



MONETARY POLICY AND THEORY

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CENTRAL BANK BALANCE SHEET REVISITED

Asset	Liability
Government bond (<u>Govt Bond</u>) Gold Loan to FIs	Currency in circulations
Foreign currency reserve (FRA) - Foreign-denominated assets - Foreign currencies - SDRs	Commercial bank reserve
	<hr/> Capital + Net Worth

Monetary Base

INTERVENTION IN THE FOREIGN EXCHANGE MARKET

- Central banks' intervention and the money supply

Central bank			
Assets		Liabilities	
Foreign Assets	-\$1B	Currency in circulation	-\$1B
(International Reserves)			

Central bank			
Assets		Liabilities	
Foreign Assets	+\$1B	Deposits with the central bank	+\$1B
(International Reserves)		(reserves)	

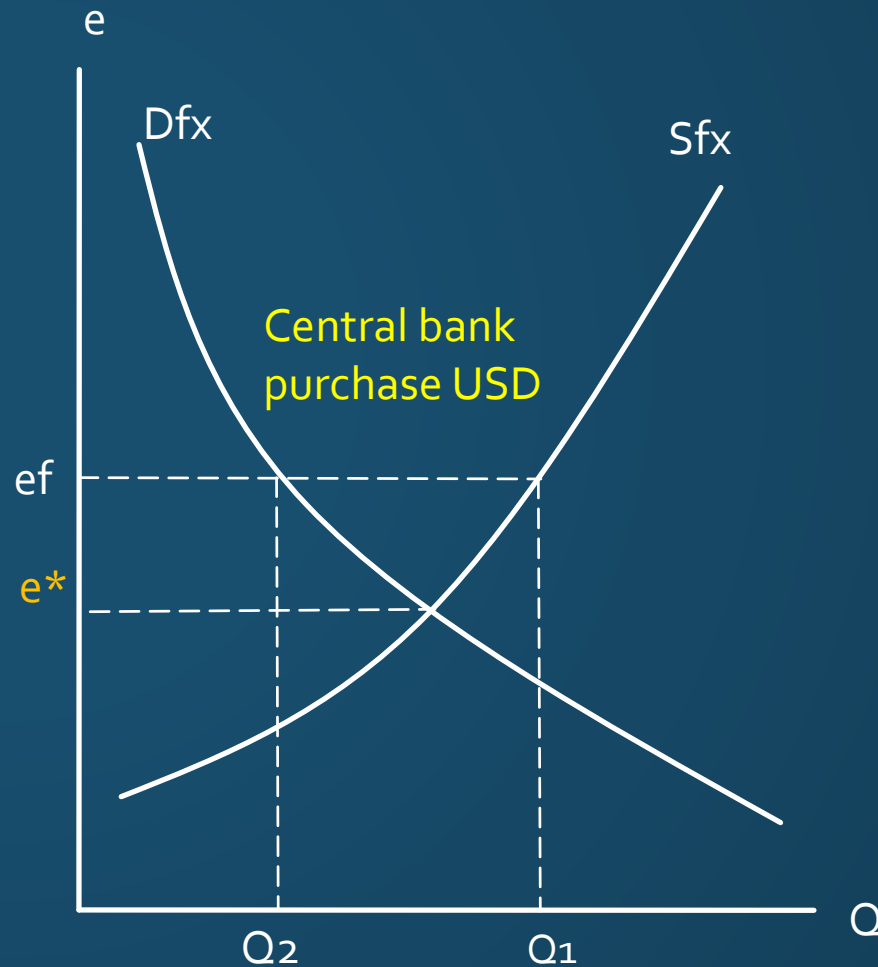
- A central bank's sale of foreign currency (foreign assets) leads to an equal decline in its international reserves and the monetary base.
- A central bank's purchase of foreign currency (foreign assets) results in an equal rise in its international reserves and the monetary base.

PURPOSE OF THE INTERVENTION

- Additional tool to provide liquidity in the market.
 - **Foreign operations:** buying and selling forex / SWAP contract
- Creating demand and supply in the forex market
 - Redirect exchange rate to the targeted level (fixed exchange rate)
 - Stabilize the movement of the exchange rate.

OFFICIAL RATE E_F ABOVE E^* : IMPLEMENTATION AND INTERVENTION

- Domestic currency (e_f) is undervalued.
 - Excess S_{fx} ; $BOP > 0$.
 - Central bank buys FX to fix e_f .
 - Accumulation of FX.
 - Problem?



