Managing Capital Outflows with Limited Reserves

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How to intervene during outflow episodes?

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 to intervene during outflow episodes?

But outflow episodes are different

- Stock of reserves may be depleted
- Possibility of panic by unsophisticated investors

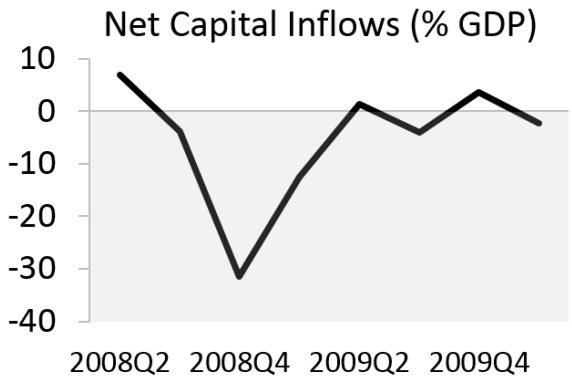
So in practice, even for managed floats, reluctant to recommend intervention except to counter severe market dysfunction

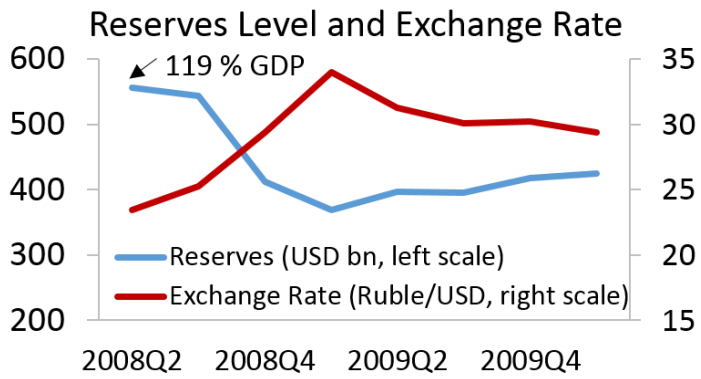
- Reserves deemed "wasted" if exchange rate eventually depreciates
- Fear of "counterproductive" interventions

Central bank behavior has been heterogeneous

Russia 2008

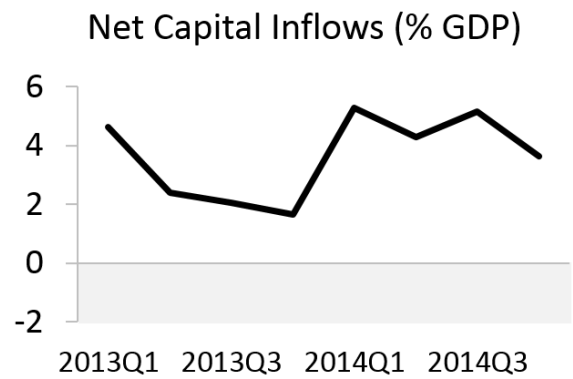
Large and temporary shock
⇒ Intervention and depreciation

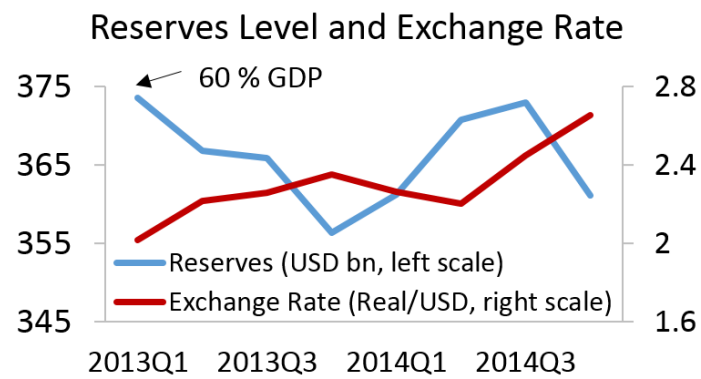




Brazil 2013

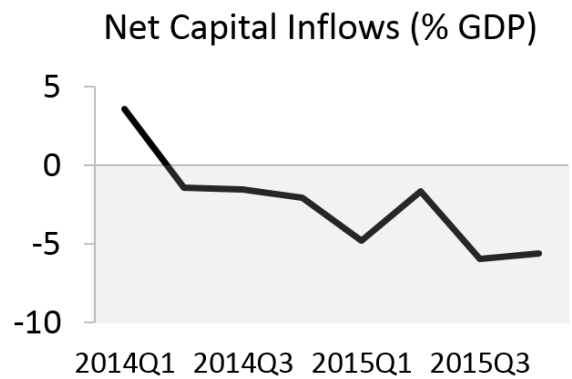
Small but potentially persistent shock
⇒ Intervention rule

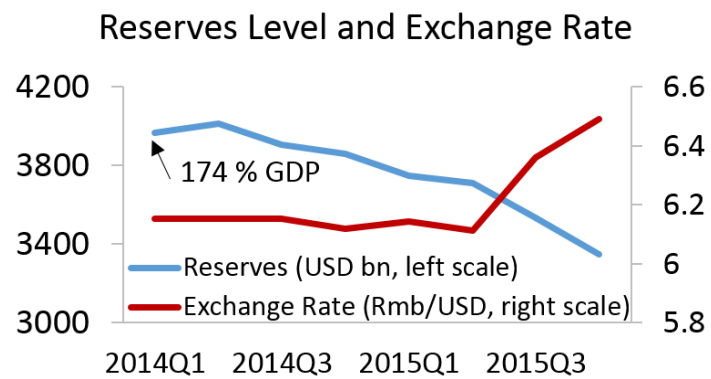




China 2014

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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Key insights:

- Central bank with full commitment uses promises of future intervention to stabilize the exchange rate, and may not intervene today
- Time consistency problem means lower intervention and worse exchange rate stabilization under discretion
  — especially when reserves are low and the shock is persistent
- Temporary pegs and volume intervention rules can improve welfare
- Existence of unsophisticated investors may improve or worsen welfare

Structure of this talk

1. Central bank's optimization problem
2. Full-commitment solution
   - Promise of sustained future intervention $\Rightarrow$ Gradual depreciation
3. Time-consistent solution
   - Low intervention $\Rightarrow$ Large immediate depreciation
4. Simple intervention rules
   - Can improve welfare above discretion
5. Panic by unsophisticated investors
   - Ambiguous effect on central bank's commitment power

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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

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

$$f_t = R_t - R_{t+1} \in [0, R_t] \text{ and } \sum_{t=0}^{\infty} f_t \leq R_0$$

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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: $k_t = a\left(E_t e_{t+1} - e_t\right) + z_t$
- 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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- Model's simplicity makes time-consistent case solvable

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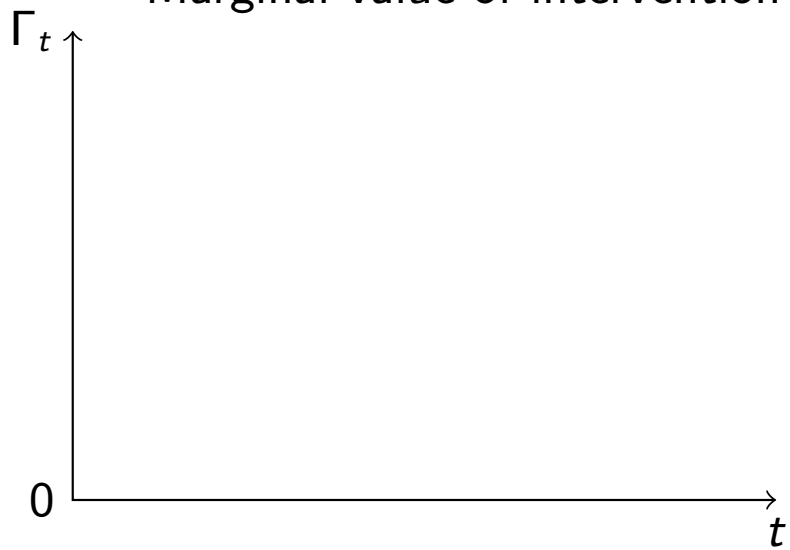
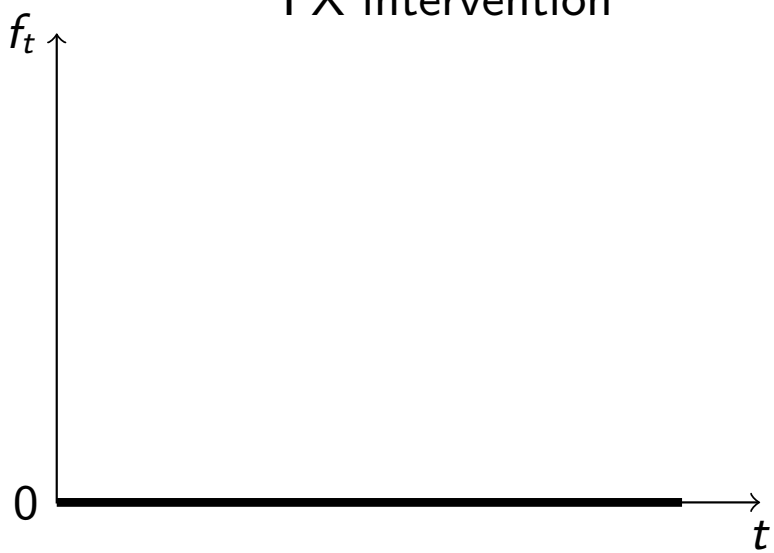
Full-commitment solution

