The anatomy of a peg: lessons from China's parallel currencies

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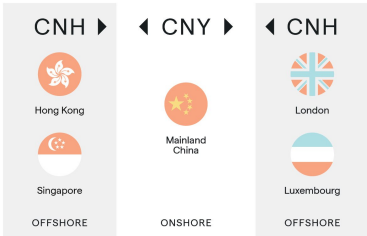
China's large-scale monetary experiment



- CNY: mainland currency, Chinese
- CNH: parallel currency, anyone
- Officially convert 1:1

Why? Internationalisation strategy

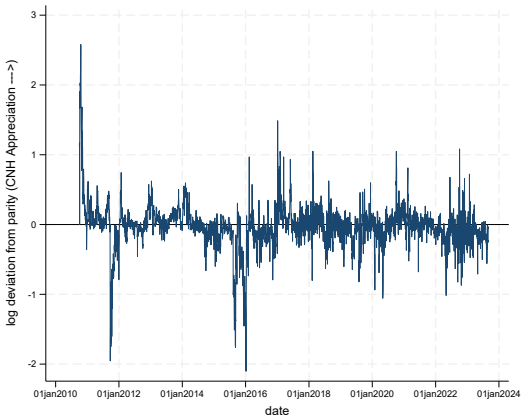
- Foreigners can use CNH freely for payments or to convert to other currencies.

Open current account, closed capital account

- Chinese firms can export/import without restrictions in CNH and convert to CNY against invoices.
- Restrictions and quotas on conversion for capital flows that are closely monitored: FDI, investment, household transfers, bank borrowing/lending.
- Large scale parallel currencies.

Gresham's law: the peg to parity and success

CNY to CNH (E)



Tension: if $\ln(E) \neq 0$ for too long, capital controls will fail by arbitrage

How is it implemented?

- Controlling scarcity of M to target E.
- PBoC weekly manages M through auctions for CNH bills
- HKMA hourly manages M through lending facility
- This paper: learn classic lessons about monetary economics, and how pegs are kept from this experience

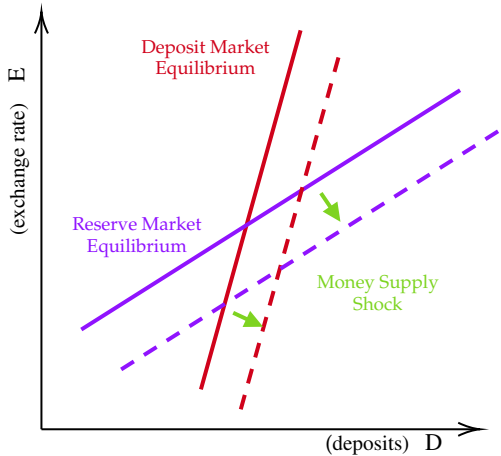
Model of banking

- Risk neutral competitive banks raise deposits onshore or offshore subject to withdrawal shocks met with offshore reserves. Interest semi-elasticity of reserve demand from banks $\varepsilon_m \equiv \partial ln(M)/\partial R^m$ – negative of elasticity wrt E.

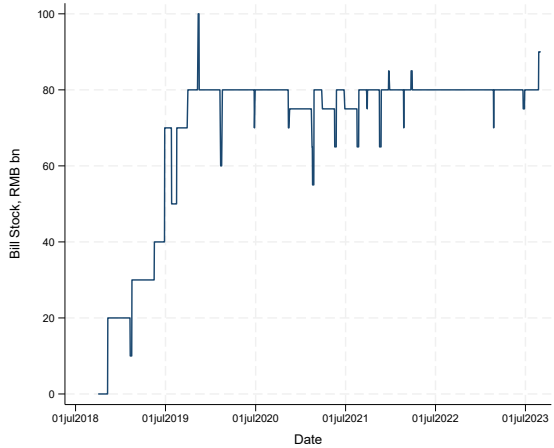
- Chinese households demand for deposits given rate of deposits R^d and preference (money demand) shock. Interest semi-elasticity ε_d

