On Foreign Exchange Intervention

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July 2017

Academic Research Versus Policy

- Arguably, there is no issue in International Macroeconomics where academic research and policy practice are more divorced
- Research: sterilized FX intervention has negligible effects empirically…
- …which is no surprise, given the theory

In contrast, central banks in Latin America and other emerging economies have intervened, often frequently, in the FX market

- Even countries committed to *inflation targeting*…
- …and starting much before the 2007-8 global financial crisis

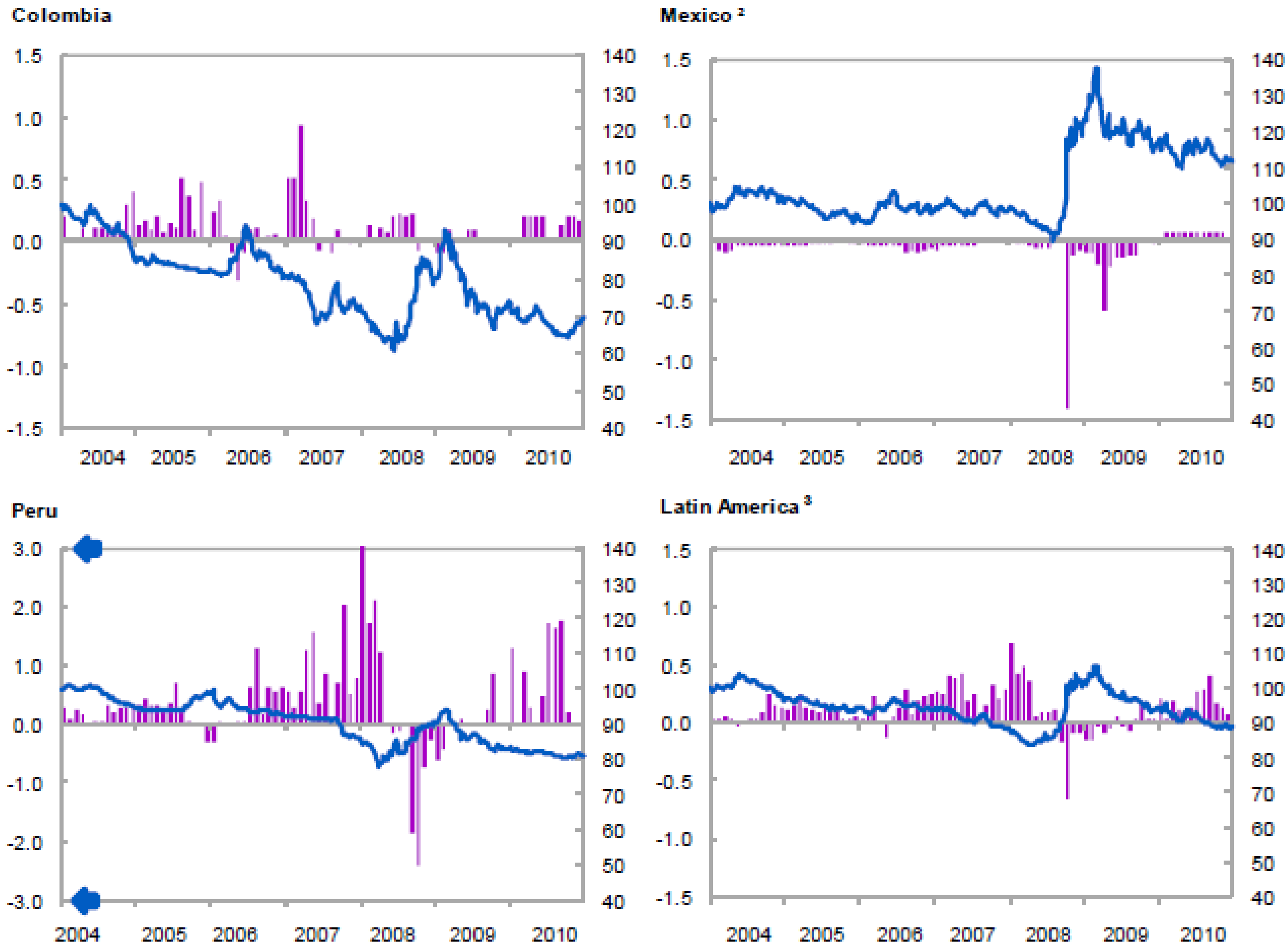
Plan of This Talk

1. Actual Practice of FX Intervention in emerging economies
2. Is Sterilized FX Intervention Effective? Dominant Theory and Empirics
3. New Perspectives After the Global Financial Crash: FX Intervention and "Unconventional Policy"

FX Intervention in Practice

What Central Bankers Actually Do

- After the milennium, FX Intervention frequent and often intense in emerging markets
- Associated with FX reserves accumulation
- See Chutasripanish and Yetman (2015) for Asia, Adler and Tovar (2011) for Latin America



