Foreign Reserves Accumulation

- Costs
  - The reserves are invested in US Treasuries, yielding less than 5% per year, minus the real appreciation of the BRL.
  - The gross fiscal cost of the sterilization is the real rate of interest (now around 7%).
  - Therefore, if the real exchange rate remains constant (requiring a depreciation of the BRL around 2% a year), there is a financial cost of 2+% per year. The actual numbers for previous years have been much higher, because the domestic real interest rate was higher and the BRL appreciated.
- Benefits
  - Fall in the risk premiuns, reducing the interest rates and stimulating capital inflows, thus reducing the cost of capital for Brazilian firms.
  - Fall of the exchange rate volatility, which reduces the volatility of real interest rate and economic activity.
  - Insurance against trade or, most importantly, capital flows shocks (reduced external vulnerability).

2. Costs and Benefits of the Exchange Reserves Accumulation

- Reserves higher than USD 170 Billions exceed the great majority of indexes proposed as desirable amounts of reserves. (Guidotti-Greenspan rule, n months of imports and others);

- The comparison with reserves/GDP of countries such as China, or even Chile, is not a good one, because:
  - It is well known that China does not hold excess reserves for insurance reasons. It does so to keep the Yuan depreciated;
  - Brazil is a closed economy: the comparison of reserves/imports rather than reserves/GDP is far less impressing.

- The cost of each additional 1 USD of reserves is the interest differential, which does not fall rapidly (it has been increasing recently), while the benefit of each 1 additional USD has been significantly falling:
  - Reserves reduce the risk of external shocks (sudden stops) but their cost increases the fiscal risk. There will certainly be a (finite) level, from which the net benefit of additional reserves accumulation will be negative.

2. Costs and Benefits of the Exchange Reserves Accumulation

- Thus, if someone thinks that, today, the reserves are not too much, but is willing to model what the desirable amount is, it is certain that, at the current rhythm of interventions (4 USD billions per month), soon enough she/he will change her/his mind.

- Such reasoning drives us to suspect that the purpose of the exchange rate interventions are not only to reduce external economic vulnerability, nor to "smooth" the trajectory of the exchange rate.

3. Empirical Test of the Effectiveness of the Sterilized Interventions

- Controlling for the determinants of the exchange rate flow, and for the changes in the foreign debt, interventions have little effect, although statistically significant, over the exchange rate.

- The purchase of USD 1 billion depreciates the exchange rate between 0,6% and 0,8%, that is, to go from 2,000 BRL/USD to between 2,012 BRL/USD and 2,016 BRL$/USD.

Dependent variable: ΔS_t	OLS(1) (eq.3.8)	2SLS(2) (eq.3.9)	2SLS(3) (eq.3.8)	2SLS(4) (eq.3.9)
C	0,03* (1,58)	0,03* (1,63)	0,04 (1,64)	0,02 (1,99)
$\Delta(i_t - i_t^*)$	0,01 (0,23)	0,16 (-0,12)	0,15 (0,23)	-0,06 (0,14)
ΔR_t	2,32*** (10,18)	2,29*** (9,72)	2,32*** (10,2)	2,31*** (9,21)
Int_t	0,2*** (2,36)	0,8*** (3,69)	-	-
Int_t^+	-	-	0,17* (1,78)	0,7*** (3,27)
Int_t^-	-	-	0,29* (1,51)	0,34** (3,0)
ΔCRB_t	-0,01* (-1,64)	-0,01* (-1,65)	-0,01* (-1,75)	-0,01*** (-1,67)
ΔIBV_t	-0,14*** (-5,95)	-0,17*** (-6,18)	-0,17*** (-5,48)	-0,17*** (-5,9)
IIE_t	-0,01*** (-3,8)	-0,01*** (-4,8)	-0,01*** (-3,8)	-0,01*** (-5,26)
Q- Statistic (6 Lags)	11,8*	11,9*	13,2*	12,8*
Adj.R²	0,25	0,22	0,24	0,25
F- Statistic	52,1***	50,8***	44,3***	45,7***

Dependent variable ΔS_t	OLS[1]	2sLS
C	0,005*	0,002
	(1,77)	(0,72)
$\Delta (i_t - i_t^*)$	0,014	0,01
	(0,23)	(0,21)
ΔR_t	2,30***	2,33***
	(10,4)	(10,3)
AV_t	-0,05	0,6*
	(-0,3)	(1,89)
Swp_t^+	0,28***	0,20*
	(2,0)	(1,85)
Swp_t^-	0,5***	0,39***
	(2,3)	(2,93)
ΔCRB_t	-0,06*	-0,06***
	(-1,71)	(-1,72)
ΔIBV_t	-0,14***	-0,14***
	(-3,48)	(-3,53)
IIE_t	-0,008***	0,01***
	(-3,8)	(4,65)
Q-Statistic (6 lags)	19,7***	12,1*
Adj.R²	0,25	0,23
F - Statistic	40,97***	39,1***

4. Repercussions of the Interventions in the Exchange markets

Let us examine the mechanics of a spot dollar purchase by the Central Bank:

1) When the Brazilian Central Bank (BCB) buys USDs, it injects BRLs which are sterilized through the sale of treasury bonds previously held by the BCB;

2) This purchase of dollars increases the spot dollar, decreasing the *forward premium*;

3) As the spot exchange rate did not change, the onshore dollar rate (cupom cambial) increases;

4) With the onshore dollar rate increase, banks borrow more dollars abroad to invest them in Brazil at the higher onshore dollar rate. To do so, they sell the borrowed USD in the spot market, invest the acquired BRL in treasury bonds, and purchase USD futures to guarantee a USD return equal to the onshore dollar rate;

5) The final result of the BCB's intervention is the attraction of more USD, which weakens the effect of the intervention over the exchange rate.

