

# Interest Arbitrage under Capital Controls: Evidence from Reported Entrepôt Trades

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# Capital Controls

- Capital Controls or Not?
  - ▶ Washington Consensus: No.
  - ▶ After Asian Financial Crisis: Really?
- Openness and Stability
  - ▶ Macroprudential Regulation v.s. Capital Controls
- Capital controls may be increasingly difficult and/or costly for outward-oriented economies like China.

# Questions

- Effectiveness of Capital Controls
  - ▶ Capital controls segment currency markets, creating arbitrage opportunities.
- Linkage between Current Accounts & Capital Accounts
  - ▶ Do international trades provide means to circumvent capital controls?
- Trade Finance
  - ▶ Does bank-intermediation in international trades play a role in capital account liberation?

# This Paper

- uses a novel administrative data set;
- documents arbitrage opportunities in onshore-offshore RMB markets;
- demonstrates how bank-intermediation of trades facilitates the interest arbitrages; and
- provides evidence that firms bypass capital controls through supposed “entrepôt trades” to arbitrage;

# Related Literature

- Merit of Capital Controls

- ▶ Motiel & Reinhart (1999); Kaplan & Rodrik (2002); Glick et al. (2006); Frasad & Rajan (2008); Jinjark et al. (2013); Forbes et al. (2015); Mitchener & Wandschneider (2015); Korinek & Sandri (2016)

- International Firms' Evasion of Capital Controls, Tariff, and Income Tax

- ▶ Fisman & Wei (2004); Auguste et al. (2006); Fisman et al. (2008); Davies et al. (forthcoming)

- RMB Internationalization & Global Monetary System

- ▶ Eichengreen & Flandreau (2012); Chițu et al. (2014); Cheung & Rime (2014); Funke et al. (2015); IMF (2015); Prasad (2016)

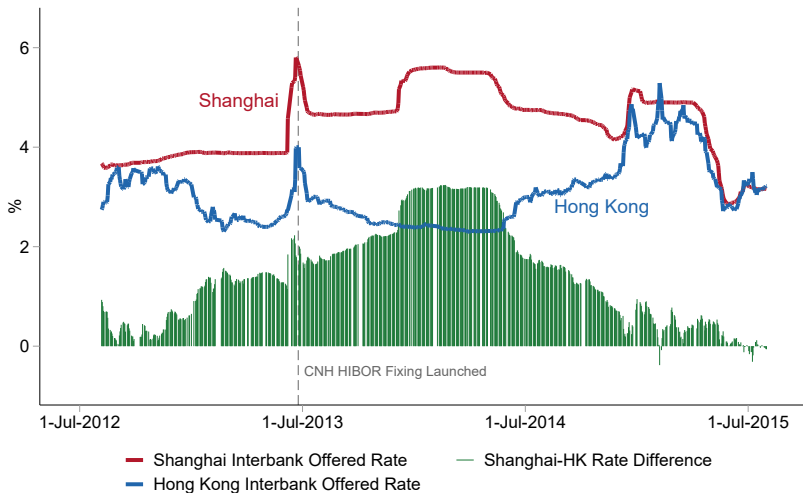
- Trade Finance

- ▶ Schmidt-Eisenlohr (2013)

# Cross-border Trade Settlements in RMB

- July 2009
  - ▶ Guangzhou, Shenzhen, Zhuhai, Dongguan, and Shanghai
  - ▶ Settlements with Hong Kong, Macau, and ASEAN
  - ▶ Available to selected firms
- June 2010
  - ▶ Extended to 20 provinces, including the province of our dataset
  - ▶ Settlements with all economies
  - ▶ Qualified firms
- August 2011
  - ▶ Nationwide
  - ▶ Any firms

# RMB Interbank Offered Rates (3-Month)



# Entrepôt Trades

- Re-exporting imports with little or no processing
- Entrepôt ports:
  - ▶ Hong Kong, Singapore, 17<sup>th</sup> century Amsterdam
- Ideal for bypassing capital controls to arbitrage:
  - ▶ Do not need to clear the Chinese custom
  - ▶ Both inflows and outflows
  - ▶ No exchange risk



# Letter of Credit (L/C)

- L/C is the most popular means of trade finance in China and India.
- Mainly dollar-denominated L/C before RMB cross-border settlement allowed.
- RMB L/C
  - ▶ No foreign debt management
  - ▶ Longer maturity: 360 days

# Interest Arbitrage under Capital Controls through Entrepôt Trades

Arbitrageur

The diagram consists of a blue rounded rectangular box at the top containing the word 'Arbitrageur'. Below this box is a horizontal dashed line. The word 'Onshore' is centered above the dashed line, and the word 'Offshore' is centered below the dashed line.