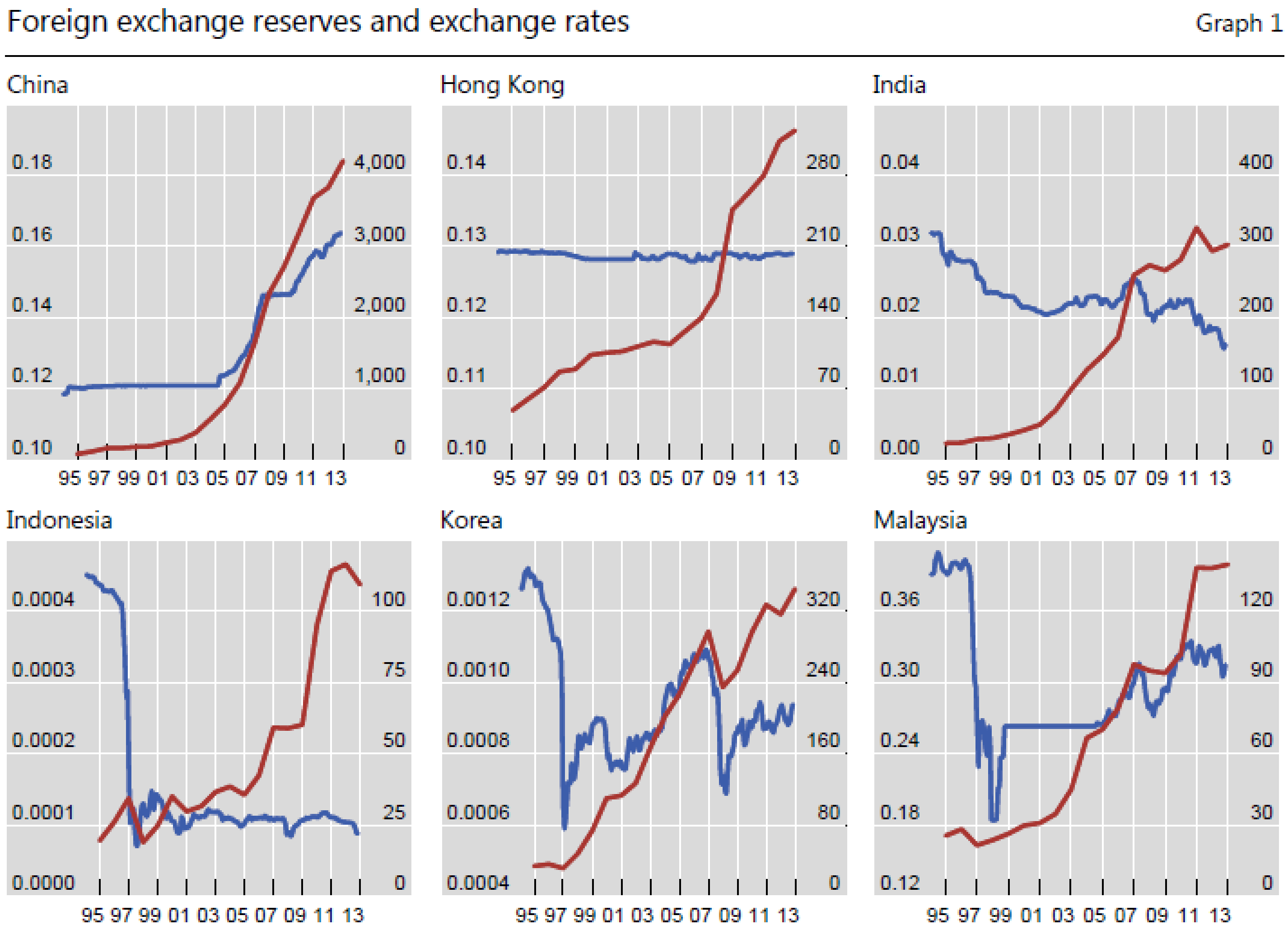
Left axis: FX Intervention, Percent of GDP; Right axis: Exchange Rate

Source: Adler and Tovar (2011)