Spread between the onshore and offshore dollar rates and banks' short term arbitrage (3 months)

Legend:
- Spread Onshore-Offshore Dollar Rates
- Banks´ Spot Exchange Rate Position (USD billion)
- Total Exchange Intervention
- Spot Exchange Intervention (USD billion)
- Exchange Rate

Y-axis (left): Percentage & Billions of USD — 19, 14, 9, 4, -1, -6, -11, -16

Y-axis (right): BRL/USD — 3,2, 3, 2,8, 2,6, 2,4, 2,2, 2, 1,8, 1,6

X-axis: abr/03, jun/03, ago/03, out/03, dez/03, fev/04, abr/04, jun/04, ago/04, out/04, dez/04, fev/05, abr/05, jun/05, ago/05, out/05, dez/05, fev/06, abr/06, jun/06, ago/06, out/06, dez/06, fev/07, abr/07, jun/07, ago/07, out/07

Spread between the onshore and offshore dollar rates and banks' short term arbitrage (3 months)

Percentage & Billions of USD (left axis)

BRL/USD (right axis)

Legend:
- Spread Onshore-Offshore Dollar Rates
- Banks´ Spot Exchange Rate Position (USD billion)
- Total Exchange Intervention
- Spot Exchange Intervention (USD billion)
- Exchange Rate

4.1. Sterilized Interventions Effect on the Onshore-Offshore Spread

Dependent Variable: $DCC3m_t$	MQO[40]
c	-0,003***
	(-3,99)
$DCC3m_{t-1}$	0,74***
	(10,2)
Av_t	0,02*
	(1,68)
Swp^+_t	-0,03
	(0,84)
Swp^-_t	-0,1
	(-0,4)
Adj.R²	0,57
Q Statistic(6 lags)	134,1***
F Statistic	300,8***

4.2. Spread Onshore-Offshore and Banks´Short Term Arbitrage

Dependent Variable: PB_t	MQO(1)[42]
C	-780,5*** (-2,7)
$DCC3m_t$	-598,8** (-2,9)
Dummy	3146,7*** (6,6)
$DCC3m_t$ * Dummy	-3079,7*** (-4,9)
AV_t	-0,50*** (-3,95)
Swp^+_t	-0,2*** (-3,09)
Swp^-_t	0,2 (1,3)
Adj.R²	0,76
F Statistic	50,9***

4.3. *Post hoc ergo propter hoc?*

It has been argued that, for the mechanism we just described to be true, it is necessary that interventions come before the onshore dollar rate increase, but statistical tests (Granger causality) would prove the opposite.

Let's see, then, an alternative sequence of events, which is compatible with the underlined economic causality of the interventions on the onshore dollar rate, as well as with the Granger causality in opposite direction.

4.3. Post hoc ergo propter hoc?

Let us examine the alternative mechanics:

1) Speculators sell USD futures contracts at BM&F to pocket the interest rate differential;

2) The USD futures contracts sale reduces the USD futures price, decreasing the *forward premium*;

3) As the domestic interest rate has not been changed, the onshore dollar rate increases, opening a spread vis-à-vis the USD rate in foreign markets;

4) The positive spread between onshore and offshore dollar rates attracts bank, that borrow USD abroad to invest them in Brazil at the higher onshore dollar rate;

5) If the Central Bank did not intervene purchasing dollars, the spot USD rate, pressured by the banks selling flow, would tend to decrease, as well as the dollar futures, pressed by the banks purchasing flow, would tend to increase, restoring equilibrium;

6) However, as the Central Bank intervenes in the spot market, the spot USD rate does <u>not</u> fall (the BRL does not appreciate), neither does the wedge between the onshore and the offshore dollar rates, keeping the banks' arbitrage opportunity open as long as the Central Bank keeps intervening;

7) The final result of the Central Bank's intervention is the attraction of more USD, which weakens the effect of the sterilized intervention on the exchange rate.

5. Cost of Sterilized Interventions and Fiscal Dominance

It is generally argued that, under the inflation targeting framework, the interest rate (Selic) must be set without considering its impact on the fiscal budget. The costs of higher interest rates on the public debt (fiscal dominance) should not be considered, since this could cause loss of efficiency and credibility of the monetary policy. The current case, however, is different from the traditional case of fiscal dominance. Nowadays, the same Central Bank that sets the interest intervenes in the exchange market.

If the Central Bank didn't intervene, the exchange rate would be even more appreciated, causing a bigger fall on inflation, making possible a larger reduction of interest rates.

To intervene in the exchange markets and not consider the costs associated to keeping the higher interest rate does not seem to be reasonable.

Muchas gracias