Onshore

Offshore

## Interest Arbitrage under Capital Controls through Entrepôt Trades

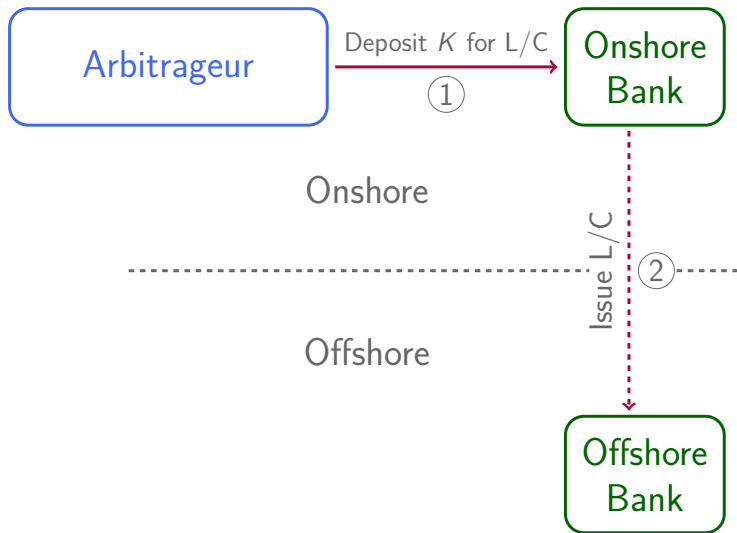


Onshore

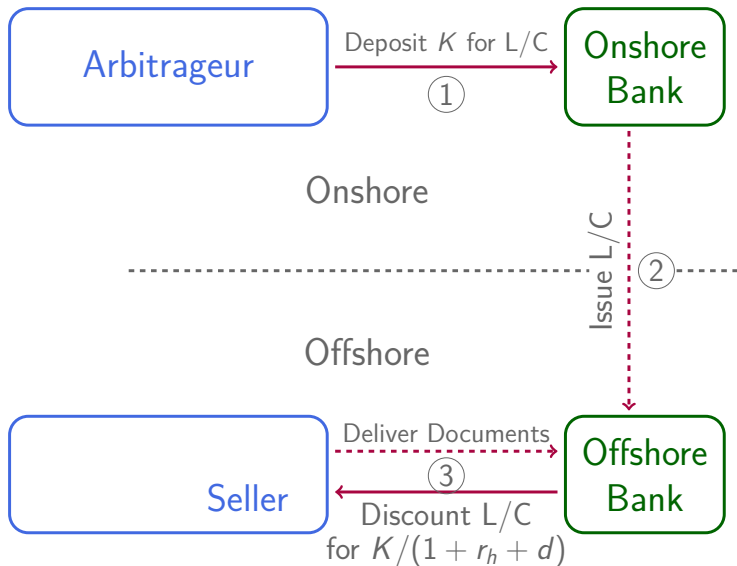


Offshore

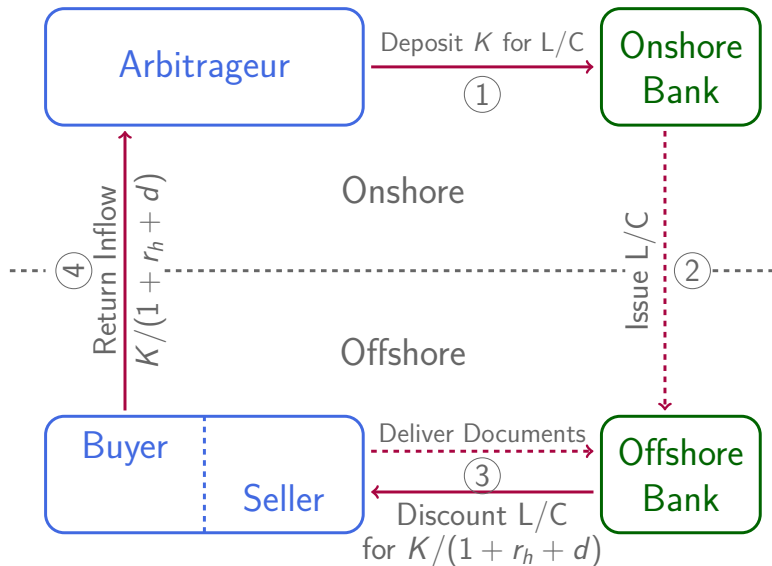
## Interest Arbitrage under Capital Controls through Entrepôt Trades