Table 1. Stylized Facts of Foreign Exchange Purchases, 2004–10

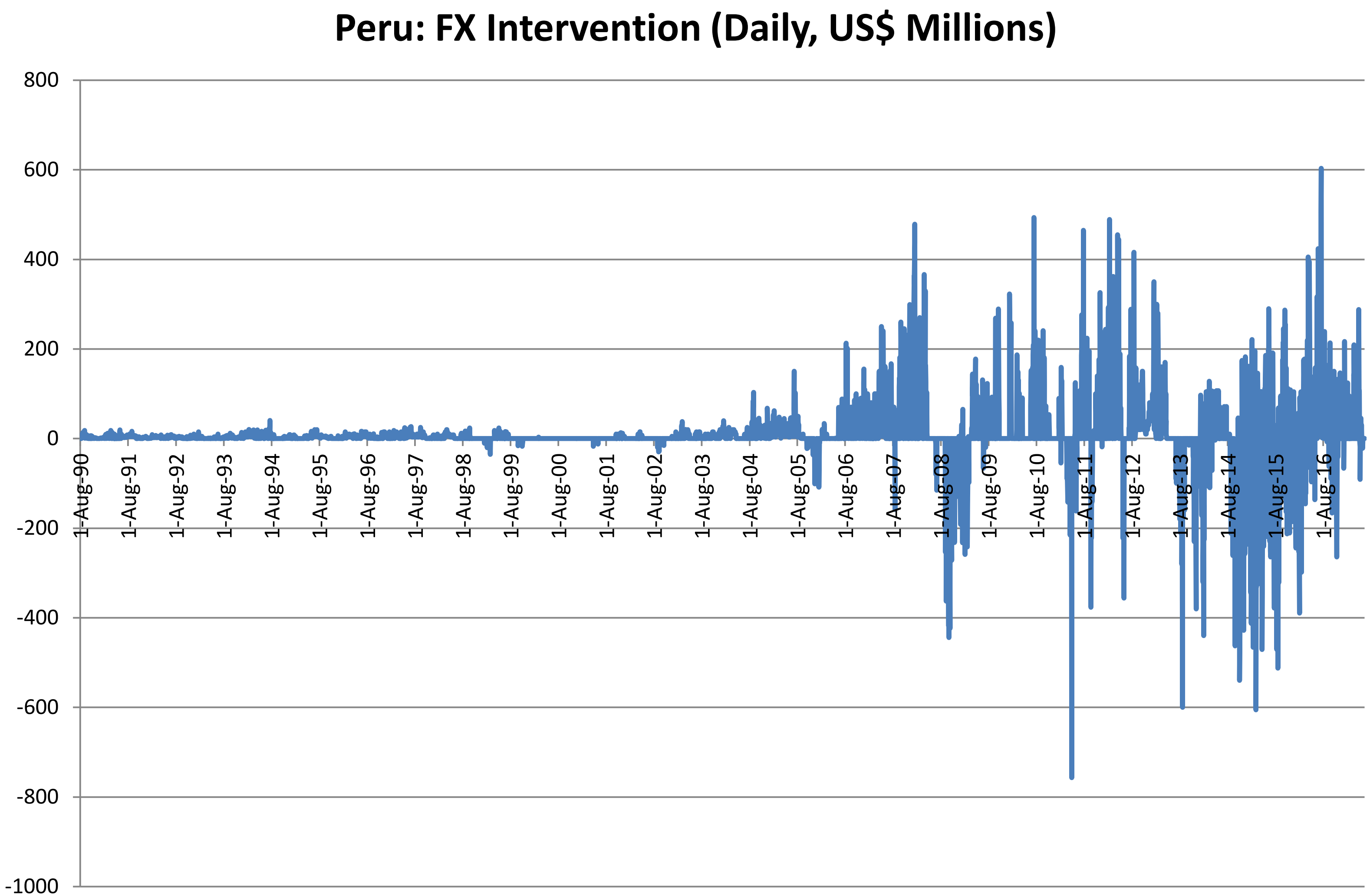
	Frequency (Percent of working days)	Intensity			
		Cumulative intervention as percent of GDP[1,2]	Daily average (Millions of U.S. dollars)[1]	Daily maximum (Millions of U.S. dollars)[1]	Has there been active FX intervention in 2011?
Chile	6	3.8	50	50	yes
Colombia	32	10.3	34	733	yes
Guatemala	19	1.6	9	332	yes
Mexico[3]	1	0.6	600	600	yes
Peru	39	36.1	55	494	yes
Latin America[4]	**19**	**10.5**	**150**	**442**	
Others					
Australia[5]	62	2.5	15	377	n.a.
Israel	24	22.3	84	300	no[6]
Turkey	66	12.5	61	4966	yes

Source: Adler and Tovar (2011)