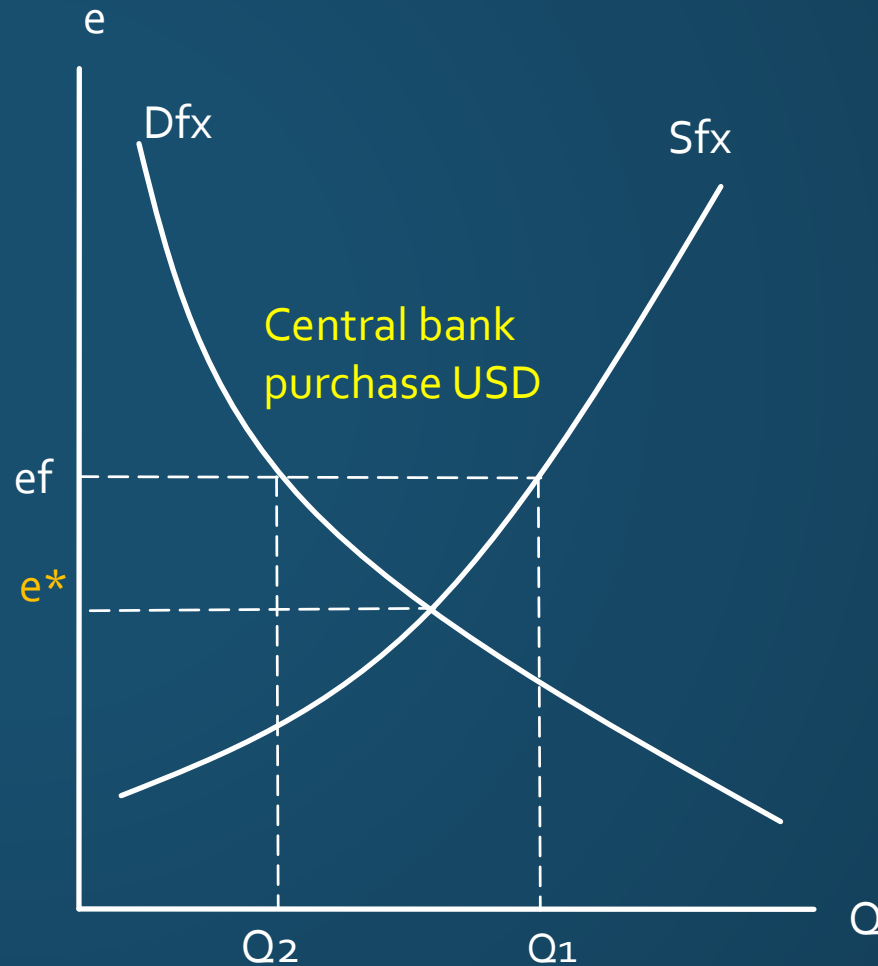
OFFICIAL RATE E_F ABOVE E^* : IMPLEMENTATION AND INTERVENTION

Asset	Liability
Government bond (Govt Bond)	Currency in circulations
Gold	
Loan to FIs	
Foreign currency reserve (FRA)	Commercial bank reserve
- Foreign-denominated assets	
- Foreign currencies	
- SDRs	
	Capital + Net Worth

↑ Monetary Base

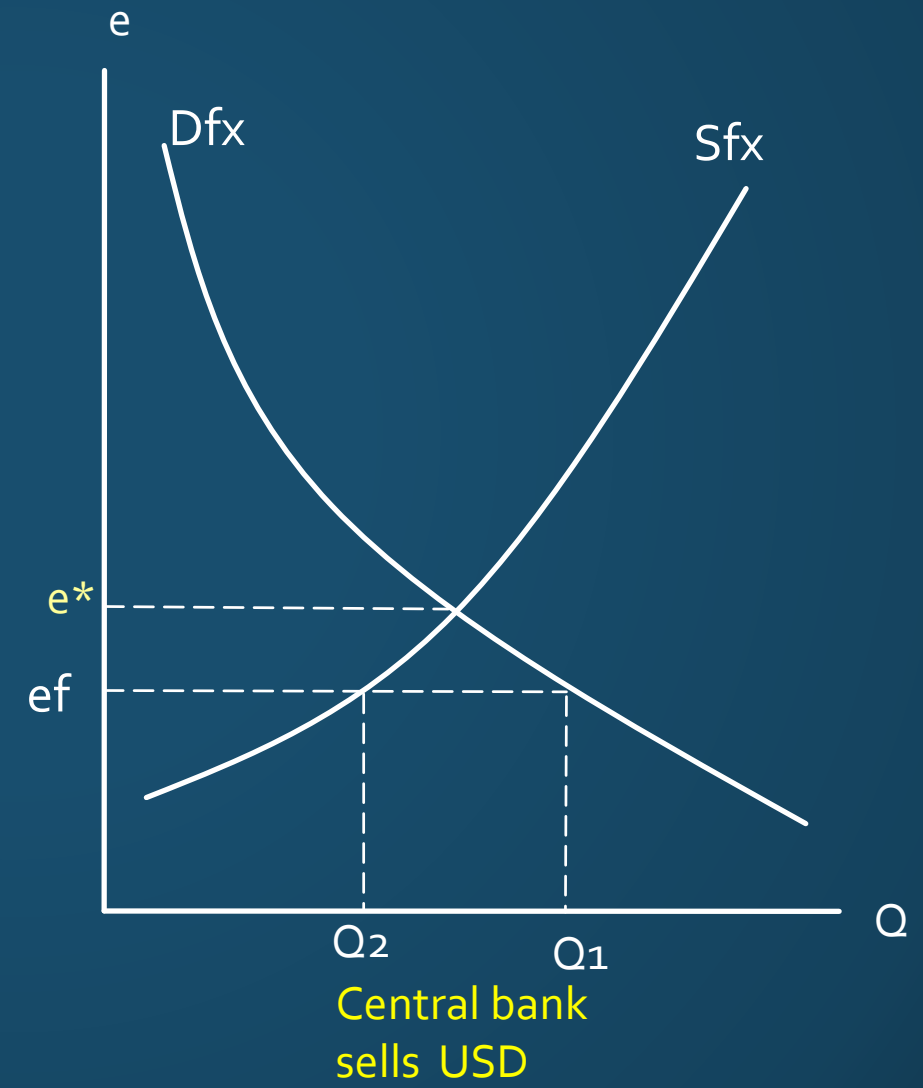
Mechanically, monetary base will rise, following the attempt to **sustain** the exchange rate at the targeted level (under fixed exchange rate)

Revaluation: lower e_f to get close to e^*



OFFICIAL RATE e_f UNDER e^* : IMPLEMENTATION AND INTERVENTION

- Domestic currency (e_f) is overvalued.
 - Excess D_{fx} ; $BOP < 0$.
 - Central bank must sell FX to fix e_f .



