

# Managing Capital Outflows: The Role of Foreign Exchange Intervention

Suman S. Basu  
IMF

Atish R. Ghosh  
IMF

Jonathan D. Ostry  
IMF

Pablo E. Winant  
Bank of England

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# How should EME central banks conduct FX intervention when faced with capital outflows?

Sterilized FX intervention increasingly accepted during inflow episodes

(*Ghosh, Ostry, and Chamon, 2016; Gabaix and Maggiori, 2015; Blanchard et al., 2015*)

- ▶ Exchange rates can transmit financial shocks

(*Jeanne and Rose, 2002; Gabaix and Maggiori, 2015*)

- ▶ FX intervention has traction on the exchange rate and can therefore cushion such shocks

(*Blanchard, Adler and Filho, 2015; Chamon, Garcia and Souza, 2015*)

# How should EME central banks conduct FX intervention when faced with capital outflows?

But outflow shocks are different

- ▶ Stock of reserves may be depleted
- ▶ Size and persistence of outflows strongly tied to financial frictions
- ▶ Possibility of panic by unsophisticated investors

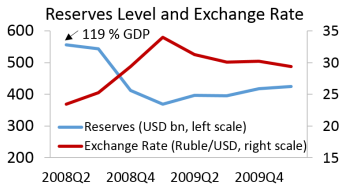
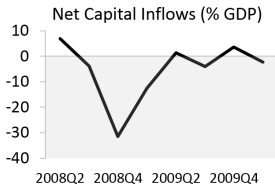
So in practice, even for managed floats, reluctant to recommend intervention except to counter severe market dysfunction

- ▶ Reserves deemed "wasted" if exchange rate eventually depreciates
- ▶ Fear of "counterproductive" interventions: central bank may invite speculative attacks and worsen the depreciation

# Central bank behavior has been heterogeneous

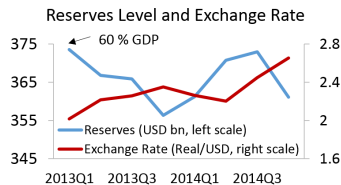
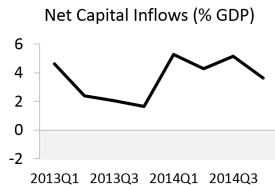
## Russia 2008

Large and temporary shock  
 ⇒ Intervention and depreciation



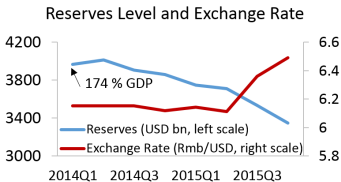
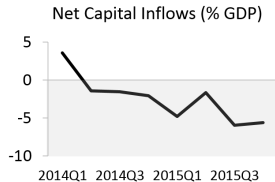
## Brazil 2013

Small but potentially persistent shock  
 ⇒ Intervention rule



## China 2014

Moderate shock with some panic  
 ⇒ Large intervention



# Message of this paper

Characterize the optimal FX intervention policy in response to capital outflows for a simple model with imperfect capital mobility

- ▶ Zero lower bound on reserves
- ▶ Persistence of the shock
- ▶ Unsophisticated investors in the FX market

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Characterize the optimal FX intervention policy in response to capital outflows for a simple model with imperfect capital mobility

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## Three key insights:

- ▶ **Time consistency problem**, which reduces intervention and worsens exchange rate stabilization  
— especially when reserves are low and the shock is persistent
- ▶ Temporary pegs and volume intervention rules can improve welfare
- ▶ Existence of unsophisticated investors alters the optimal policy
  - “Counterproductive interventions” not possible with speculators only, but are possible if investors panic when reserves decline;
  - Investors who panic when the exchange rate depreciates can improve welfare by enhancing the central bank’s commitment power