Marginal value of intervention

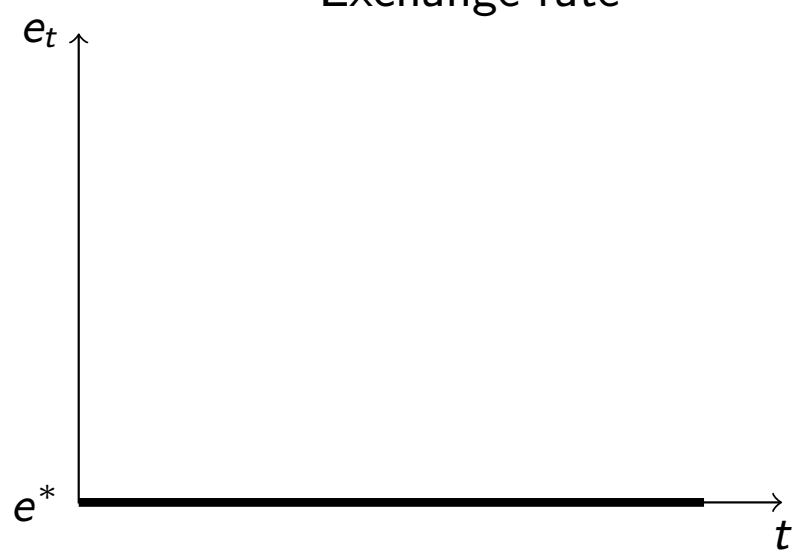


Solution in the absence of shocks

FX intervention



Exchange rate



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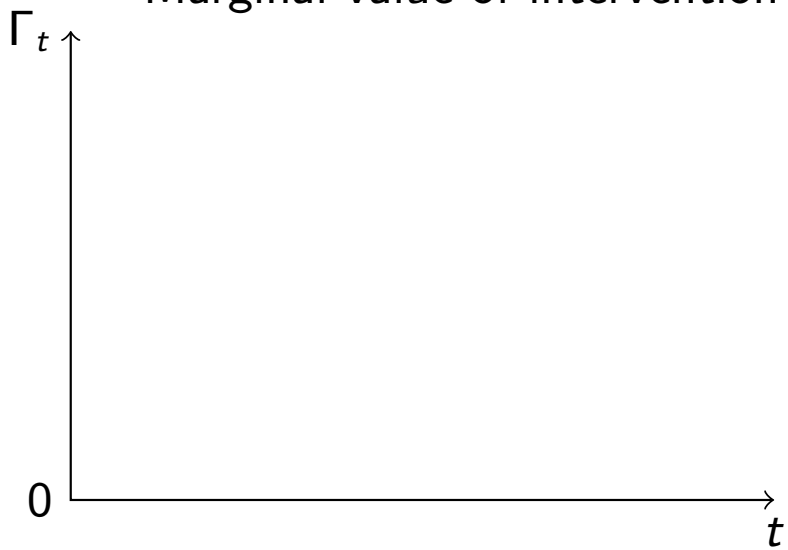
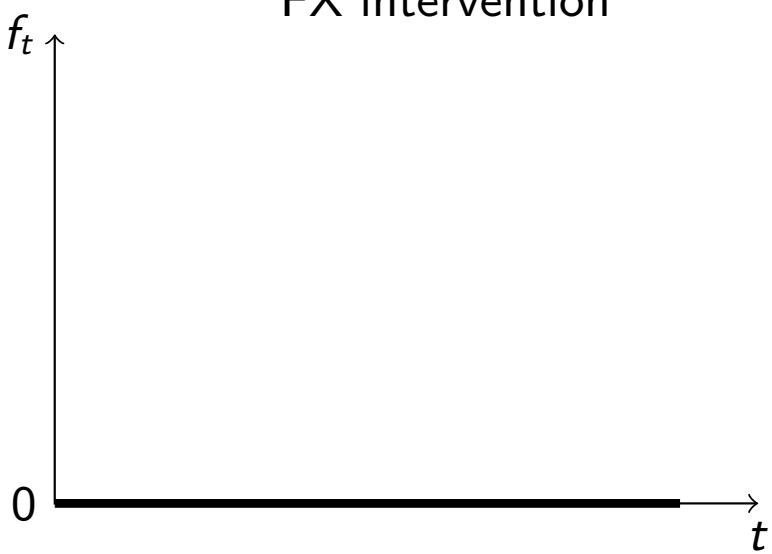


Consider shock $z_t = \bar{z} > 0$

FX intervention



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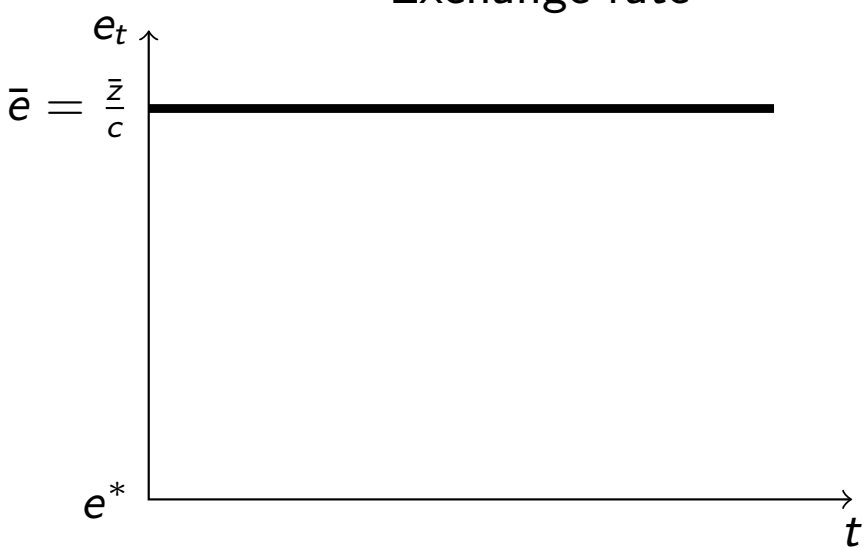

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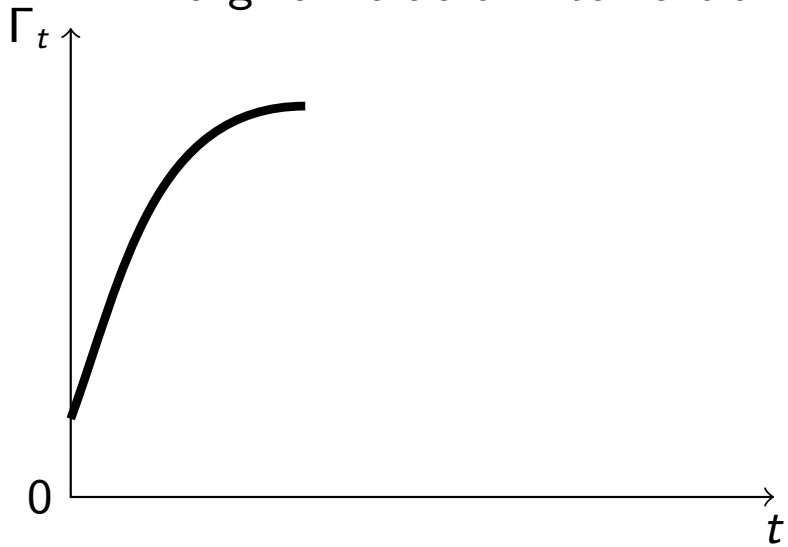