OFFICIAL RATE e_f UNDER e^* : IMPLEMENTATION AND INTERVENTION

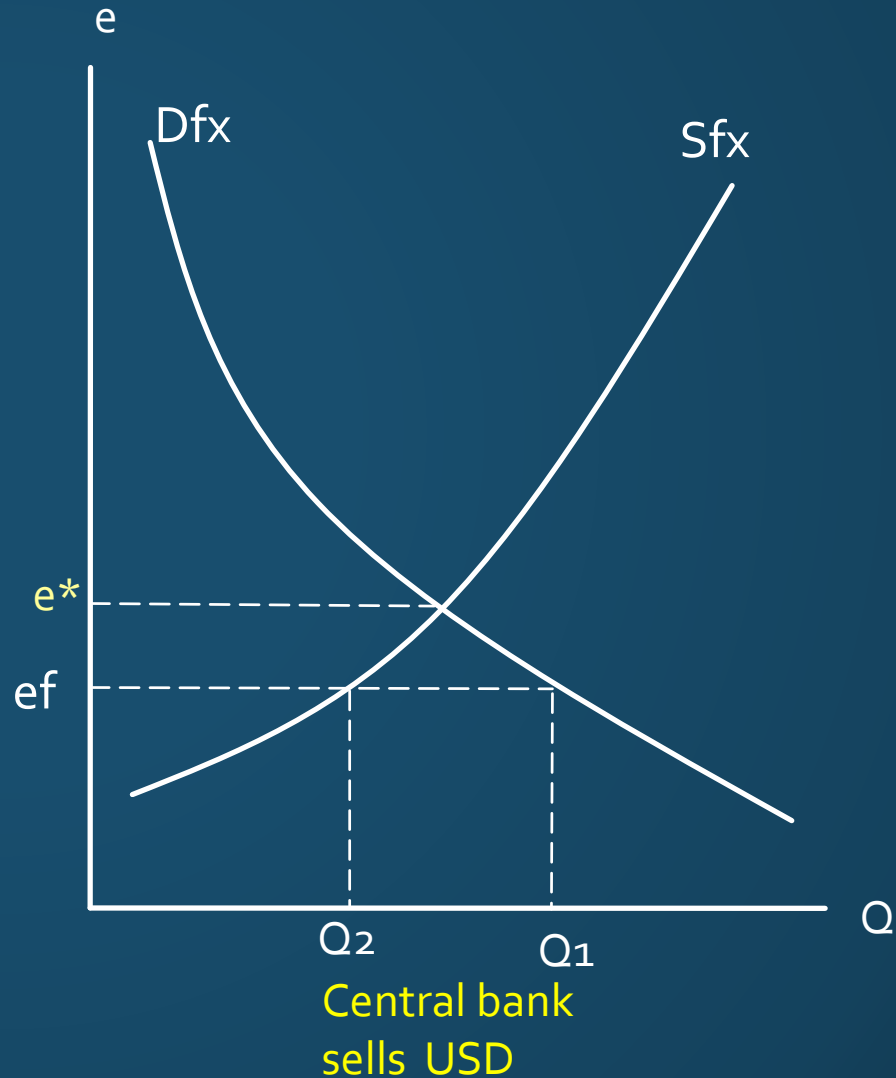
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- Foreign-denominated assets	<hr/> Capital + Net Worth
- Foreign currencies	
- SDRs	