# Structure of this talk

1. The central bank's optimization problem
2. Full-commitment solution
  - ▶ Promise of sustained future intervention and gradual depreciation
3. Time-consistent solution
  - ▶ Low intervention and large immediate depreciation
4. Simple intervention rules
  - ▶ Can improve welfare above discretion
5. Panic by unsophisticated investors
  - ▶ Can generate “counterproductive interventions”
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# The central bank's optimization problem

Choose sequence of FX intervention  $\{f_t\}_{t=0}^{\infty}$  to minimize:

$$E_0 \sum_{t=0}^{\infty} \beta^t \frac{(e_t - e^*)^2}{2}$$

subject to the constraints

$$e_t = \frac{1}{a+c} [z_t - f_t + a e_{t+1}]$$

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The target  $e^*$  may differ from the pure float exchange rate

Environment where a depreciation is destabilizing

- ▶ Inefficient path of domestic terms of trade (*Cavallino, 2015*)
- ▶ Balance sheets of FX borrowers (*Aghion, Bacchetta, and Banerjee, 2001*)

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Imperfect capital mobility with portfolio balance shocks

- ▶ Capital outflows:  $k_t = a(E_t e_{t+1} - e_t) + z_t$
- ▶ Market clearing:  $k_t \equiv c e_t + f_t$

Exchange rate is affected by intervention today and in the future

Full commitment: Credibly promise  $e_{t+1}$ ; Time consistency: Cannot

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Zero lower bound on reserves

- ▶ Not a standard linear-quadratic problem!
- ▶ Model's simplicity makes time-consistent case solvable



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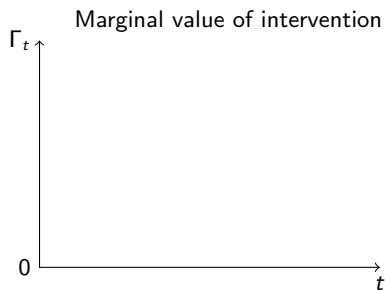
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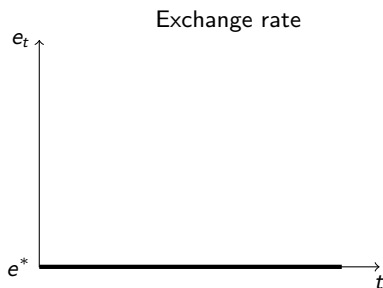
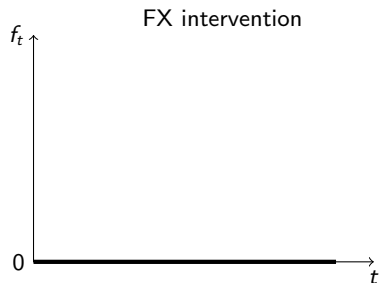
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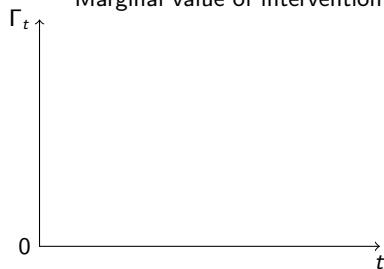


Solution in the absence of shocks



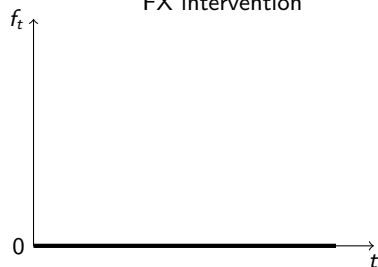
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Marginal value of intervention

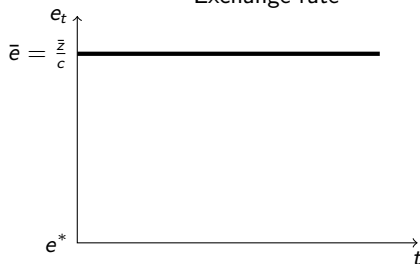


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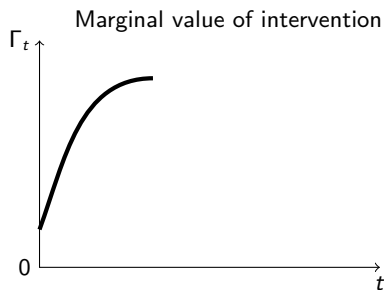
FX intervention