- Equilibrium for (E, D) money supply shock:

$$d\log(E)/d\log(M) = (\varepsilon_m + (M/D)\varepsilon_d)^{-1}$$

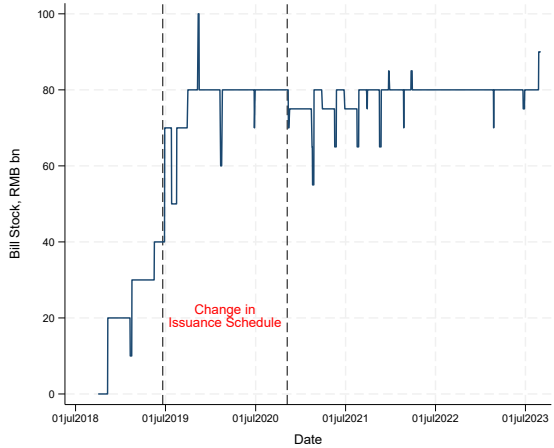


EXOGENOUS HIGHER CNH MONEY SUPPLY



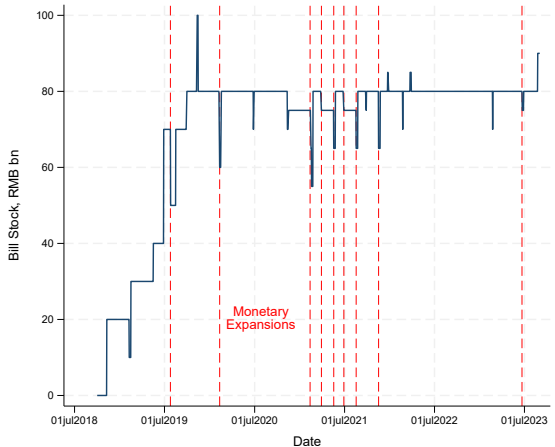
Bill issuance: November 2018 goal was 40bn of 3M bills and 10bn of 12M bills.

EXOGENOUS HIGHER CNH MONEY SUPPLY

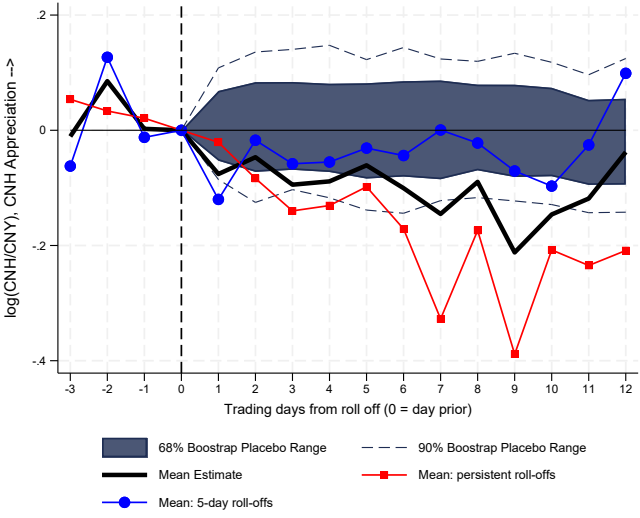


8 Aug 2019: new goal of 20bn of 3M and 6M and 40bn of 12M. 6 Nov 2020: switch to 10bn of 3M and 6M and 60bn of 12M

EXOGENOUS HIGHER CNH MONEY SUPPLY



Response of E to M



A 1% increase in M lowers E by 0.11pp.

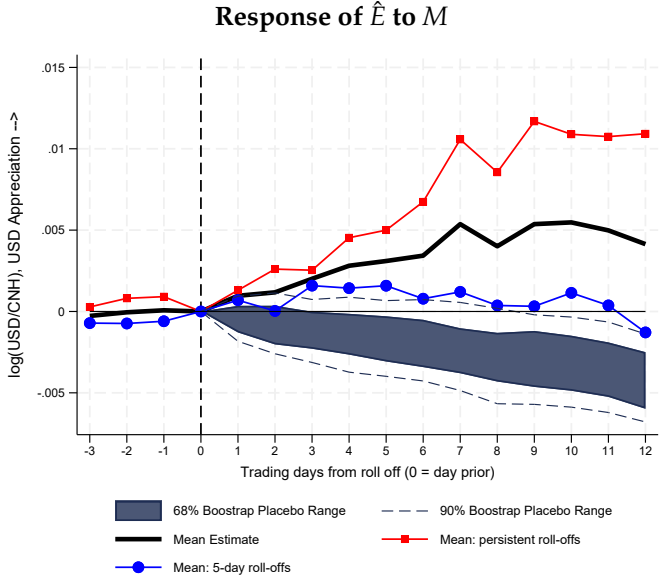
Since $\frac{M}{D} = \frac{196}{730}$ and $\varepsilon_d \approx 10$, Benati et al (2021) , then

$$\varepsilon_m = \frac{11/196}{0.0011} - \left(\frac{196}{730}\right)\varepsilon_d = 48.$$

Same number as US in 2007 under scarce reserve system. Also matches time series exercise.