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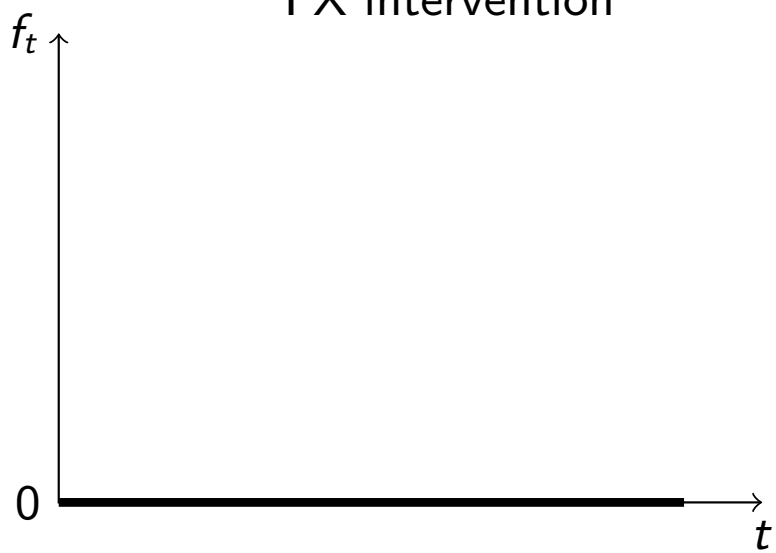
Promise of future intervention appreciates exchange rates in earlier periods

FX intervention



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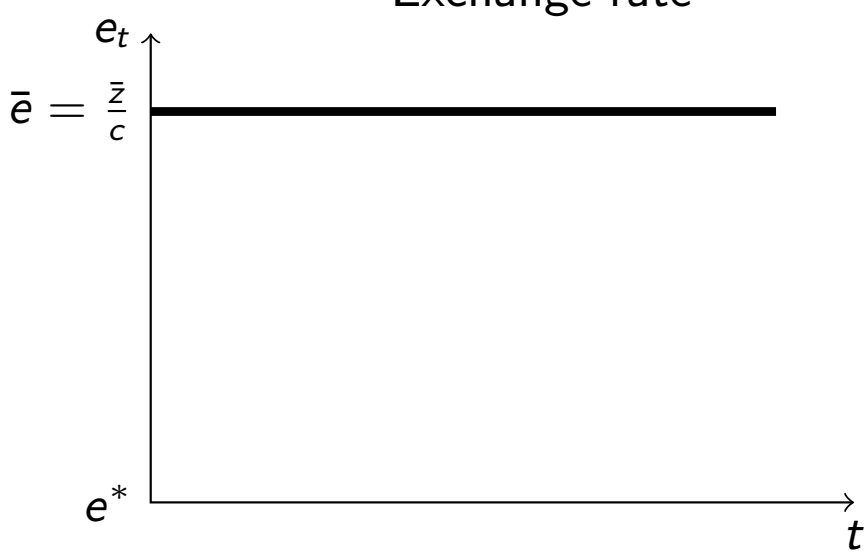

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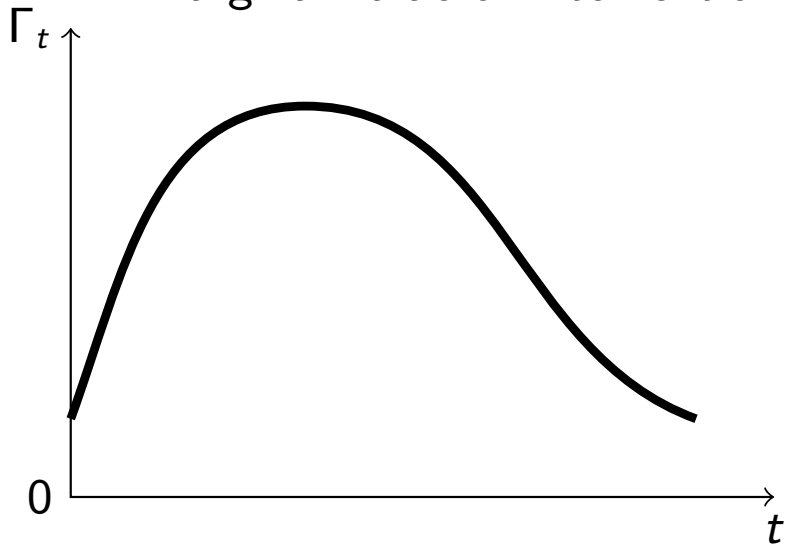

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Promise of future intervention appreciates exchange rates in earlier periods, but is discounted

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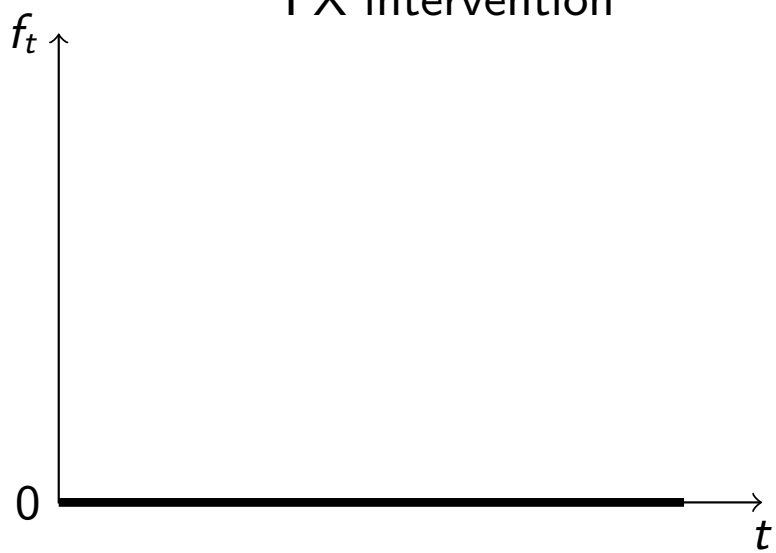

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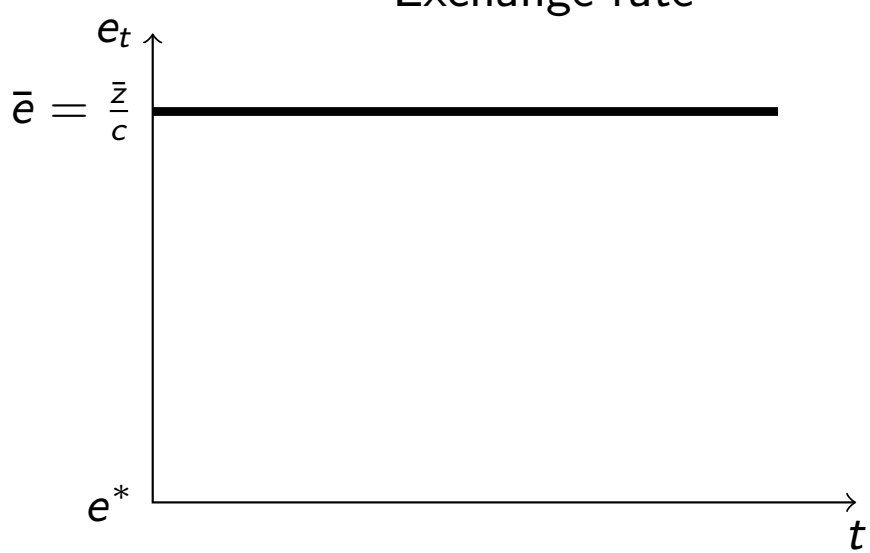