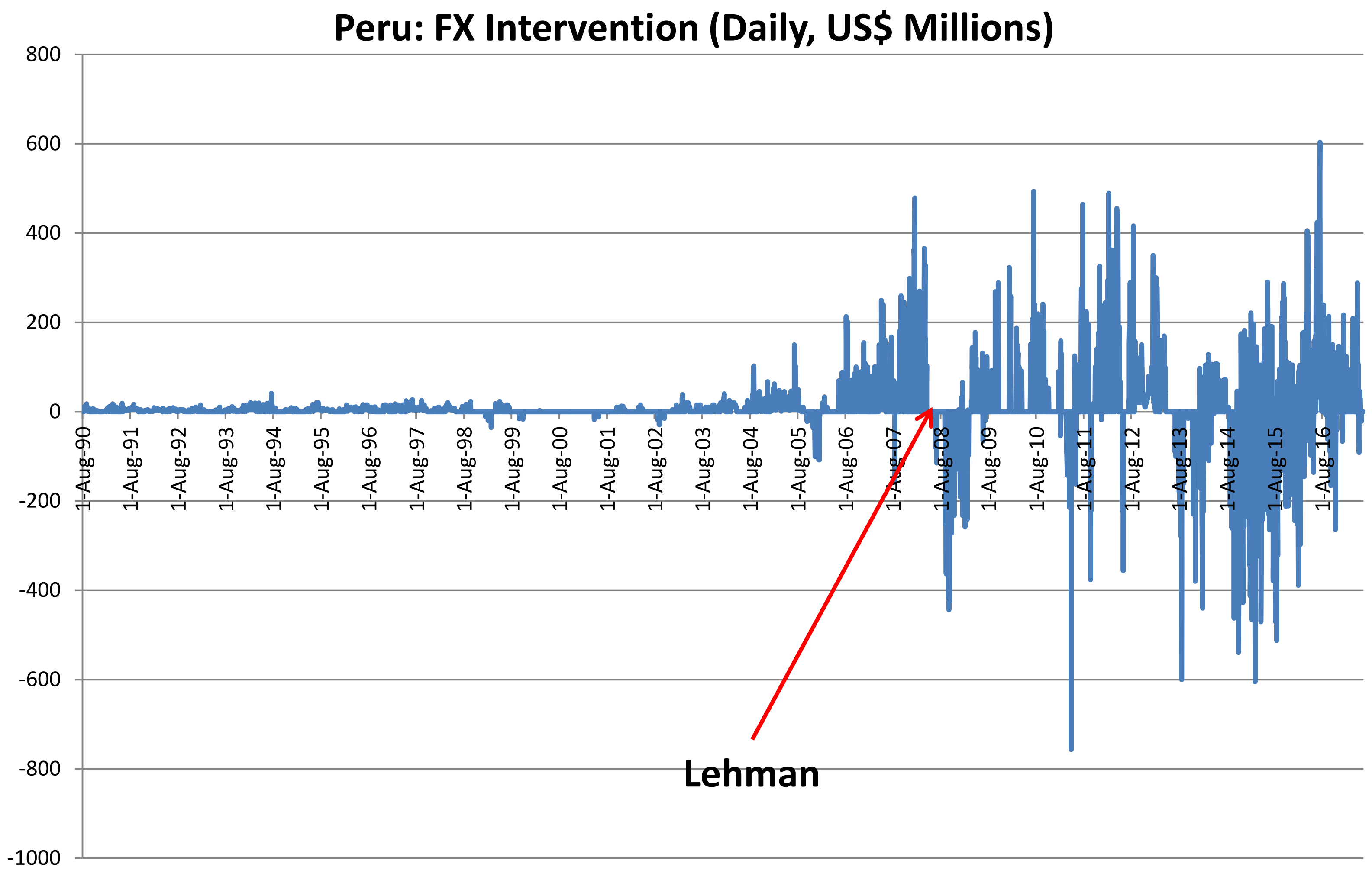


Left axis: US$ per domestic currency. Right axis: US$ billion

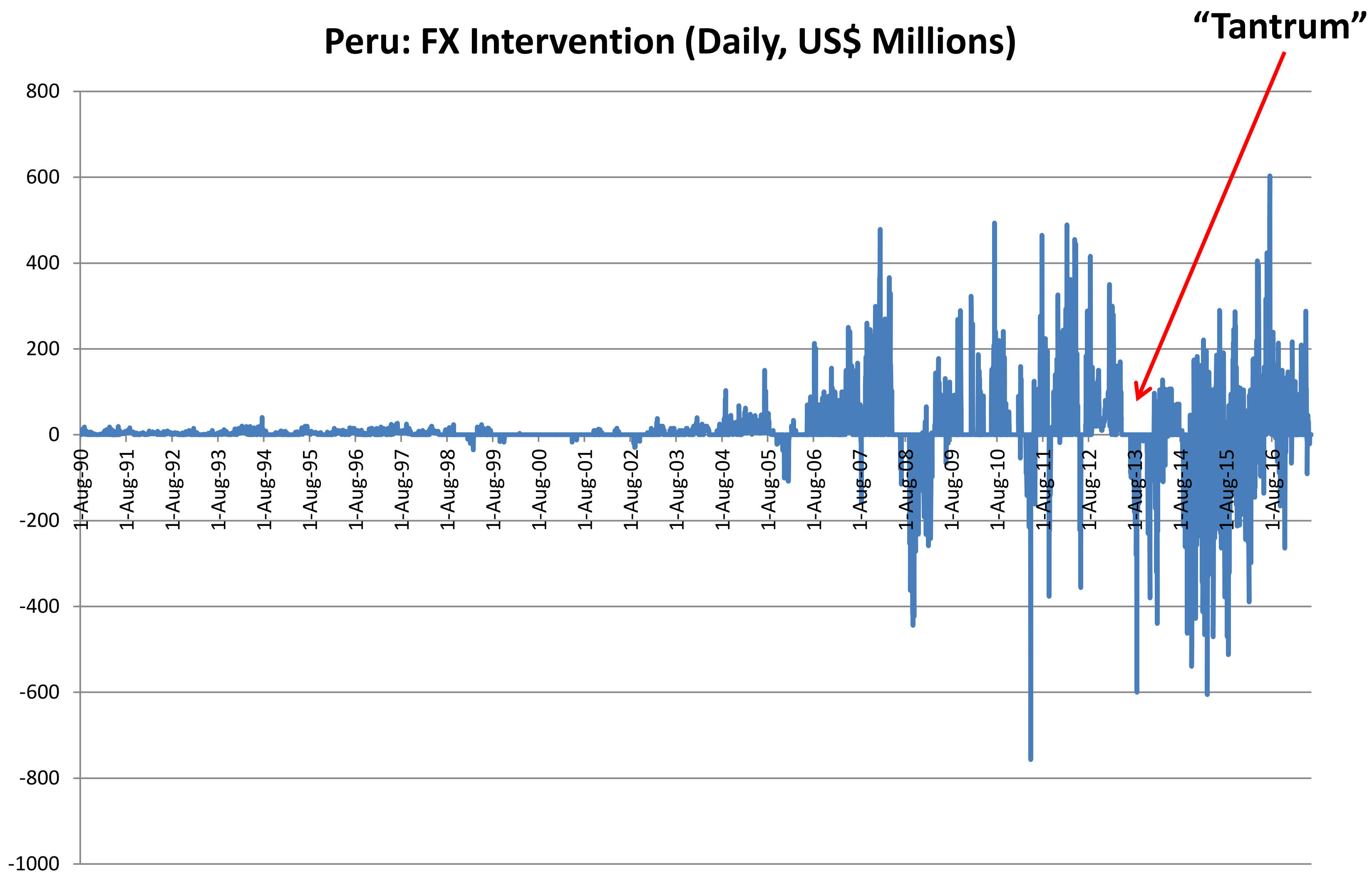
Source: Chutasripanish and Yetman (2015)