WHY LET E FLUCTUATE? E IS A PRESSURE VALVE FOR $\hat{E}$

- When the yuan is depreciating against USD, CNH depreciates more than CNY...
- ...and vice versa when appreciating...
- ... failure to perfectly maintain the peg is a tool to slow an FX adjustment.



MONETARY ANATOMY OF THE PEG

Simple policy rule

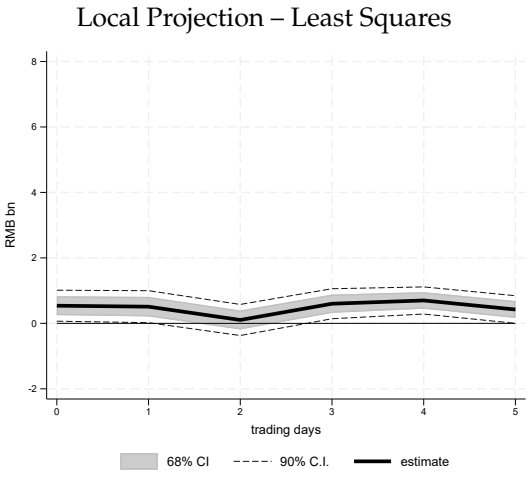
$$\log(M'/M) = \eta \log(E).$$

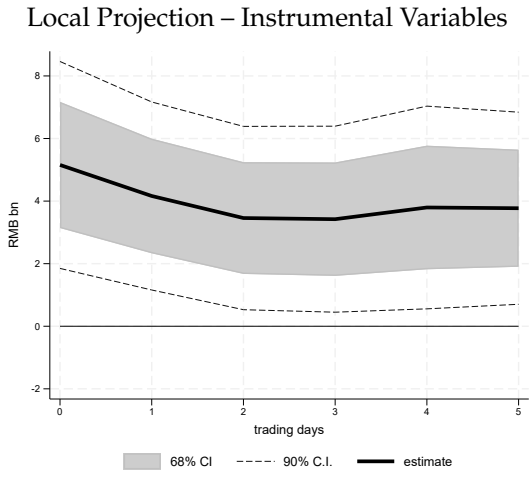
Is (i) $\eta > 0$ and, if so, (ii) is η big enough to maintain the peg?

But E also driven by policy changes and other supply shocks. IV strategy based on CNY:

- CNY-USD exchange rate ($\tilde{E}$) trades in a 2% corridor around a central parity rate ($\bar{E}$).
- $\bar{E}$ set in the morning and not set in response to E.
- Most of time $\bar{E}$ tracks the previous close of CNY-USD. Sometimes it does not. Unfilled pressure on CNY rate to change.
- Since CNH is not controlled, it will adjust in anticipation of CNY
- Use deviation of $\bar{E}$ today from $\tilde{E}$ yesterday as instrument for E, F-stat is 20.

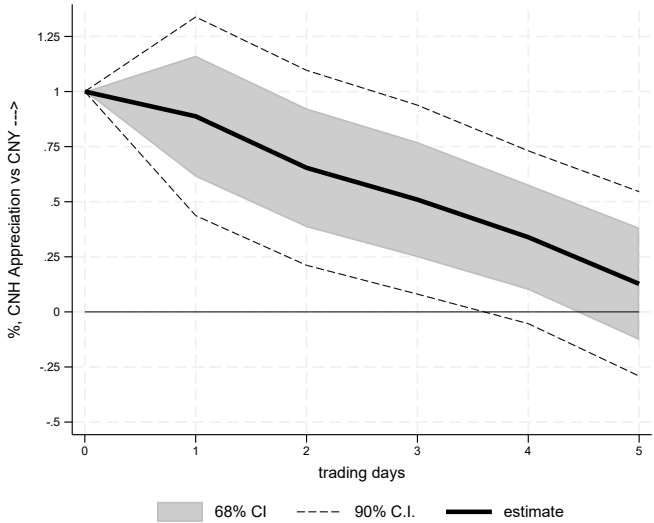
Response of M to E (PLP lending)





If z is PLP drawing, then plot from regression $y_{t+h} = \beta_h e_t + \gamma_h e_{t-1} + \delta_h y_{t-1} + \text{error}$

Is the money response enough to restore parity?