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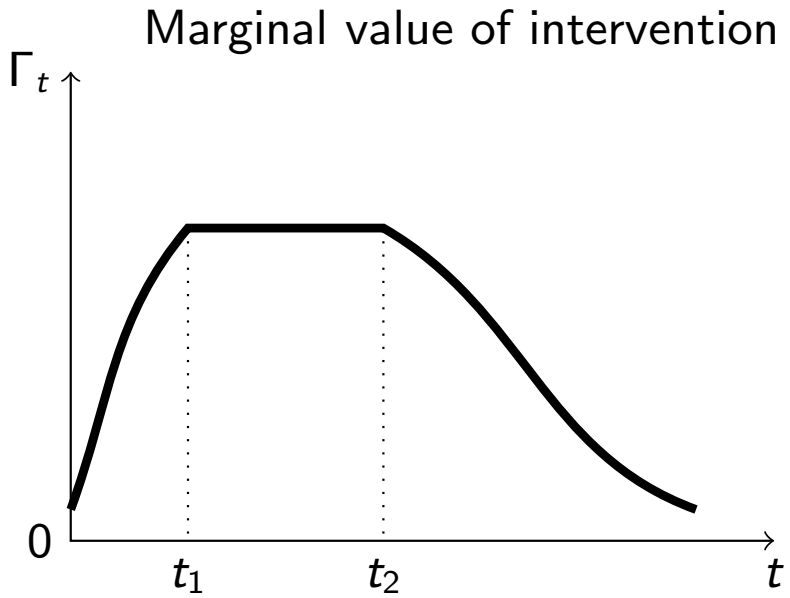
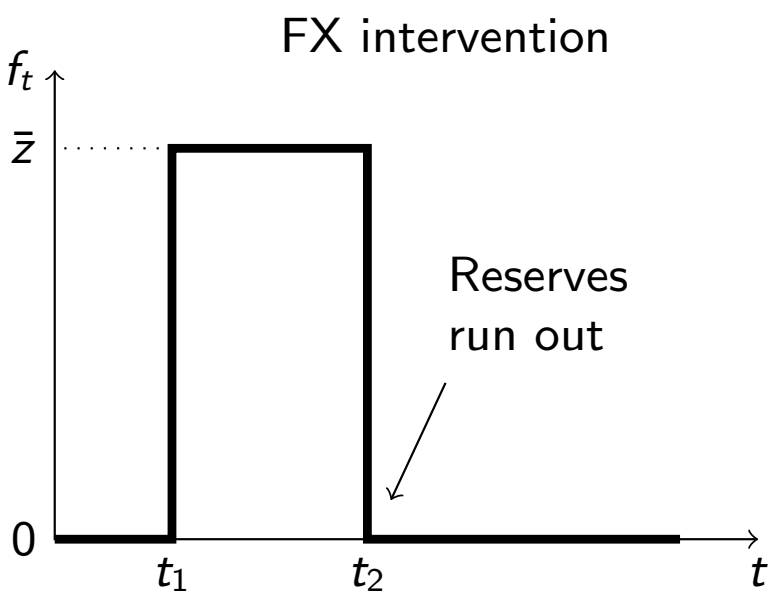
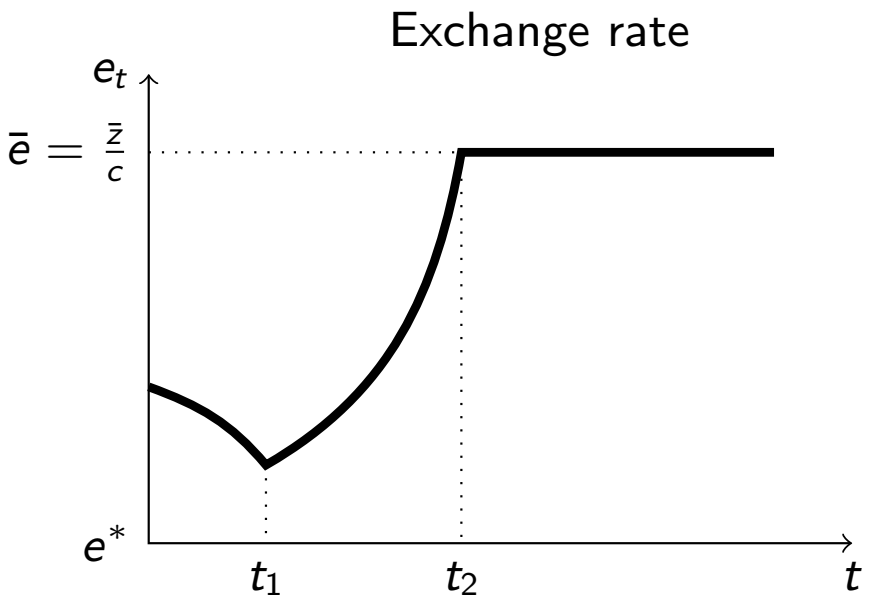


Consider shock $z_t = \bar{z} > 0$

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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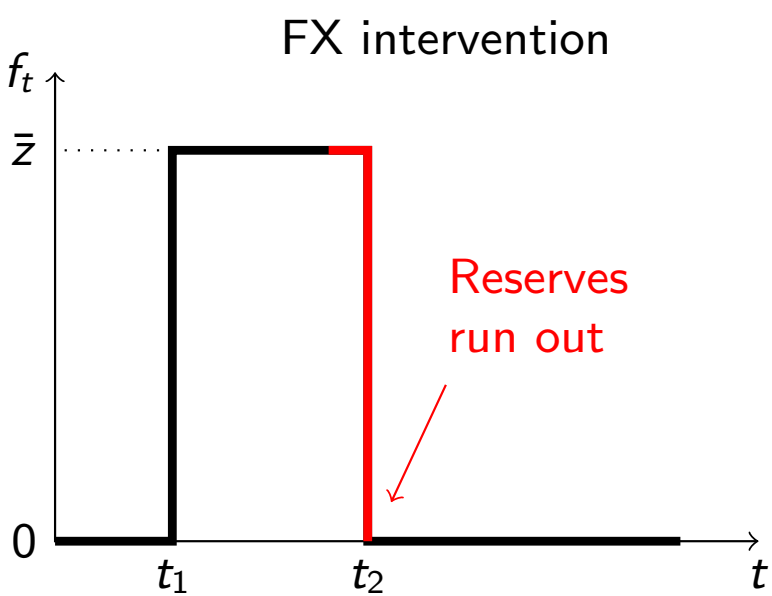
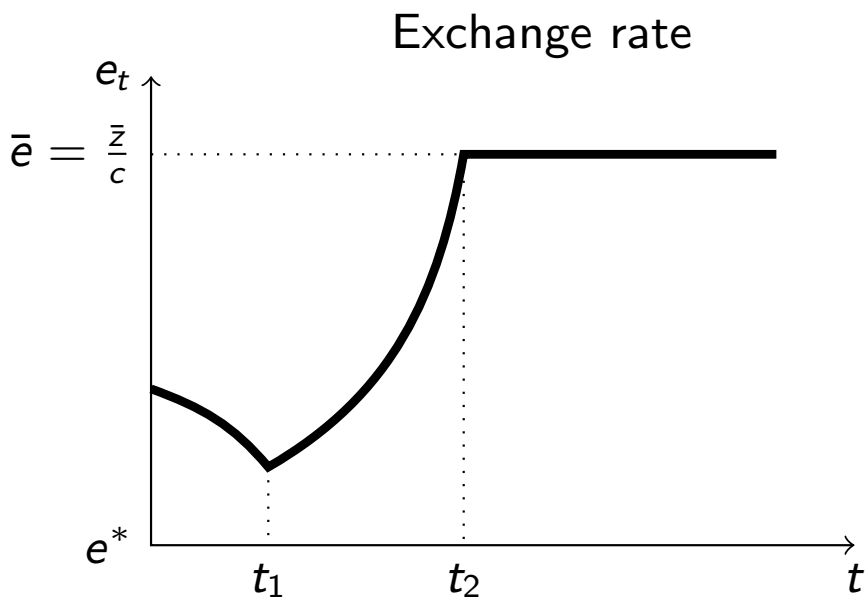
Time-consistent solution

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

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

$\Rightarrow$ Can only influence investors' expectations by keeping reserves for tomorrow





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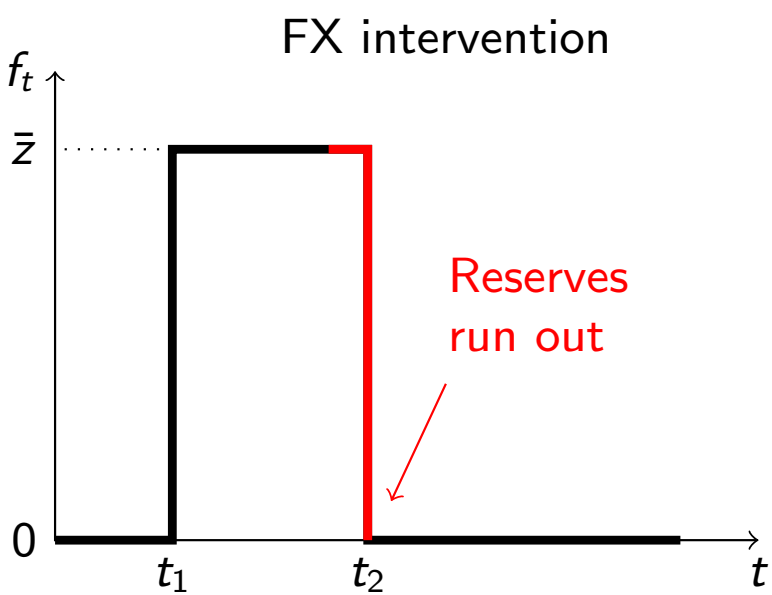