Source: Central Bank of Peru



Peru: FX Intervention (Daily, US$ Millions)
800
600
400
200
0
-200
-400
-600
-800
-1000
1-Aug-90
1-Aug-91
1-Aug-92
1-Aug-93
1-Aug-94
1-Aug-95
1-Aug-96
1-Aug-97
1-Aug-98
1-Aug-99
1-Aug-00
1-Aug-01
1-Aug-02
1-Aug-03
1-Aug-04
1-Aug-05
1-Aug-06
1-Aug-07
1-Aug-08
1-Aug-09
1-Aug-10
1-Aug-11
1-Aug-12
1-Aug-13
1-Aug-14
1-Aug-15
1-Aug-16
Lehman



Peru: FX Intervention (Daily, US$ Millions)
"Tantrum"
800
600
400
200
0
-200
-400
-600
-800
-1000
1-Aug-90
1-Aug-91
1-Aug-92
1-Aug-93
1-Aug-94
1-Aug-95
1-Aug-96
1-Aug-97
1-Aug-98
1-Aug-99
1-Aug-00
1-Aug-01
1-Aug-02
1-Aug-03
1-Aug-04
1-Aug-05
1-Aug-06
1-Aug-07
1-Aug-08
1-Aug-09
1-Aug-10
1-Aug-11
1-Aug-12
1-Aug-13
1-Aug-14
1-Aug-15
1-Aug-16

Why Is There FX Intervention?

In surveys and official statements (e.g. Adler-Tovar) central bankers cite two main *reasons* for FX Intervention:

1. Limit exchange rate *volatility*
2. Build a buffer of international reserves

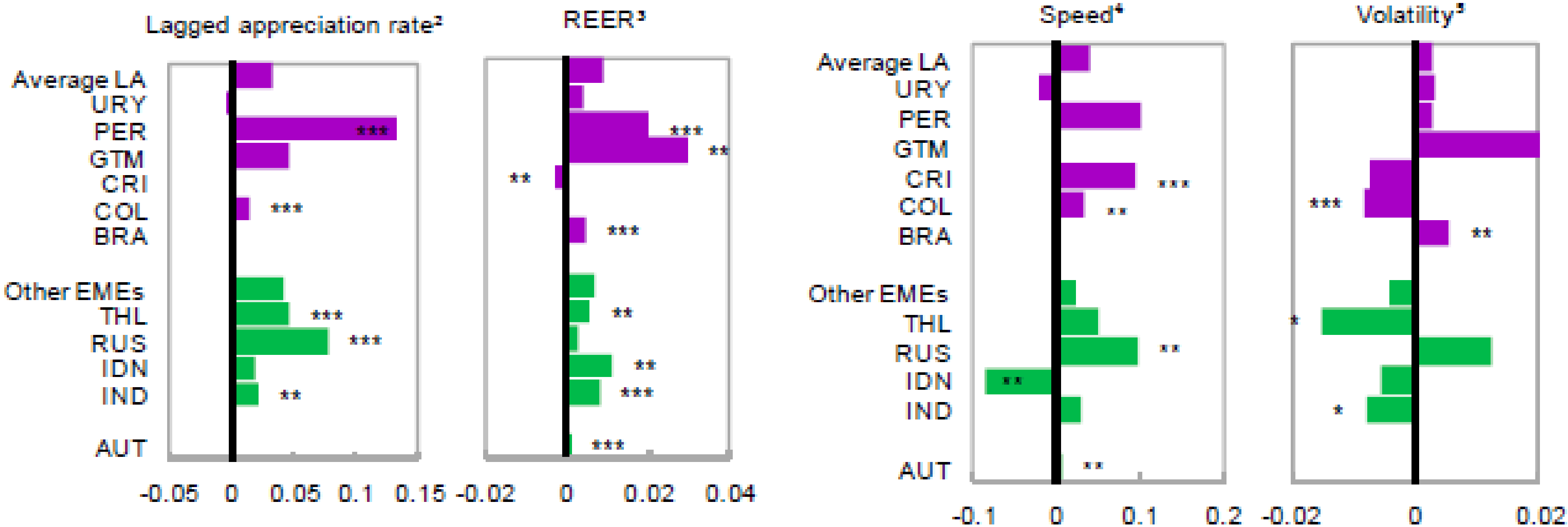
What Central Bankers Seem to Believe…

"…around 70% of participating central banks believe that their intervention during the 2005-2012 period was *successful* (BIS, 2013). Similarly, most of the central banks included in BIS (2005) view intervention as an *effective tool* to calm disorderly FX markets, correct exchange rate misalignments and/or stabilise exchange rates…." [Chutasripanish and Yetman (2015) , emphasis added]