After 5 days, 0.83 of 1% increase in the exchange rate has reverted. Channels:

- 0.53 can be accounted for by the shock dissipating (incl CNY adjustment),
- ¥5bn money response: using earlier estimate accounts for 0.05
- Remaining 0.25: other liquidity policies that shift $\phi(M/D)$

A LIQUIDITY ANATOMY OF THE PEG

- Poole model of random withdrawal shock, interbank markets, and discount window.
- A rise in money demand only partially offset by a rise in money supply (E rises) leads to:
  a) an increase in the tightness in the interbank market θ;

A) INTERBANK MARKET TIGHTNESS: BILL AUCTION SUBSCRIPTIONS

Regression of bill auction subscription rate (bids / bills auctioned) on the exchange rate

Bill maturities	All	12M	6M	3M
	(1)	(2)	(3)	(4)
$\frac{1}{5}\sum_0^4 \log(E_{t-h})$	-2.76***	-3.38***	-2.78***	-3.38***
	(0.93)	(1.10)	(0.93)	(1.12)
Number of Auctions	35	19	16	19
R^2	0.142	0.335	0.131	0.324

Heteroskedasticity robust standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, ***$p < 0.01$

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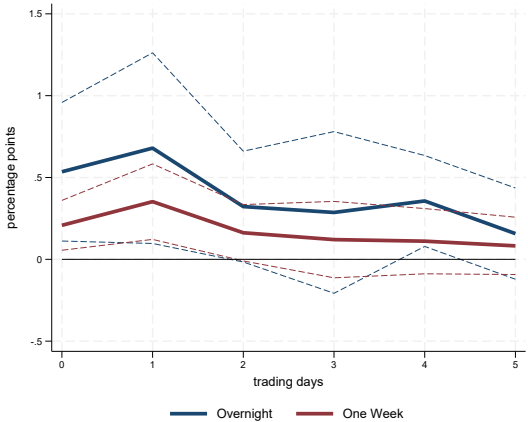
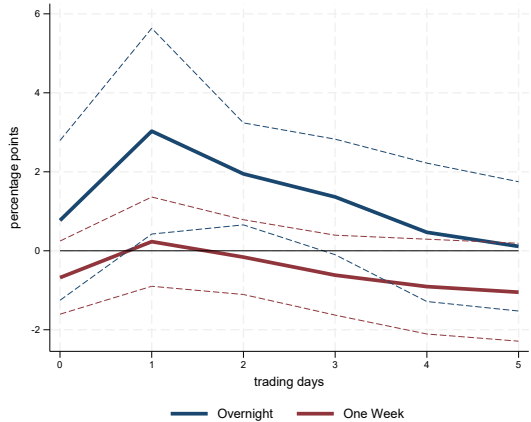
  b) an increase in the interbank rate $R^f(\theta)$;

B) INTERBANK RATE RESPONSE TO A MONEY DEMAND SHOCK

Local Projection - Least Squares



Local Projection - Instrumental Variables



z is interbank rate facility drawing, plot from regression $z_{t+h} = \beta_h e_t + \gamma_h e_{t-1} + \delta_h z_{t-1} + \text{error}$