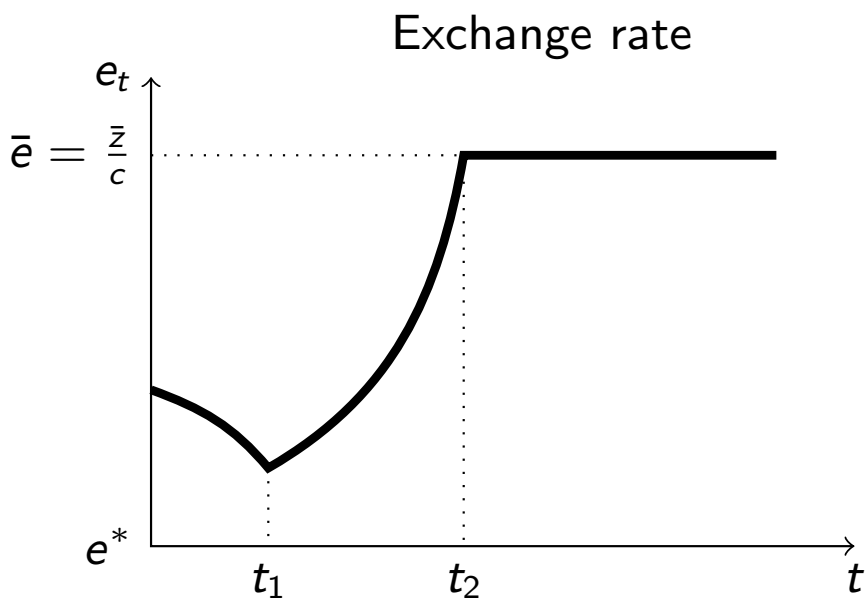

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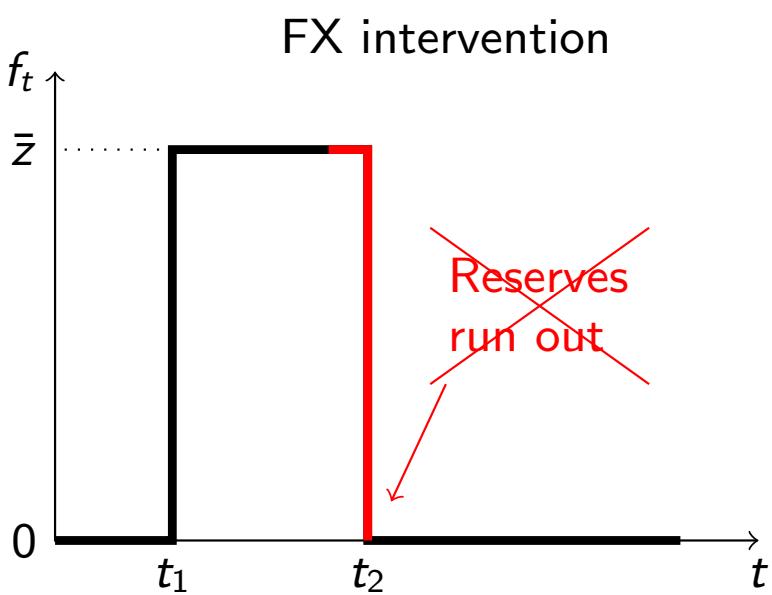
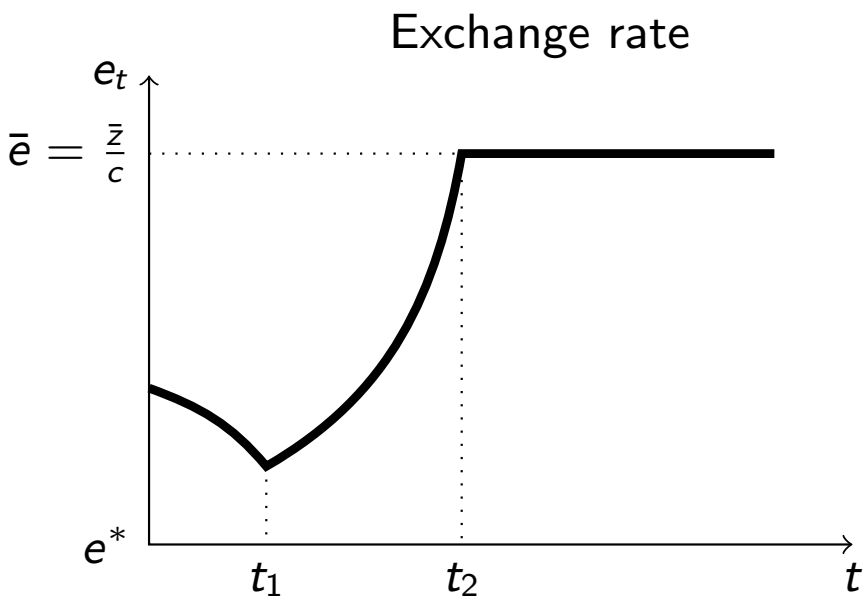
$\Rightarrow$ Not credible to use up all reserves





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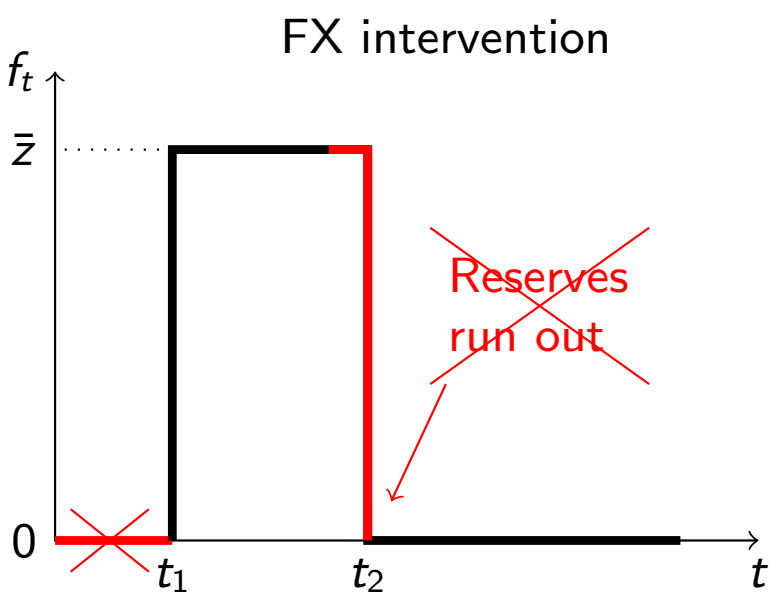