…Versus the Empirical Evidence

1. In fact, Adler-Tovar found that *neither exchange rate volatility nor reserves accumulation* were significant determinants of FX Intervention

Central Bank Intervention Reaction Functions
Selected Coefficients[1]



Source: Adler and Tovar (2011)

Source: Adler and Tovar (2011)

…Versus the Empirical Evidence

1. In fact, the Adler-Tovar find that neither exchange rate volatility nor reserves accumulation are significant determinants of FX Intervention

2. More generally, the empirical literature typically finds that *sterilized* FX intervention has very small impact, if any, on aggregate outcomes (see e.g. Menkhoff 2010)

“Conventional” Academic Research on FX Intervention

Research on FXI, *Circa* Lehman

- About a decade ago, very little research on sterilized FX intervention
- Empirically: there was a consensus in that *portfolio balance* effects were tiny
- Consistent with theory of dynamic equilibrium models (Backus Kehoe 1989)

Why Focus on *Sterilized* Intervention

- Emphasis on sterilized intervention warranted to understand the impact of intervention *keeping monetary policy constant*

A Central Bank’s Balance Sheet

Assets

- FX reserves
- Credit to private sector
- Credit to government

Liabilities

- Monetary Base

Net Worth

The Central Bank Balance Sheet

Assets

- FX reserves ↑
- Credit to private sector
- Credit to government

Liabilities

- Monetary Base

Net Worth

In a sterilized FX purchase ….

The Central Bank Balance Sheet

Assets

- FX reserves
- Credit to private sector
- Credit to government

Liabilities

- Monetary Base

Net Worth

In a sterilized FX purchase, the ratio of CB foreign assets to domestic assets must increase, to keep M constant (or i Constant, see García 2016)

Portfolio Balance Empirics

Long tradition dating back to the 1970s estimated UIP equations such as:

$$i_t = i_t^* + E_t(\Delta S_{t+1}) + \varrho_t$$

with the *risk premium* ϱ_t a function of the ratio of privately owned foreign bonds to domestic bonds

The Demise of the Portfolio Balance Approach

1. Empirical results disappointing

2. Measurement Problems Paramount

3. Unsatisfactory Theory (original derivation from partial equilibrium, mean variance optimization)

The Backus-Kehoe Critique

- In canonical dynamic general equilibrium models, Backus-Kehoe (1989) showed that the denomination of government debt was *irrelevant* for real outcomes
- A "Ricardian" result which obtains naturally with frictionless, complete financial markets, and it can be extended (with important caveats, however)

Newer Empirical Approaches

- More recently, several studies have collected and analyzed actual intervention data
- Key issue: endogeneity
- Common response: look at high frequency data (weekly, daily, or even intraday)
- Typical findings: the impact of FX intervention is small and short lived

Impact of swap operations on USDBRL returns.

D.V.: log change in USDBRL rate	
	I
d (log BRL/USD rate) t-1	−0.060 E2**
	6.57
d (log commodity price index)	−0.088 E2**
	5.28
d (VIX)	0.078**
	7.28
Traditional swap t	−0.507**
	6.62
Traditional swap t-1	−0.128**
	3.31
Reverse swap t	0.155**
	5.20
Reverse swap t-1	0.042**
	2.87

From: Kolhscheen and Andrade (2014)

- Kohlscheen-Andrade: FX Intervention in Brazil has maximal impact in the first *half hour*
- Then mean reversion (they do not report measures of persistence, such as half life)
- GARCH specification does not allow intervention to affect *volatility*

The Global Crisis: Opportunity for Reassessment

An Opportunity: The Global Crisis

- With the global crisis, central banks in advanced economies were forced to consider “unconventional” policies
- Quantitative Easing, Credit Easing, Forward Guidance…
- Recent literature on such *central bank portfolio* operations

FX Intervention and Unconventional Policy

- *Sterilized* FX intervention can be seen as an unconventional policy, as it changes only the asset side of the central bank balance sheet