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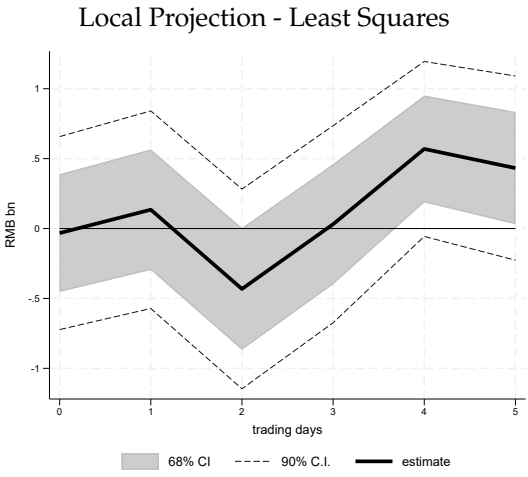
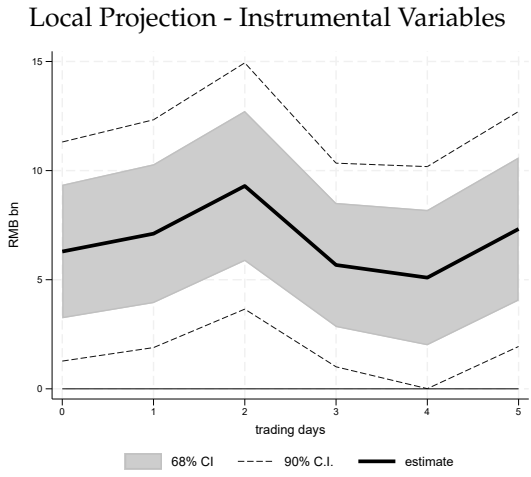
  c) greater use of the discount window liquidity facilities.

C) Discount window drawings





z is intraday facility drawing, plot from regression $z_{t+h} = \beta_h e_t + \gamma_h e_{t-1} + \delta_h z_{t-1} + \text{error}$

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- Liquidity policies: restrict access to the lending facility raises the marginal benefit of reserves, appreciates the CNH. Case study: 5 April 2016 and the role of the three-day lagged overnight rate starts
  $\rightarrow$ Prior to 5 April 2016, the R^z was set as previous day's overnight R^f plus 50bp. On that day, the rule was changed to the average of the previous three days overnight rate plus 50bp. The three day lagged overnight rate starts significantly raising E:
  $\rightarrow$ Another case study: on 22nd of July of 2022, the spread was cut to 25bp: comparing 10 days before to 10 days: 2bp reduction in E and a 10bp reduction in R^f

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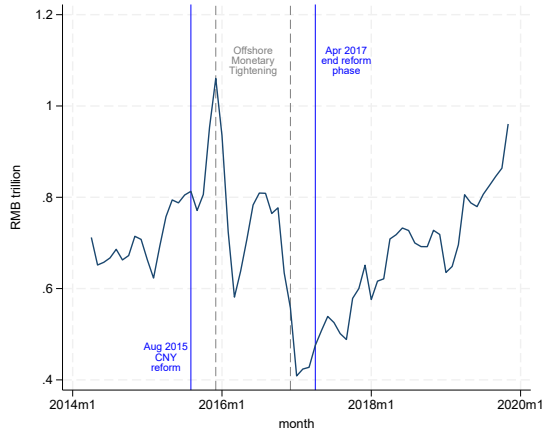
- Liquidity policies: restrict access to the lending facility raises the marginal benefit of reserves, appreciates the CNH. Case study: 5 April 2016 and the role of the three-day lagged overnight rate starts
- Liquidity controls: on deposit flows, on reserve flows, on FXI via bills: raise the marginal benefit of reserves, can offset negative shocks to money demand in order to keep the peg, come with: more use of the intraday facility; an increase in the interbank rate; a return to parity of the peg E.