} Monetary Base

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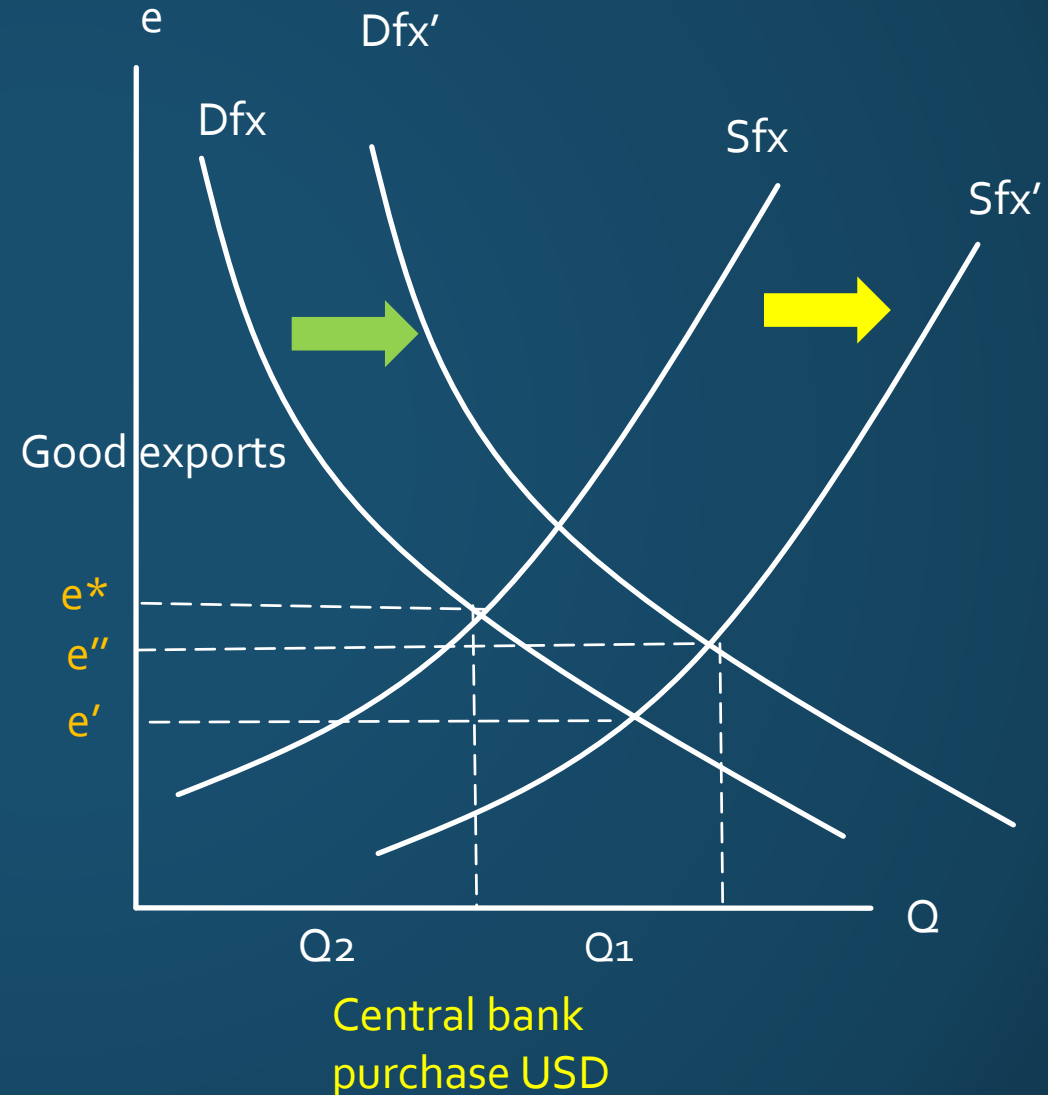
But official reserves are not unlimited?

Devaluation of domestic currency; making domestic currency value weaker.



INTERVENTION IN THE FOREIGN EXCHANGE MARKET

- Good exports on service: $S_{fx} \rightarrow S'_{fx}$
- Hurting goods-exporting firms
- Central bank intervenes the market by buying the USD, creating demand D_{fx}' .
- Rather than having baht quickly appreciated, central bank can slow down the pace of its appreciation.



INTERVENTION IN THE FOREIGN EXCHANGE MARKET

- Unsterilized forex intervention:
 - Buying more USD implies more foreign reserve accumulated.
 - Monetary base will increase

Asset	Liability
Government bond (Govt Bond)	Currency in circulations
Gold	
Loan to FIs	
Foreign currency reserve (FRA)	Commercial bank reserve
- Foreign-denominated assets	
- Foreign currencies	
- SDRs	Capital + Net Worth

Diagram illustrating the balance sheet components and their relationship to the Monetary Base. A blue arrow points down from Government bond (Govt Bond) to Foreign currency reserve (FRA). A red arrow points up from Foreign currency reserve (FRA) to the Monetary Base. A blue arrow points down from the Monetary Base to Commercial bank reserve. A red arrow points up from Commercial bank reserve to the Monetary Base. A bracket on the right side of the table indicates that Currency in circulations and Commercial bank reserve together form the Monetary Base.

- Central bank might offset the increase of monetary base by conducting the OMO sale.
- The technique is commonly called “**Financial sterilization**”, aka sterilized forex intervention.