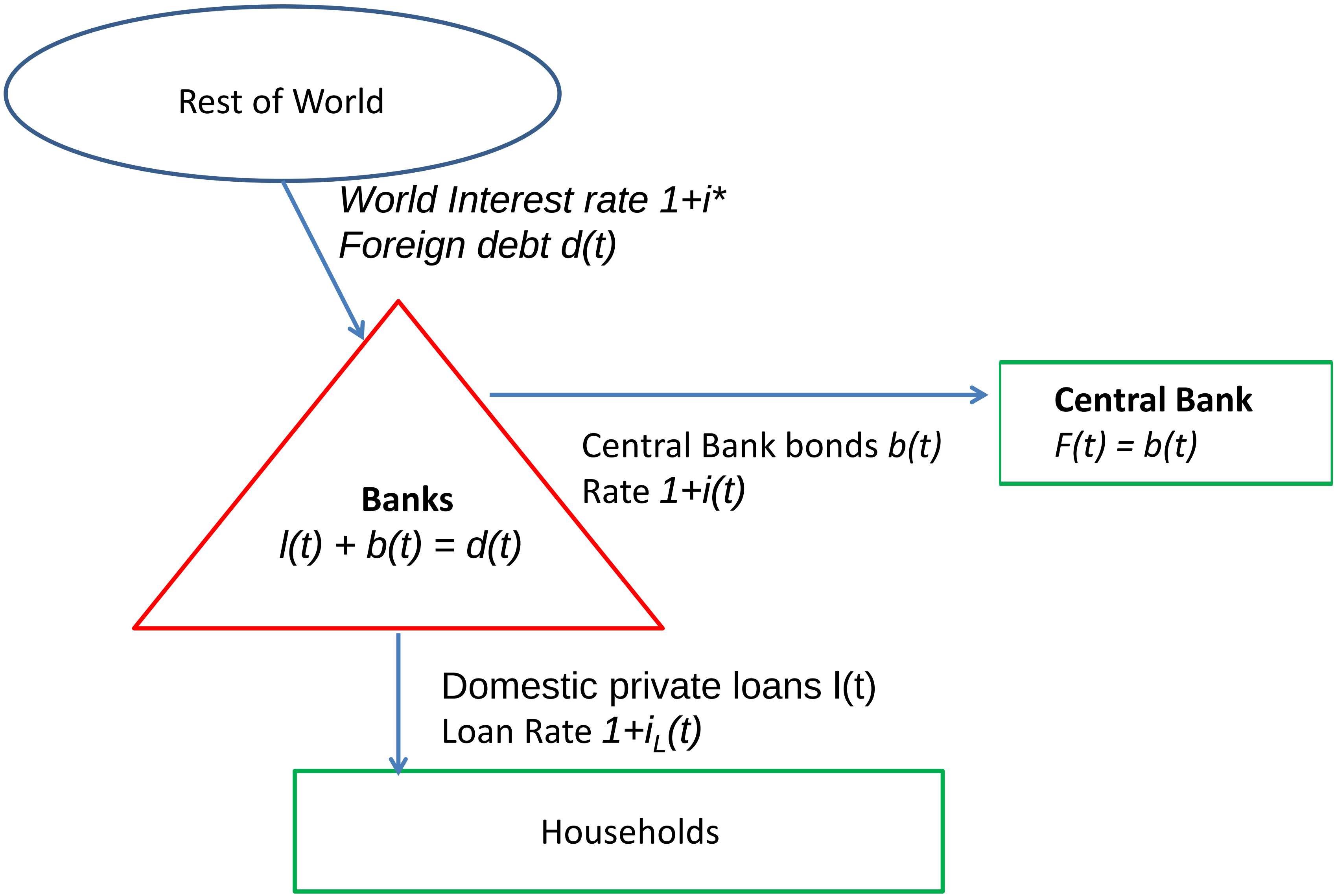
- In fact, under some assumptions, it is exactly equivalent to other policies emphasized in the recent literature (Céspedes, Chang, and Velasco)

FX Intervention and Unconventional Policy

- So we can hope to extend insights from recent and ongoing work on unconventional policy to the question of sterilized FX intervention
- Especially: the crucial role of financial frictions and financial institutions (intermediaries)
- Recent progress: Ostry-Ghosh-Chamon, Benes-Berg-Portillo-Vavra, Vargas-González-Rodríguez, García, CCV, Chang-Velasco

Banks and FX Intervention

- In Benes et al. and Vargas et al. banks borrow from ROW, make loans, and hold central bank bonds
- Central bank issues bonds to purchase FX reserves



Financial Flows in Benes et al., Vargas et al.

Banks and Imperfect Substitutibility

- Crucially, loans and CB bonds are imperfect substitutes in private banks portfolios because of a cost technology (Edwards-Vegh)
- This leads to equations such as

$$\text{UIP: } i_t = i_t^* + E_t(\Delta S_{t+1}) + \varrho_t$$

$$\text{Domestic Spread: } i_{Lt} = i_t + \varrho_{Lt}$$

where ϱ_t is *increasing* in the b_t/l_t ratio, and ϱ_{Lt} is *decreasing* in the same ratio

How FX Intervention Works

- A sale of FX reserves ➔ a reduction in CB bonds b_t
- Banks rebalance portfolios, reduce loan supply ➔ push ϱ_t and i_t up
- Usual UIP logic ➔ Exchange rate appreciation
- (Note that ϱ_{Lt} and the loan spread $i_{Lt} - i_t$ must *fall* (Vargas et al.))

Remarks

- These papers introduce portfolio balance considerations in a more convincing and realistic way (via financial intermediaries)
- Link impact of FX intervention to the characteristics of the financial system
- Implications for the desirability of FX intervention remain unclear, however (contrast Benes et al. against Vargas et al.)