EPISODE 1): THE 11/8/2015 DEPRECIATION AND CONTROLS

CNH/USD and CNY/USD exchange rates

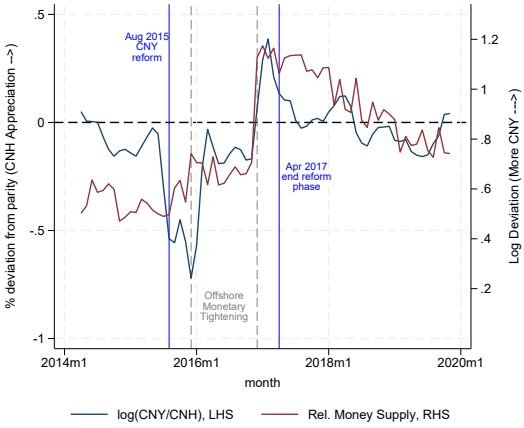
RMB flows from onshore to offshore



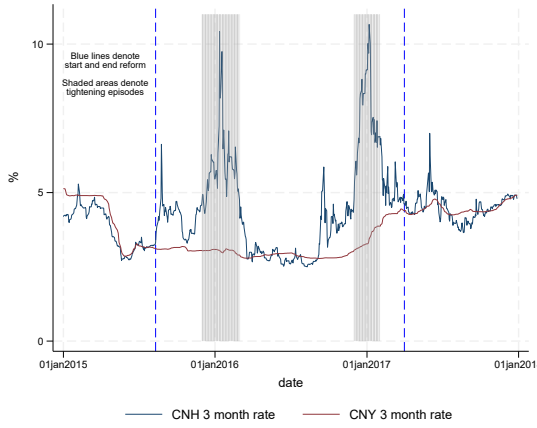
Episode 1): the 11/8/2015 depreciation and controls

Deposits fall, interbank rate rises

Relative stock of CNH-CNY deposits and e

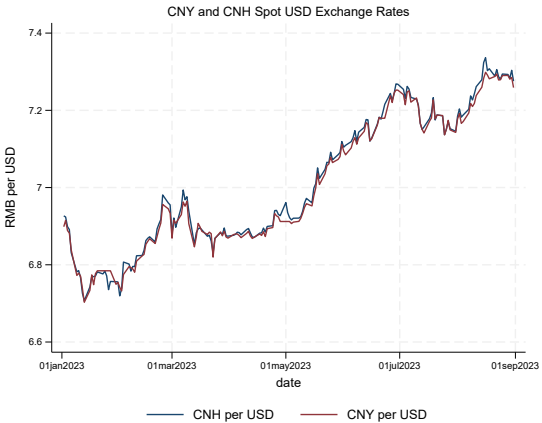


3-month interbank rates for CNH and CNY

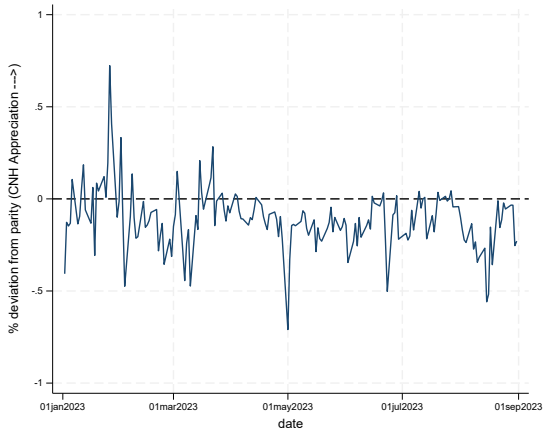


Episode 2) Summer 2023 and monetary/liquidity policies

CNH/USD and CNY/USD exchange rates



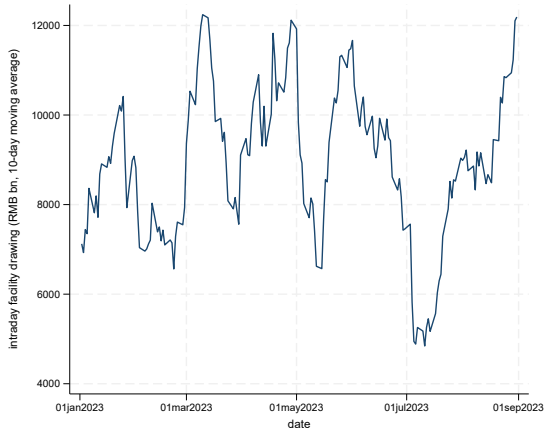
CNH/CNY exchange rate



Episode 2) Summer 2023 and monetary/liquidity policies

3-month interbank rates for CNH and CNY

Intraday liquidity facility borrowing



Conclusion

- China has offshore currency to enforce capital controls while allowing for an open current account and internationalization of the yuan.
  - $\rightarrow$ Gresham's law – need to maintain a peg. How?

- Monetarist anatomy of a peg:
  - $\rightarrow$ Scarce reserves (elasticity of 50) $\implies$ money influences exchange rate.
  - $\rightarrow$ This money supply changes only accounts for one sixth of adjustment to maintain peg.

- Liquidity anatomy of a peg:
  - $\rightarrow$ Other policies that shift the benefit of liquidity used.
  - $\rightarrow$ Interbank market efficiency and discount window.
  - $\rightarrow$ Capital controls limit transfers of liquidity. Active in '15. Less so in '23.