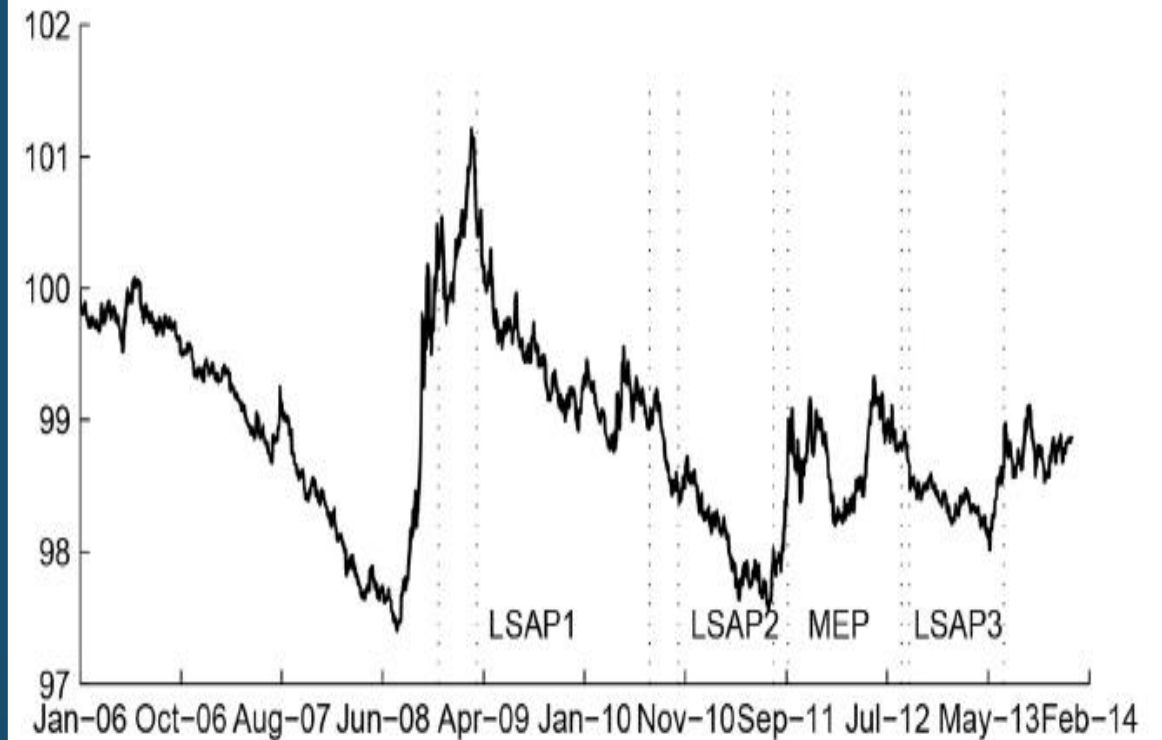
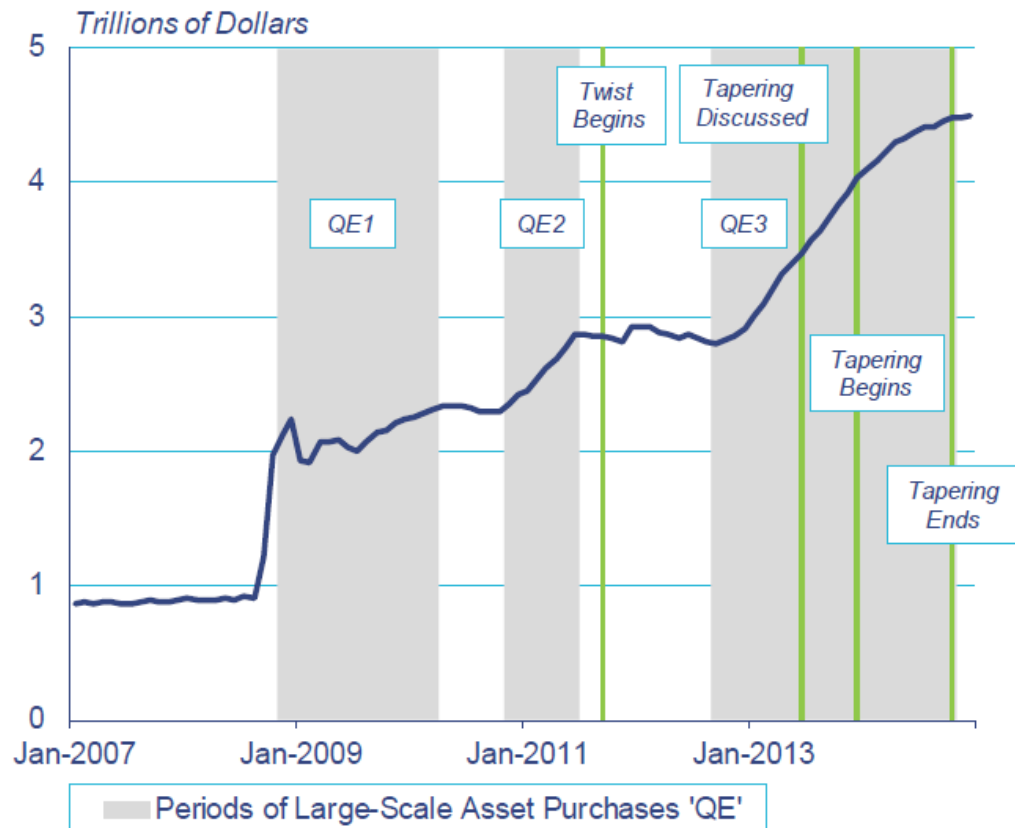
INTERVENTION IN THE FOREIGN EXCHANGE MARKET

- **Sterilized** foreign exchange intervention

Federal Reserve System			
Assets		Liabilities	
Foreign Assets		Monetary Base	
(International Reserves)	+\$1B	(reserves)	0
Government Bonds	-\$1B		

- To counter the effect of the foreign exchange intervention, conduct an offsetting open market operation
- There is no effect on the monetary base.