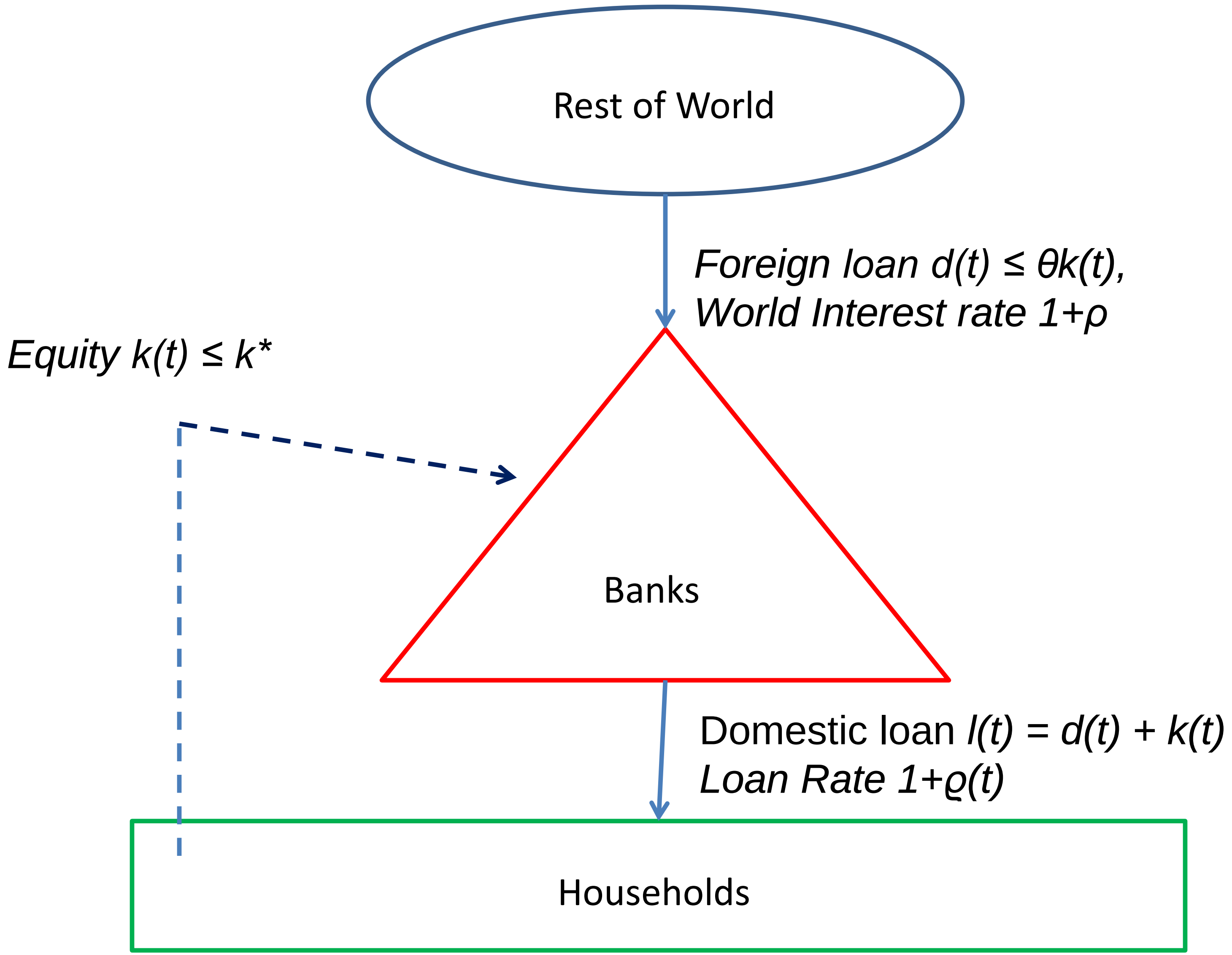
More Remarks

- Presumably, optimal policy may imply that sterilized FX intervention should happen all the time
- Unfortunately, older empirical evidence against portfolio balance view of FX intervention is also evidence against the key components of this perspective (UIP condition is basically the same)

An alternative: Occasionally binding financial constraints

- CCV: banks borrow from abroad subject to a credit limit that depends on collaterizable equity

- The limit may or may not bind in equilibrium



Financial Flows in Chang-Velasco (2016)

FX Intervention, Again

- In CCV, FX intervention can be effective because of the implied changes in the government’s credit to the private sector
- In fact, FX intervention can be exactly equivalent to the *liquidity facility* policies studied by Gertler and Kiyotaki (2010) and others
- Such policies relax the collateral constraint
- Hence they are effective *if and only if the constraint binds*

Implications

- Sterilized FX intervention is effective only at times (when financial constraints bind), not at others
- Perhaps more consistent with empirical evidence
- FX Intervention is called for only at times of credit disruptions

More Implications

- This perspective justifies FX intervention to contain excessive *depreciation*
- A rationale for FX intervention during *appreciation* periods remains to be found
- Although one may presumably construct one based on precautionary accumulation of reserves

Final Remarks

Main Message

- The global financial crisis resulted in much research on unconventional policy and central bank balance sheet policy
- Sterilized FX Intervention can and should be seen as part of this general topic
- Emphasis on financial frictions and institutions
- Reconciling theory and evidence remains a must

Related Questions Not Addressed Today (But Important Nonetheless)

- FX Intervention, Signaling, and Commitment

- Misalignment, Bubbles, and the Like: Can FX intervention help?

- FX Intervention and Competitiveness (the Political Economy elephant in the room?)