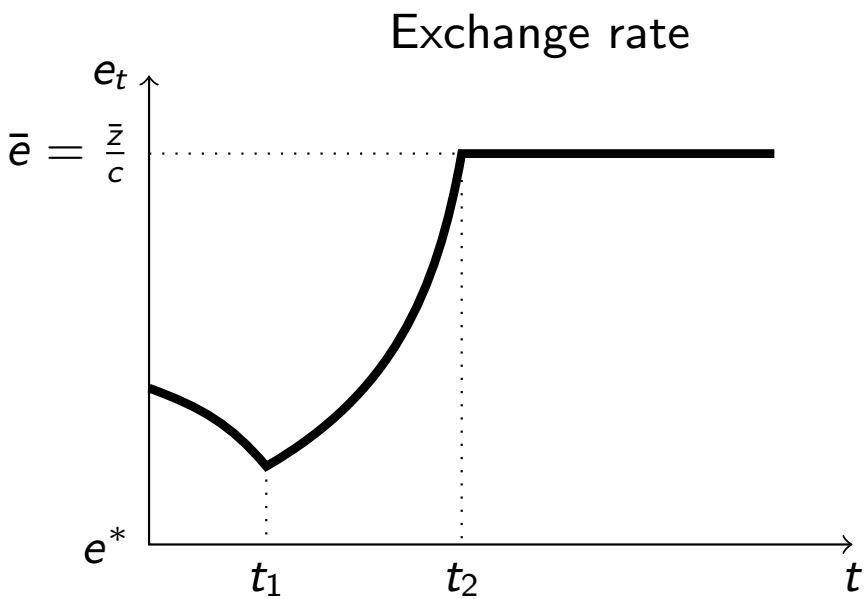

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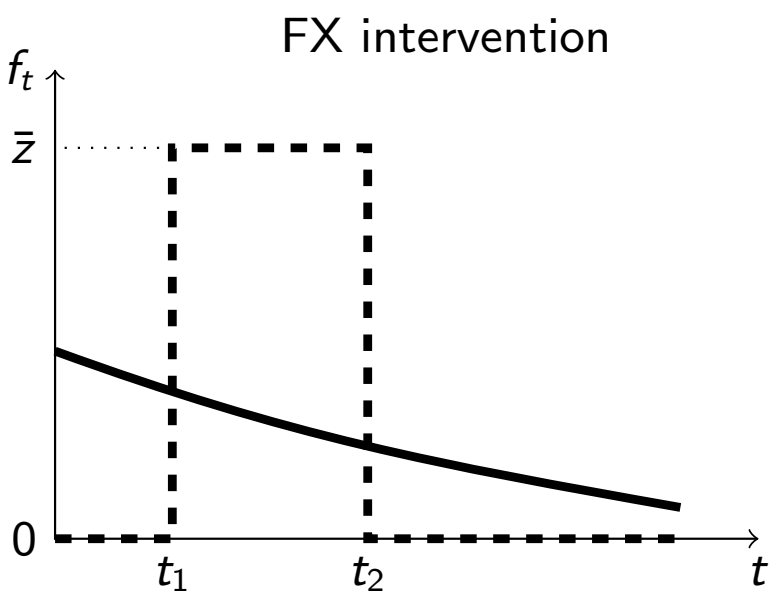
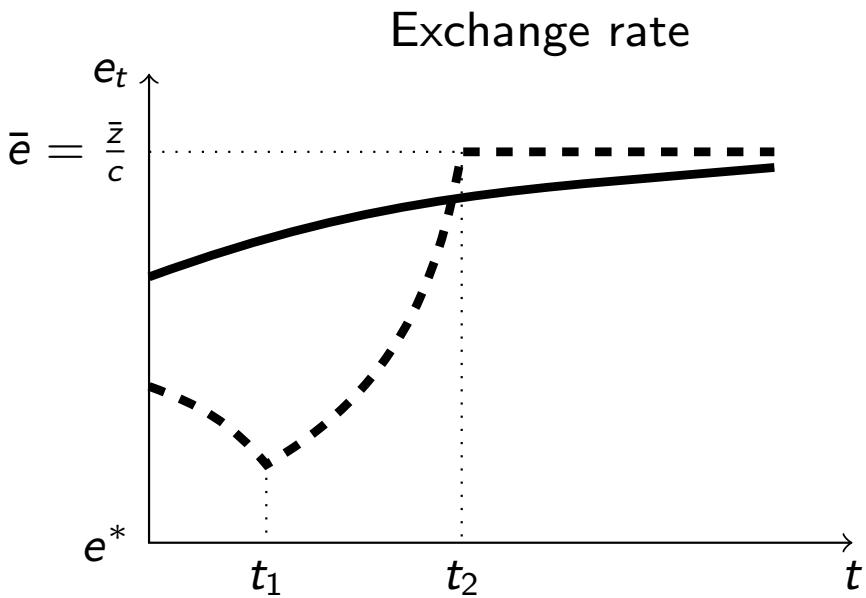
$\Rightarrow$ Not credible to use up all reserves or to leave all reserves

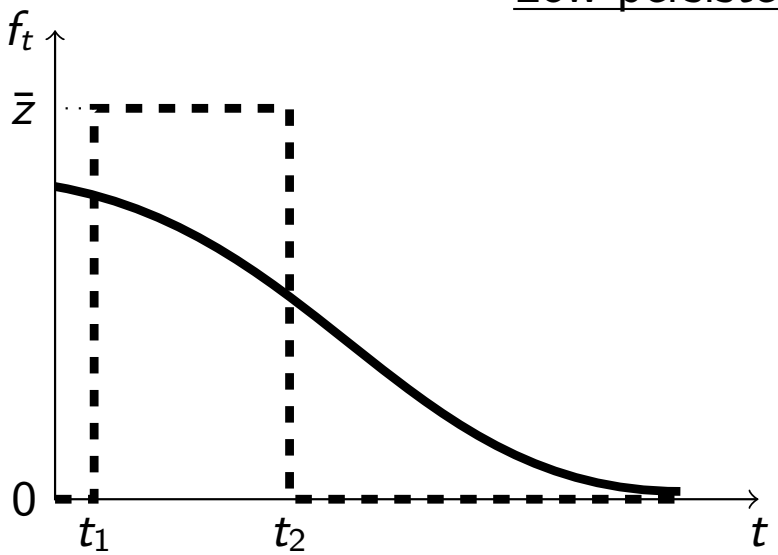
$\Rightarrow$ Low intervention in every period and large immediate depreciation

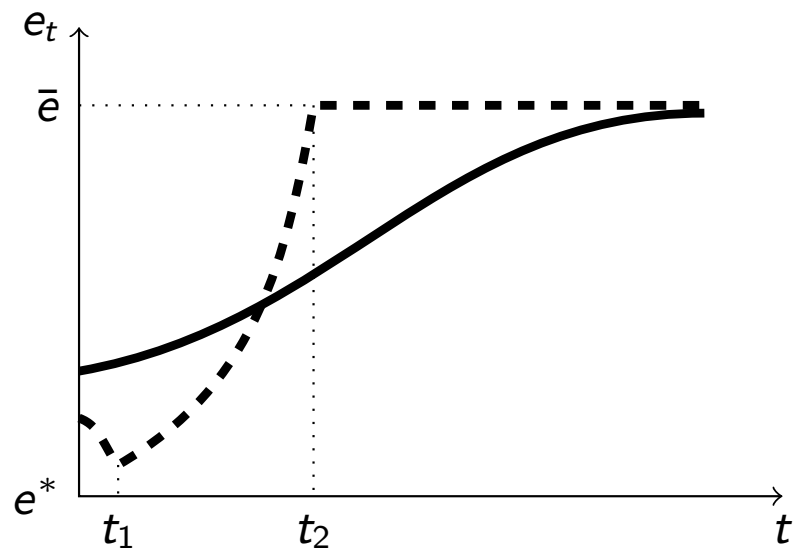




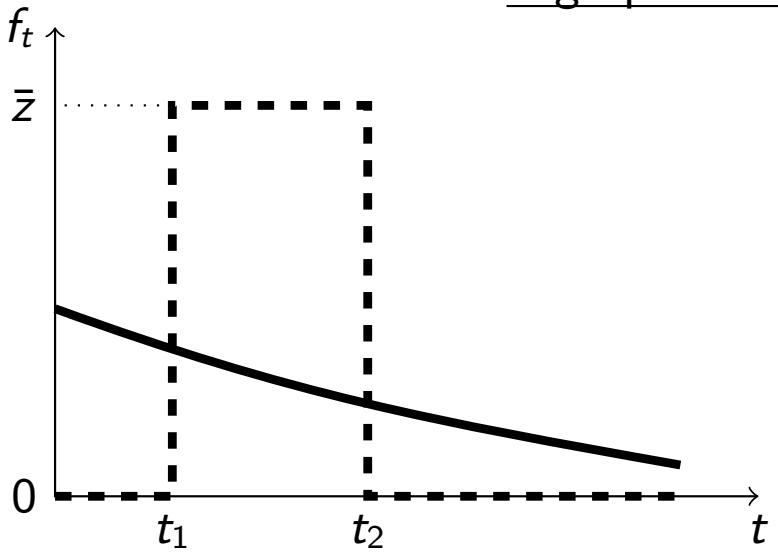
Problem is more severe when the shock is more persistent