Exchange rate

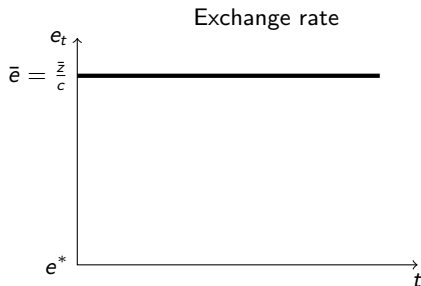
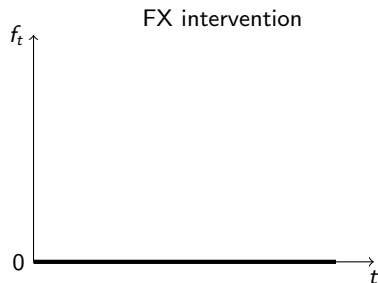


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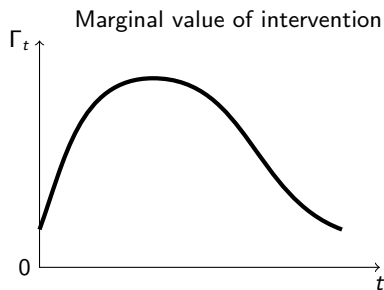


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Promise of future intervention appreciates exchange rates in earlier periods

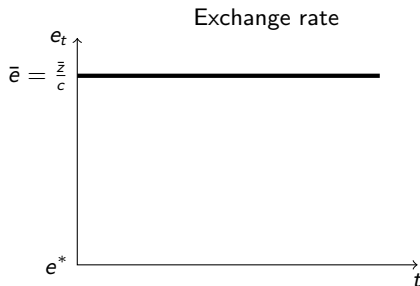
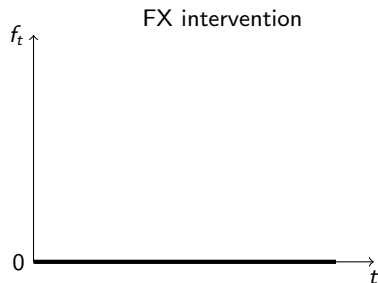


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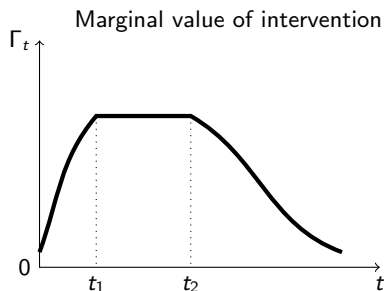


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Promise of future intervention appreciates exchange rates in earlier periods, but is discounted



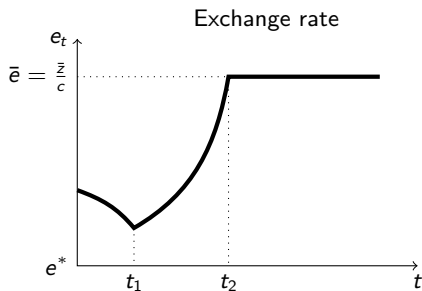
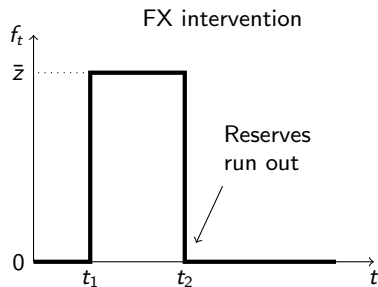
# Full-commitment solution



Consider shock  $z_t = \bar{z} > 0$

Promise of future intervention appreciates exchange rates in earlier periods, but is discounted