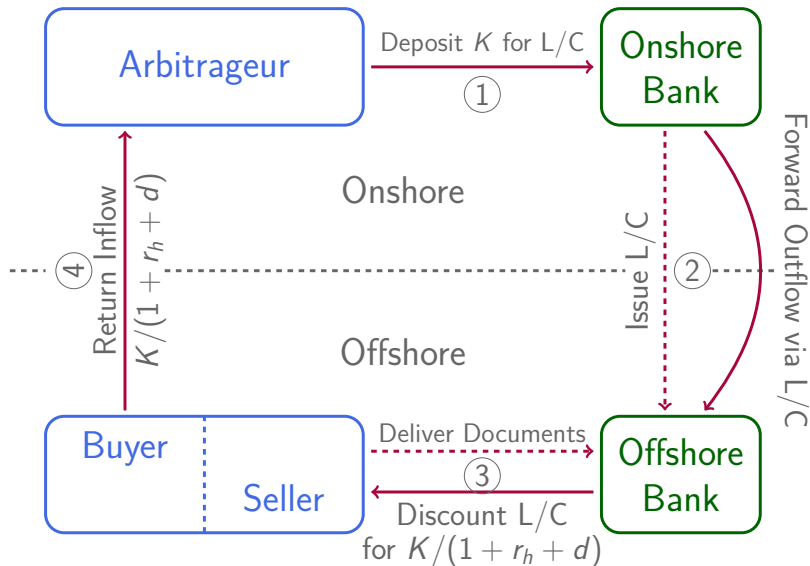
## Interest Arbitrage under Capital Controls through Entrepôt Trades



# Interest Arbitrage under Capital Controls through Entrepôt Trades



# Interest Arbitrage under Capital Controls through Entrepôt Trades



# Data Description

- Transaction level trade settlements in RMB
  - ▶ Both inflows & outflows
  - ▶ A large well-off coastal province
  - ▶ 2011 – 2016
  - ▶ Value, firm ID, date, means of settlement etc.
- Onshore and offshore interest and exchange rates of RMB
  - ▶ Bloomberg
  - ▶ Hong Kong Treasury Markets Association

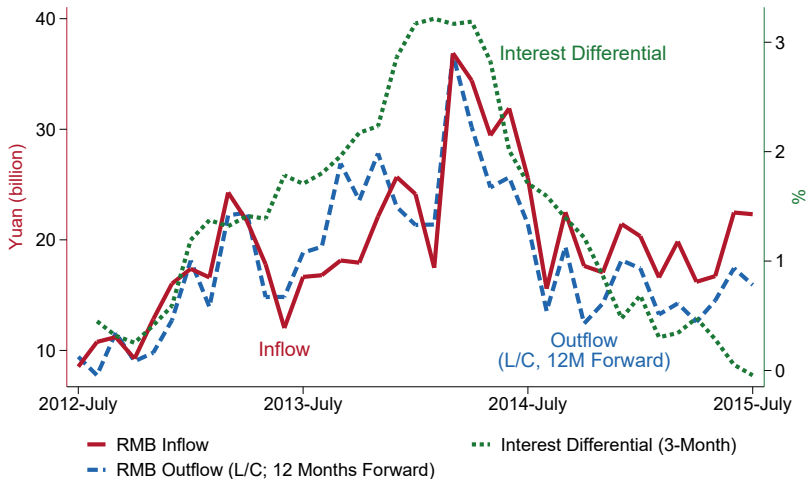


### Shares of RMB **Inflows** by Settlement Means

Year	Amount (billion ¥)	Letter of Credit	Wire Transfer	Others
2011	67.2	0.003	0.961	0.035
2012	123.1	0.006	0.978	0.016
2013	227.1	0.004	0.981	0.015
2014	294.1	0.003	0.991	0.006
2015	255.7	0.005	0.991	0.003
2016	84.5	0.014	0.985	0.002
Total	1051.6	0.005	0.985	0.010

### Shares of RMB **Outflows** by Settlement Means

Year	Amount (billion ¥)	Letter of Credit	Wire Transfer	Others
2011	14.0	0.567	0.400	0.032
2012	96.5	0.737	0.249	0.013
2013	127.9	0.801	0.174	0.025
2014	271.3	0.907	0.085	0.009
2015	353.9	0.733	0.255	0.012
2016	208.9	0.647	0.343	0.009
Total	1072.5	0.766	0.221	0.013