APPLICATION: QES AND EMERGING MARKET CURRENCY

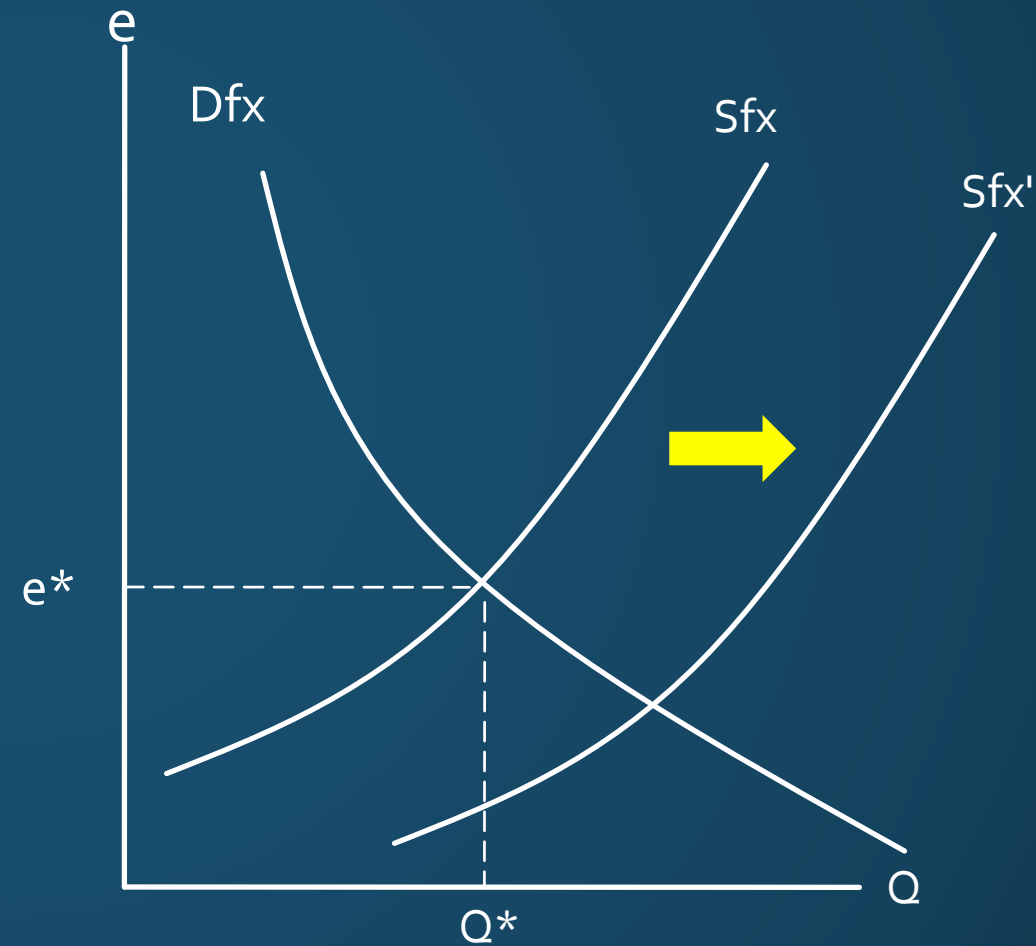


B. EME exchange rates (index)

APPLICATION: QES AND EMERGING MARKET CURRENCY

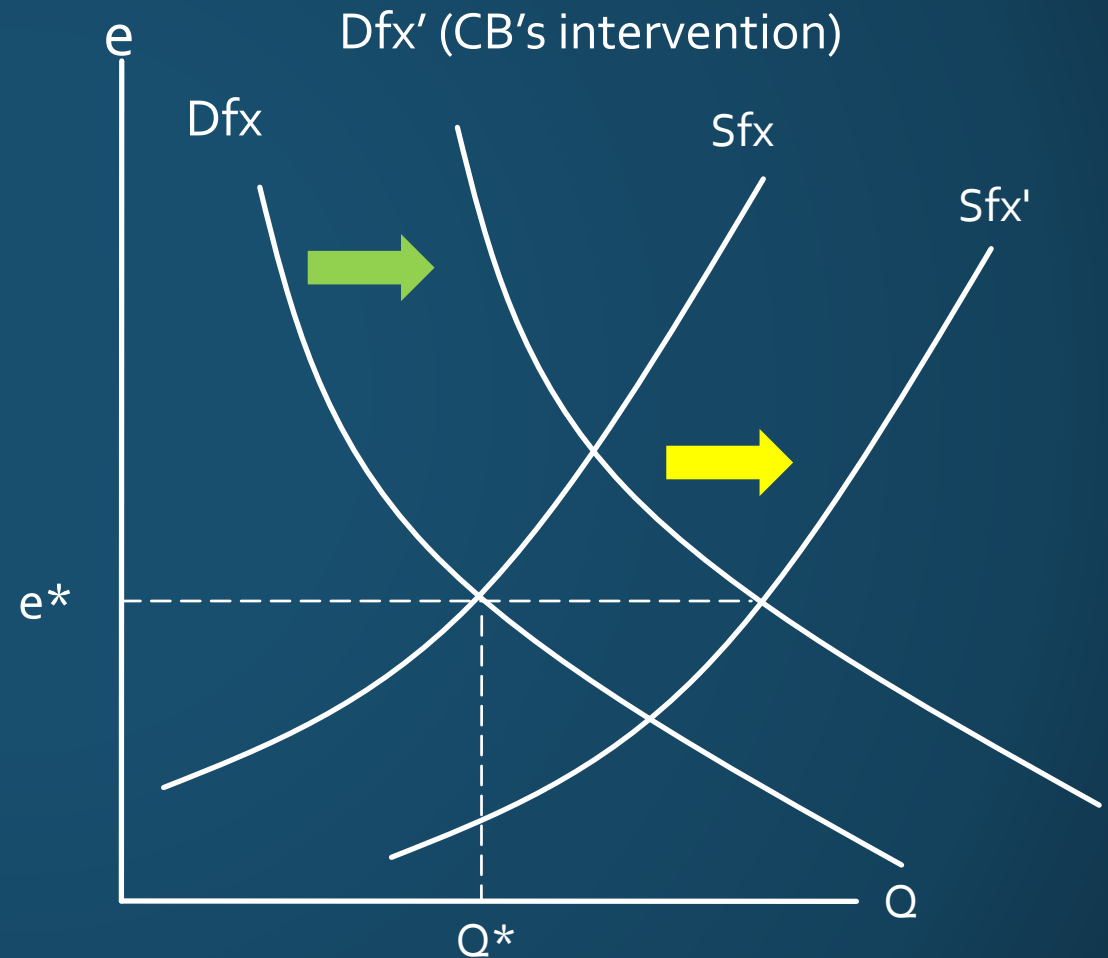


B. EME exchange rates (index)



APPLICATION: QES AND EMERGING MARKET CURRENCY

- Emerging market central banks had worried about the pace of appreciation.
- **They intervened the forex market.**



Instruments used for FX intervention

Table 2

Instrument	Mechanism	Effects			Examples
		Provide hedge for FX exposure	Support FX market liquidity	Economise on use of FX reserves	
FX spot transaction	Central bank sells FX spot	Yes	Yes	No	
FX swap or FX repo	Central bank sells FX spot and purchases FX forward	Yes, against market risk or FX maturity mismatch	Possibly	Yes; only temporary supply of FX	Korea (FX swap), Brazil and Russia (FX repo)
Currency forward (non-deliverable, settled in local currency) ¹	Central bank pays domestic currency related to change in FX value	Domestic currency payment offsetting FX valuation losses	Possibly, if FX demand declines	Yes; no foreign currency payment	Brazil, Peru
FX index certificate	Central bank pays domestic currency equivalent of change in FX value	Domestic currency payment offsetting FX valuation losses	Possibly, if FX demand declines	Yes; no foreign currency payment	Peru