$\Rightarrow$  Promise sustained future intervention until reserves run out



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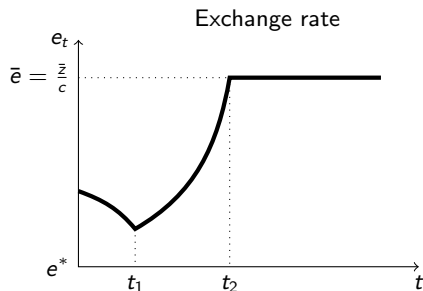
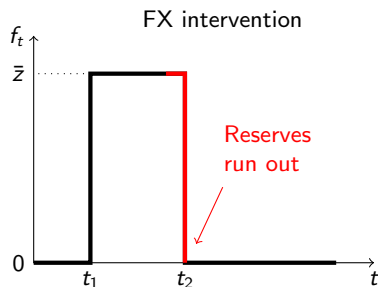


# Time-consistent solution

Central bank re-optimizes in every period, ignoring past promises

⇒ Investors' expectations  $e_{t+1}(R_{t+1})$  depend only on reserves

⇒ Can only influence investors' expectations by keeping reserves for tomorrow



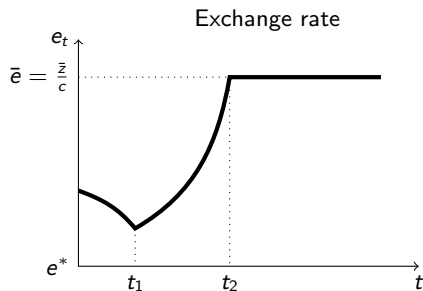
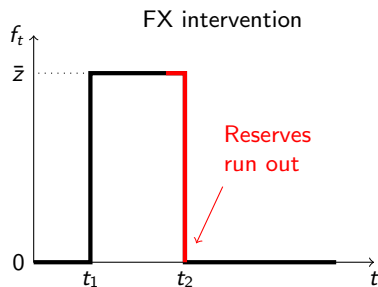
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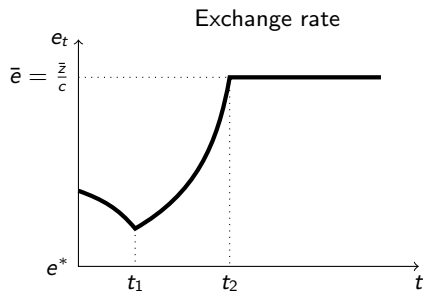
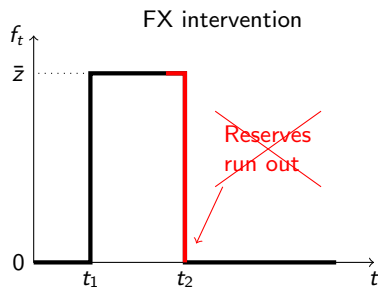
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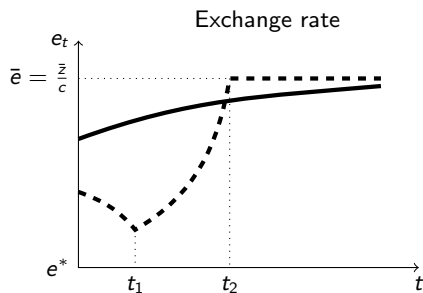
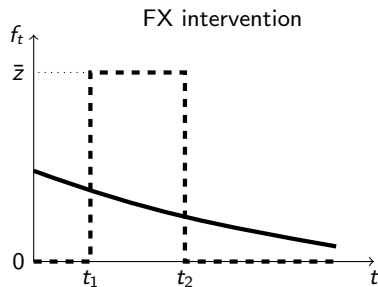
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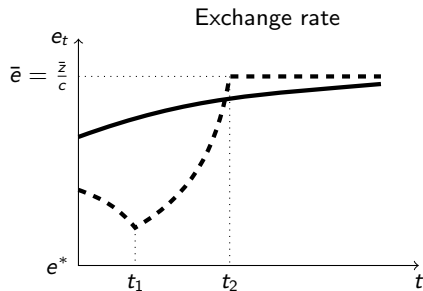
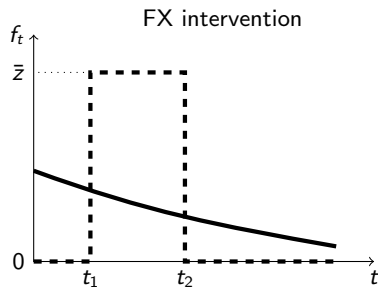
⇒ Low intervention and large immediate depreciation