Onshore-Offshore Interest Differentials and RMB Inflows and Outflows

	Inflow			Outflow (L/C, 1-Year Forward)		
	(1)	(2)	(3)	(4)	(5)	(6)
Interest Rate Differential	0.190*** (0.070)	0.190*** (0.069)	0.207*** (0.068)	0.294*** (0.058)	0.292*** (0.061)	0.279*** (0.062)
Tuesday		0.154*** (0.014)	0.152*** (0.015)		-0.678*** (0.052)	-0.677*** (0.053)
Wednesday		0.274*** (0.017)	0.272*** (0.018)		-0.779*** (0.081)	-0.778*** (0.082)
Thursday		0.269*** (0.029)	0.266*** (0.030)		-0.861*** (0.049)	-0.859*** (0.050)
Friday		0.277*** (0.022)	0.273*** (0.022)		-0.702*** (0.062)	-0.698*** (0.063)
Exchange Rate Differential			-4.127 (2.519)			3.417 (2.516)
$R^2$	0.172	0.228	0.236	0.133	0.281	0.282
Observations (days)	698	698	698	698	698	698

Notes: Newey-West HAC robust S.E.s in parentheses. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

Onshore-Offshore Interest Differentials and RMB Inflows and Outflows: Robustness to Timing

	Inflow			Outflow (L/C, 1-Year Forward)		
	(1)	(2)	(3)	(4)	(5)	(6)
Interest Rate Differential	0.207*** (0.068)			0.279*** (0.062)		
Interest Rate Differential (lag)		0.208*** (0.067)			0.279*** (0.061)	
Interest Rate Differential (1-week moving average)			0.218*** (0.066)			0.265*** (0.058)
$R^2$	0.236	0.236	0.242	0.282	0.283	0.314
Observations (days)	698	697	698	698	697	698

Notes: Newey-West HAC robust S.E.s in parentheses. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

## Decomposing the Effects of Onshore-Offshore Interest Differentials on Various Margins of Inflows

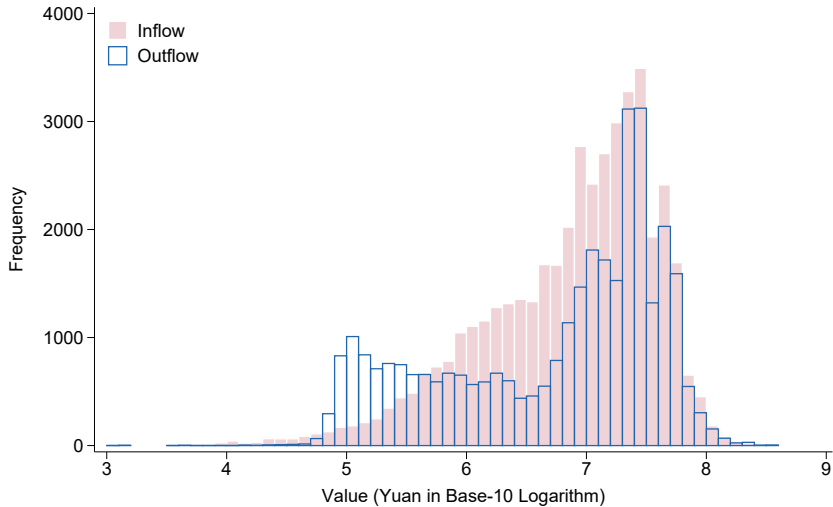
Outcome Variable (log):	Total Value (A)	Mean Value (I)	Transactions (E)	Transactions per Firm ( $E_p$ )	Transacting Firms ( $E_f$ )
	Inflow				
Interest Rate Differential	0.207*** (0.068)	0.016 (0.057)	0.191*** (0.022)	-0.005 (0.010)	0.196*** (0.021)
$R^2$	0.236	0.010	0.316	0.043	0.351
Observations (days)	698	698	698	698	698
Outcome Variable (no log):					
Mean	0.990	0.018	53.82	1.39	38.8
Standard Deviation	0.428	0.005	19.04	0.20	13.3

Notes: Newey-West HAC robust S.E.s in parentheses. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

## Decomposing the Effects of Onshore-Offshore Interest Differentials on Various Margins of Outflows

Outcome Variable (log):	Total Value (A)	Mean Value (I)	Transactions (E)	Transactions per Firm ( $E_p$ )	Transacting Firms ( $E_f$ )
	Outflow (L/C, 1-Year Forward)				
Interest Rate Differential	0.279*** (0.062)	0.130*** (0.020)	0.149** (0.064)	-0.094* (0.052)	0.242*** (0.019)
$R^2$	0.282	0.133	0.285	0.179	0.377
Observations (days)	698	698	698	698	698
Outcome Variable (no log):					
Mean	0.774	0.019	40.71	1.50	26.6
Standard Deviation	0.610	0.007	29.13	0.39	15.7

Notes: Newey-West HAC robust S.E.s in parentheses. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .



# Return to Arbitrage

After infinite rounds of arbitrages, the initial capital  $K$  becomes:

$$K' = \sum_{i=0}^{\infty} \frac{r_s K}{(1 + r_h + d)^i} = \frac{r_s(1 + r_h + d)K}{r_h + d}$$

The rate of return to arbitrage  $r_a$  is:

$$r_a = r_s + \frac{r_s - r_h - d}{r_h + d}$$



# Fixed Costs to Arbitrage

In a frictionless world, arbitrage if and only if:

$$r_s > r_h + d.$$

With a fixed cost  $F$  to initiate arbitrage, arbitrage if and only if:

$$K \left( \frac{r_s - r_h - d}{r_h + d} \right) > F$$

With a fixed cost  $L$  for each round of arbitrages, arbitrage if and only if:

$$\tilde{K} > L \left( \frac{r_s}{1 + r_s} - \frac{r_h + d}{1 + r_h + d} \right)^{-1} := K_{min}$$

# The Impacts of Interest Differentials on the Distribution of Forward L/C Outflow

We estimate the quantile effects of interest differential on forward L/C outflows:

$$Q_{\tau}(Y_{it}) = \delta_{\tau}D_t + X_t'\beta_{\tau}$$

where

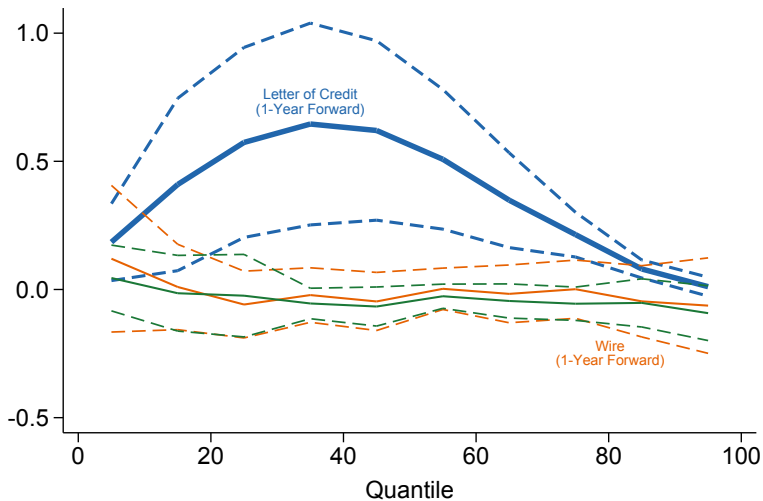
$Y_{it}$  : one-year forward L/C outflow on day  $t$ ;

$Q_{\tau}(Y_{it})$  :  $\tau$ -quantile of  $Y_{it}$ ;

$D_t$  : onshore-offshore interest differentials;

$X_t$  : controls as before.

# Onshore-Offshore Interest Differentials on the Distribution of Outflows



- Coeff. Estimate (L/C, 1-Yr Forward)
- - - 95% C.I. (L/C, 1-Yr Forward)
- Coeff. Estimate (Wire, 1-Yr Forward)
- - - 95% C.I. (Wire, 1-Yr Forward)
- Coeff. Estimate (Wire, Contemporary)
- - - 95% C.I. (Wire, Contemporary)

## Onshore-Offshore Interest Differentials and Entry of Entrepôt Traders

Time Trend:	None	Linear	Quadratic	Cubic
Dependent Variable:	Number of New Firms			
Interest Rate Differential	0.603*** (0.122)	0.596*** (0.112)	0.820*** (0.261)	0.811*** (0.237)
Dependent Variable:	Share of New Firms			
Interest Rate Differential	0.004 (0.003)	0.004** (0.002)	0.010** (0.004)	0.009*** (0.003)
Dependent Variable:	New Firms' Share of Transaction Volume			
Interest Rate Differential	0.002 (0.004)	0.002 (0.003)	0.016*** (0.006)	0.016*** (0.003)
Observations (days)	698	698	698	698

Notes: Newey-West HAC robust S.E.s in parentheses. \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

# Concluding Remarks

- RMB Interest arbitrages are feasible but costly.
- Entrepôt trades and bank instruments for trade finance facilitate the arbitrages.
- In the short run, the circular arbitraging flows inflate statistics of RMB usage in international trades.
- In the long run, whether the arbitrages opportunities crowd out real international trades.