FX options	Central bank sells options to buy FX from its reserves if local currency depreciation exceeds threshold	Yes	Yes; supplies liquidity when demand for FX increases	Yes, partly. FX reserves sold only when market initiates purchases (ie options are exercised)	Colombia

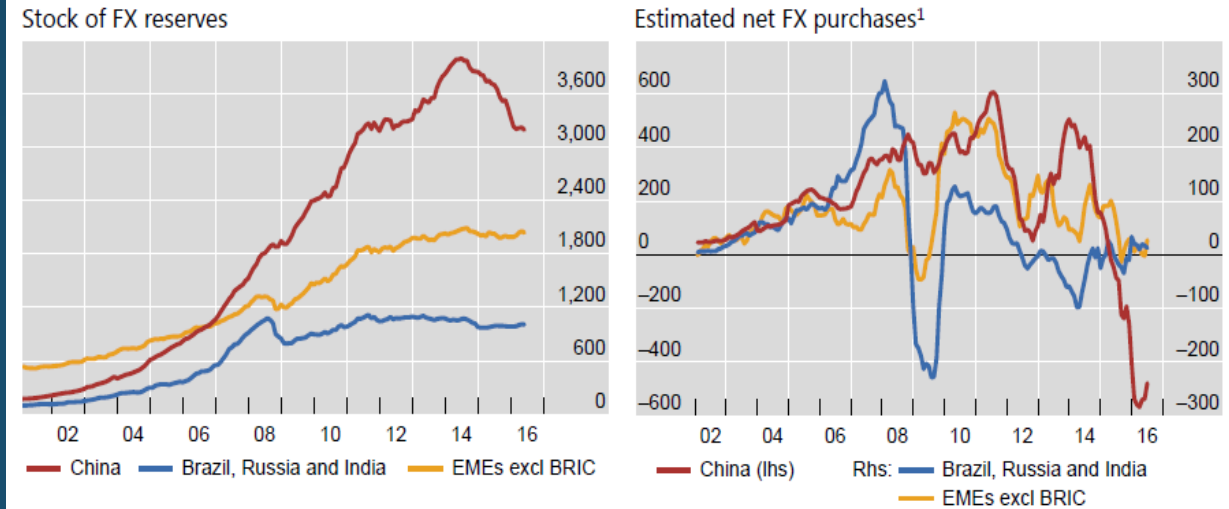
¹ Referred to as swap cambial (currency or FX swap) in Brazil.

Source: National authorities.

Foreign reserves and estimated net FX purchases

In billions of US dollars

Graph 1



¹ Twelve-month moving sums. Based on actual intervention data whenever available; otherwise based on reserve variation net of valuation effects. Valuation gains and losses were computed based on the average currency composition for EMEs.

Sources: IMF, *Data Template on International Reserves and Foreign Currency Liquidity* and *International Financial Statistics*; national data; authors' calculations.

- Intervention was followed by the **sterilization program**.
- Central banks then offset the increase of money supply by **conducting OMO sale!**
OMO sale → limitation?
- Direct absorb the liquidity by issue central bank's bond.

Interest rate differential!