# Time-consistent solution

The time consistency problem is more severe

- ▶ For low to moderate reserves
- ▶ For persistent shocks



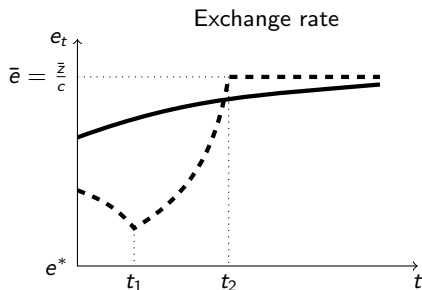
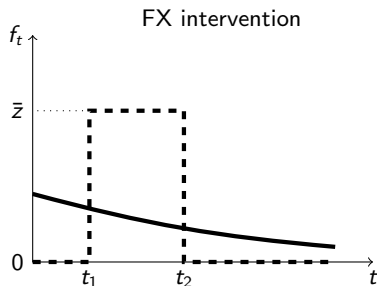
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# Partial commitment is useful after persistent shocks

Temporary peg or volume intervention rules

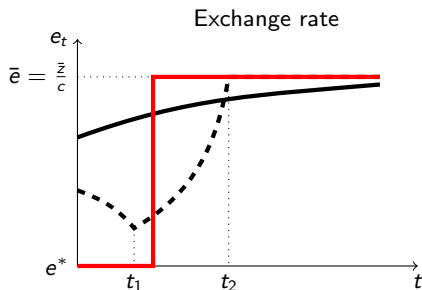
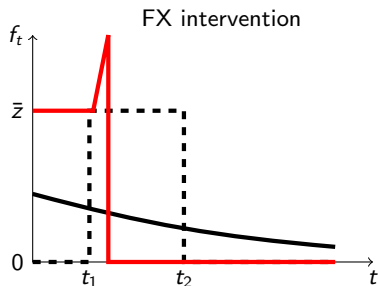
- ▶ Are worse than the full-commitment solution
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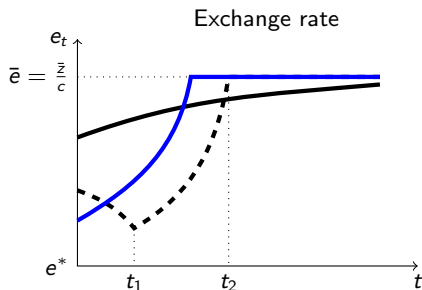
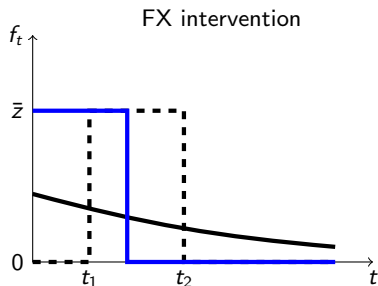




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# Panic when reserves decline

New speculators and higher  $a \nRightarrow$  "Counterproductive interventions"

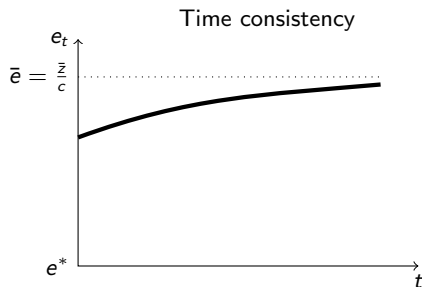
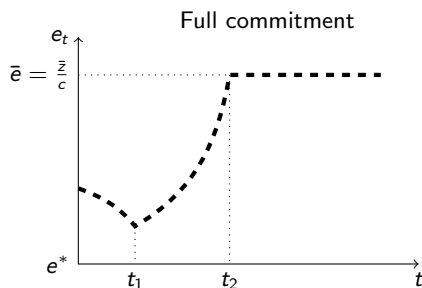
"Counterproductive interventions" possible with new unsophisticated investors