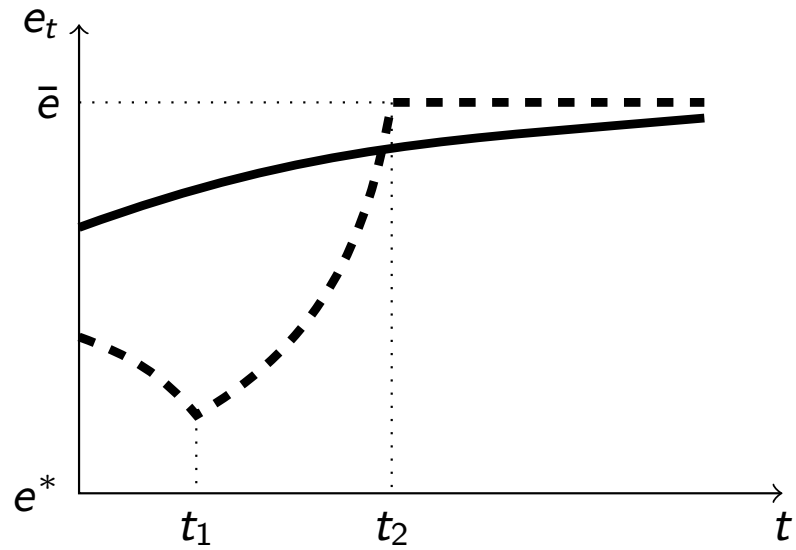
Low persistence





High persistence





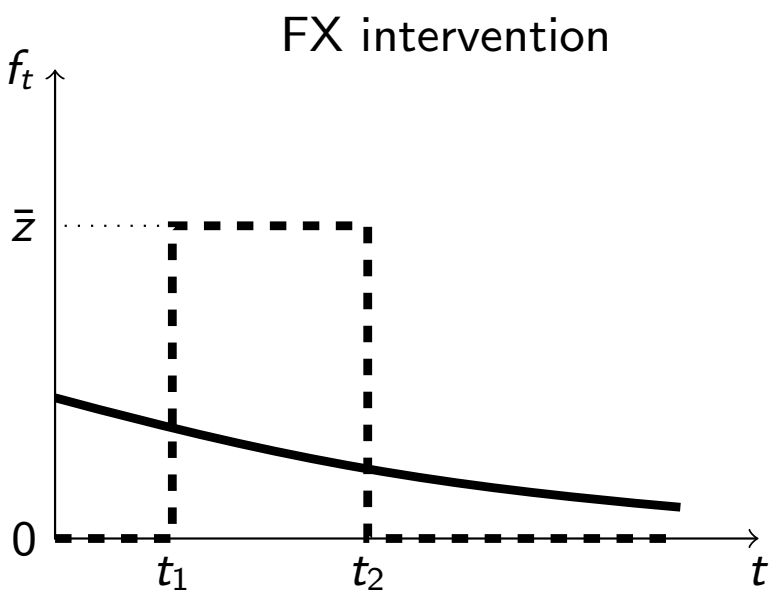
Structure of this talk

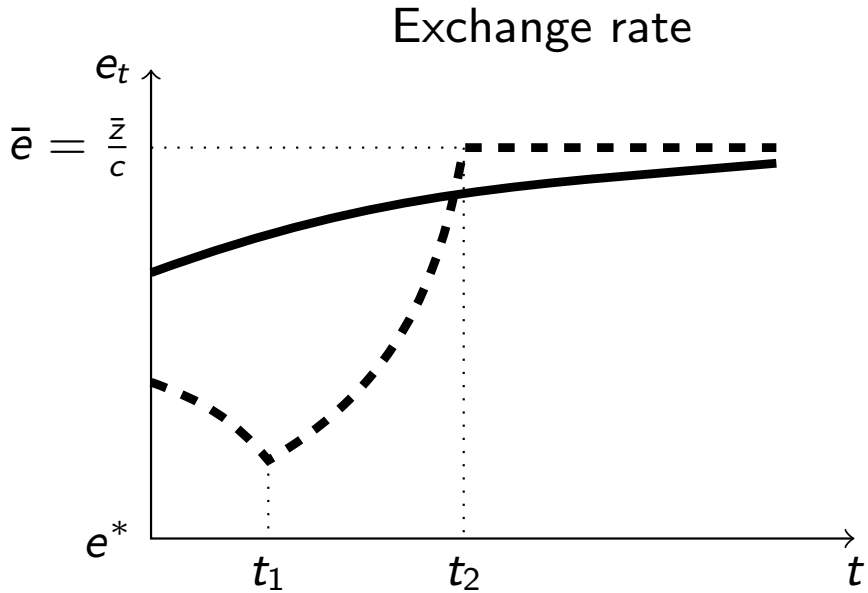
1. Central bank's optimization problem
2. Full-commitment solution
   - Promise of sustained future intervention $\Rightarrow$ Gradual depreciation
3. Time-consistent solution
   - Low intervention $\Rightarrow$ Large immediate depreciation
4. Simple intervention rules
   - Can improve welfare above discretion
5. Panic by unsophisticated investors
   - Ambiguous effect on central bank's commitment power

Partial commitment is useful after persistent shocks

Temporary peg or volume intervention rules

- Are worse than the full-commitment solution
- But can improve on the time-consistent solution because they prevent the large immediate depreciation





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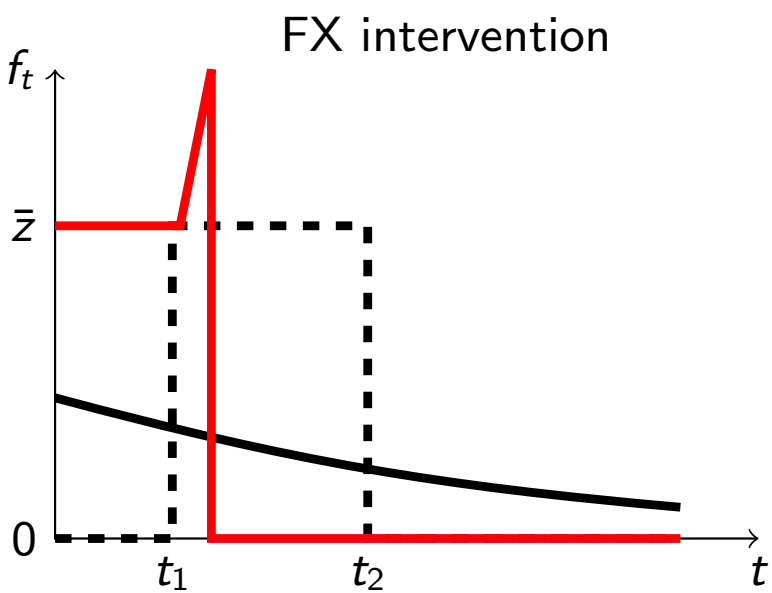

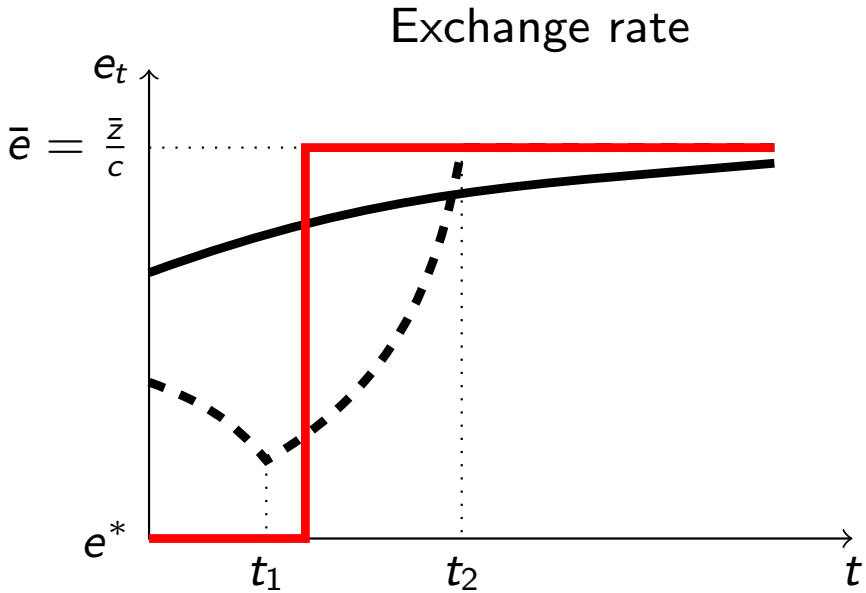

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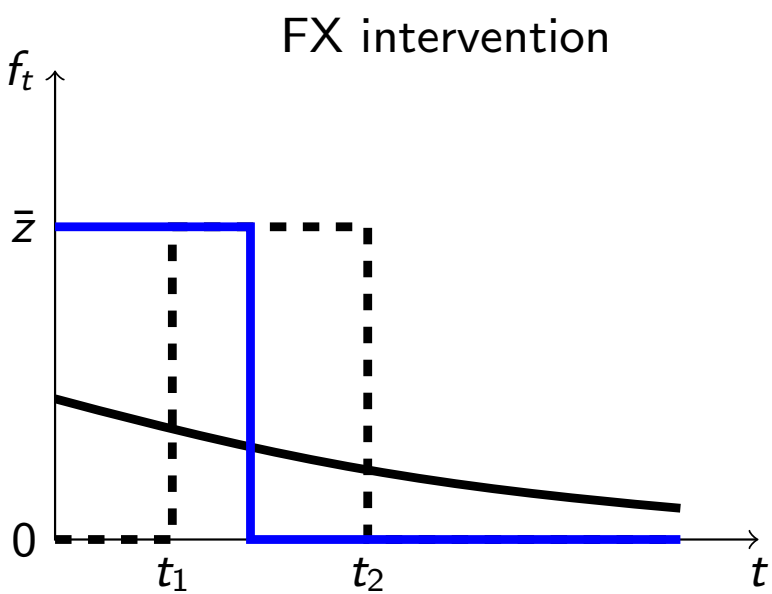