$$k_t^{Panic} = \frac{(R_t - R_{t+1})^2}{2\theta}$$

$\Rightarrow$  Large interventions can be counterproductive

$\Rightarrow$  Limit intervention to prevent FX market panic

$\Rightarrow$  Exchange rate becomes destabilized even under full commitment



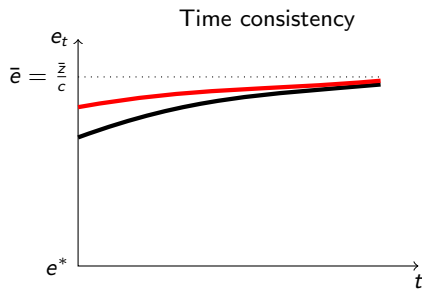
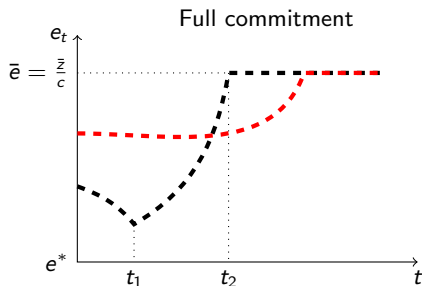
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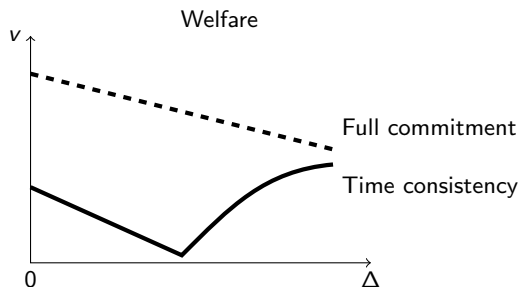


# Panic when exchange rate depreciates

Cost  $\Delta$  when  $e_t > e^*$

- ▶ Hurts welfare under full commitment
- ▶ But can improve on the time-consistent solution by providing commitment to maintain a temporary peg

⇒ Imperfection of panic offsets imperfection of lack of commitment

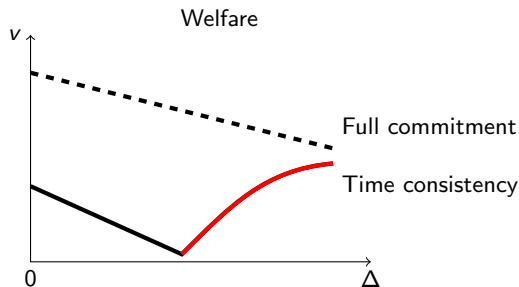


# Panic when exchange rate depreciates

Cost  $\Delta$  when  $e_t > e^*$

- ▶ Hurts welfare under full commitment
- ▶ But can improve on the time-consistent solution by providing commitment to maintain a temporary peg

⇒ Imperfection of panic offsets imperfection of lack of commitment



# Conclusion

Characterize the optimal FX intervention policy in response to capital outflows for a simple model with imperfect capital mobility

- ▶ Zero lower bound on reserves
- ▶ Persistence of the shock
- ▶ Unsophisticated investors in the FX market

## Three key insights:

- ▶ **Time consistency problem**, which reduces intervention and worsens exchange rate stabilization  
— especially when reserves are low and the shock is persistent
- ▶ Temporary pegs and volume intervention rules can improve welfare
- ▶ Existence of unsophisticated investors alters the optimal policy
  - “Counterproductive interventions” not possible with speculators only, but are possible if investors panic when reserves decline;
  - Investors who panic when the exchange rate depreciates can improve welfare by enhancing the central bank’s commitment power