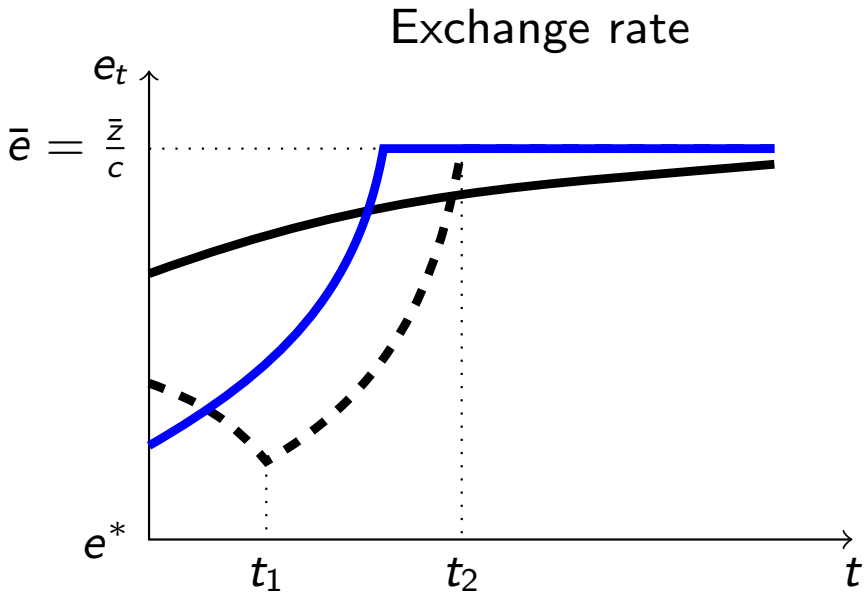

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Panic when reserves decline

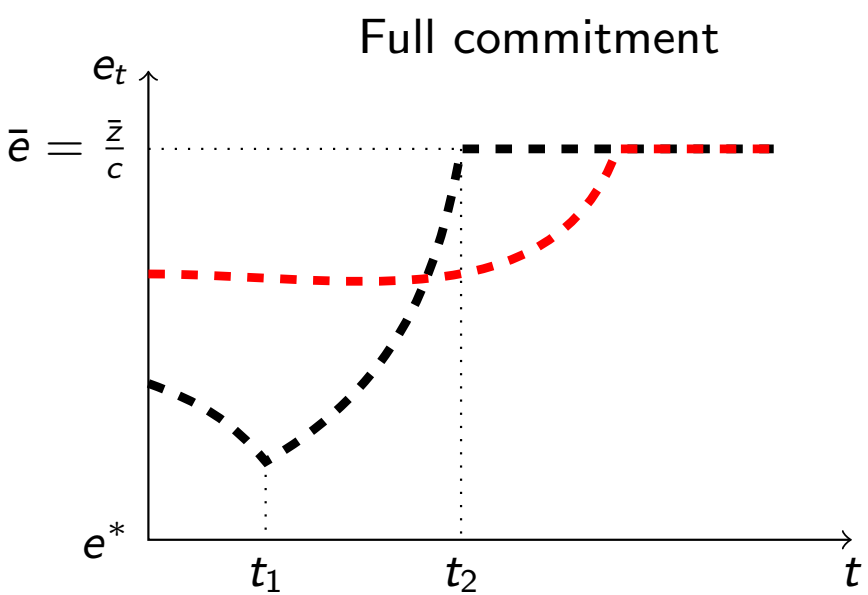
"Counterproductive interventions" only if we add new unsophisticated investors

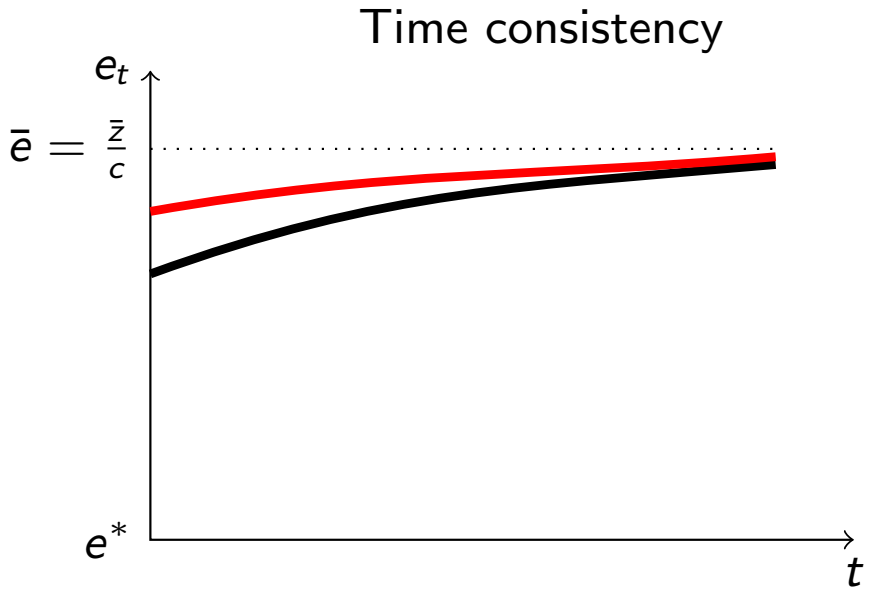
$$k_t^{Panic} = \frac{(R_t - R_{t+1})^2}{2\theta}$$

$\Rightarrow$ Large interventions can be counterproductive

$\Rightarrow$ Limit intervention to prevent FX market panic

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



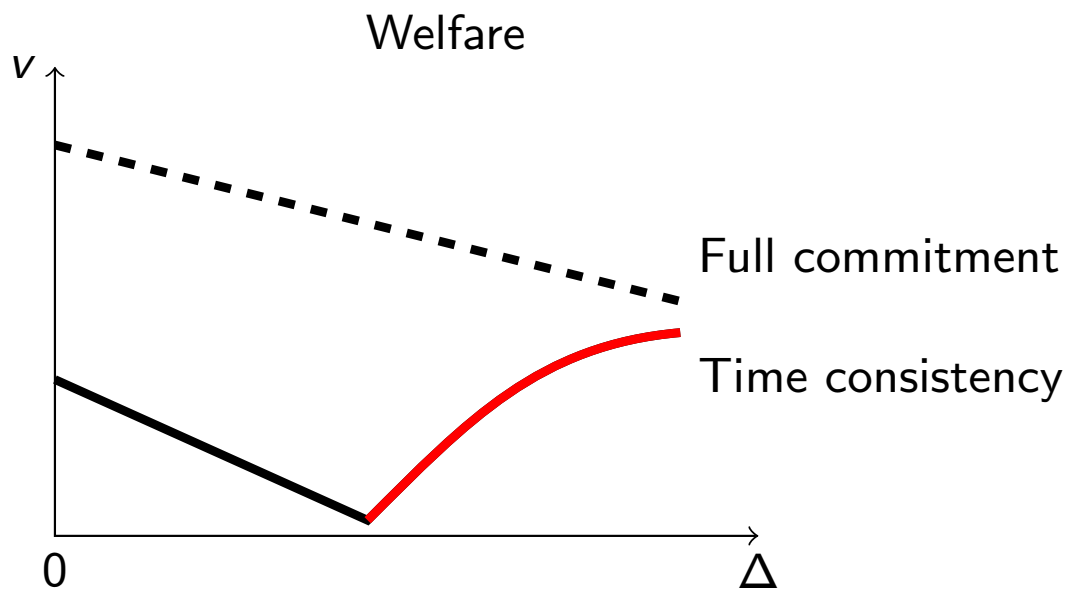


Panic when exchange rate depreciates

Cost Δ 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

$\Rightarrow$ 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

Key insights:

- Central bank with full commitment uses promises of future intervention to stabilize the exchange rate, and may not intervene today
- Time consistency problem means lower intervention and worse exchange rate stabilization under discretion
  — especially when reserves are low and the shock is persistent
- Temporary pegs and volume intervention rules can improve welfare
- Existence of unsophisticated investors may improve or worsen welfare