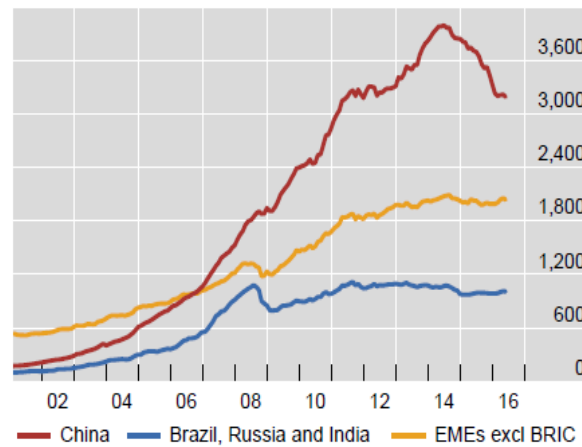
APPLICATION: QES AND EMERGING MARKET CURRENCY

Foreign reserves and estimated net FX purchases

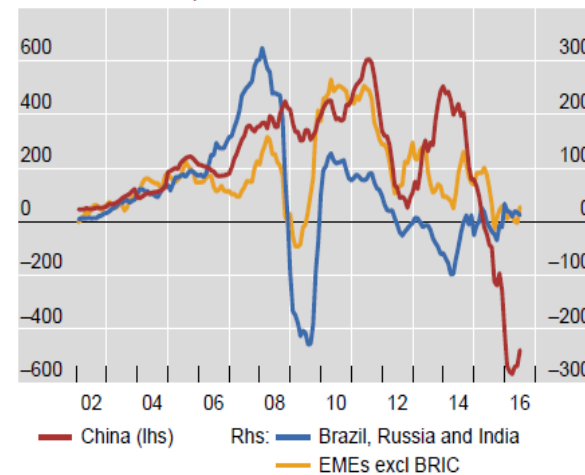
In billions of US dollars

Graph 1

Stock of FX reserves



Estimated net FX purchases¹



¹ Twelve-month moving sums. Based on actual intervention data whenever available; otherwise based on reserve variation net of valuation effects. Valuation gains and losses were computed based on the average currency composition for EMEs.

Sources: IMF, *Data Template on International Reserves and Foreign Currency Liquidity* and *International Financial Statistics*; national data; authors' calculations.

- Intervention was followed by the sterilization program.
- Central banks then offset the increase of money supply.
OMO sale → limitation?
- Direct absorb the liquidity by issue central bank's bond.
- What's the problem?

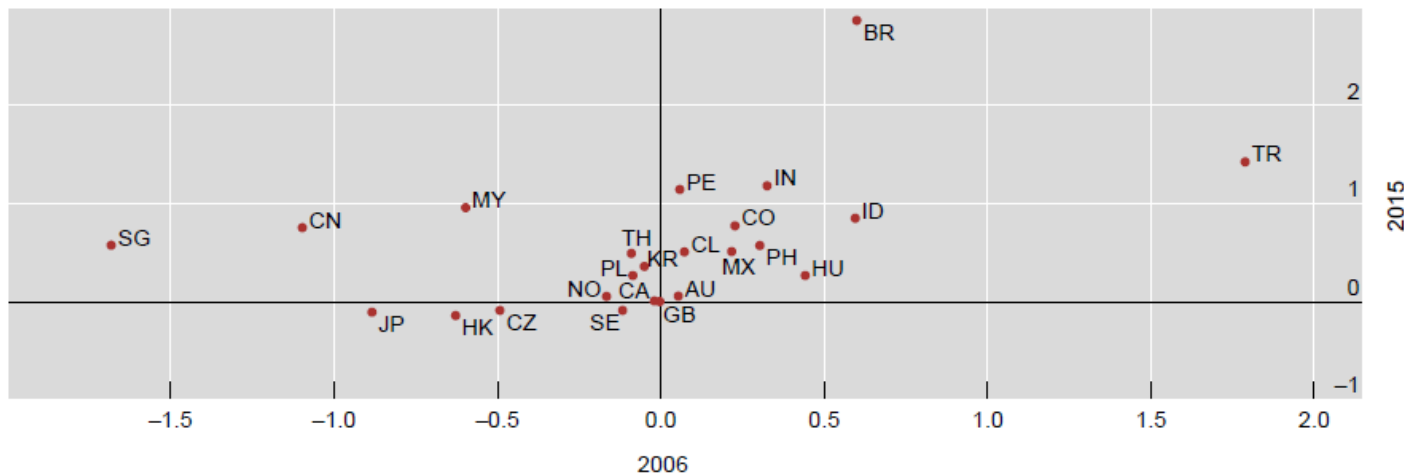
Interest rate differential!

APPLICATION: QES AND EMERGING MARKET CURRENCY

Interest rate differentials¹ have increased, raising the cost of holding FX reserves

Cost of FX holdings, as a percentage of GDP

Graph 4



AU = Australia; BR = Brazil; CA = Canada; CL = Chile; CN = China; CO = Colombia; CZ = Czech Republic; GB = United Kingdom; HK = Hong Kong SAR; HU = Hungary; ID = Indonesia; IN = India; JP = Japan; KR = Korea; MX = Mexico; MY = Malaysia; NO = Norway; PE = Peru; PH = Philippines; PL = Poland; SE = Sweden; SG = Singapore; TH = Thailand; TR = Turkey.

¹ FX reserves multiplied by interest rate differentials. Interest rate differentials are calculated as the difference between the one-year US Treasury bill yield and the closest comparable domestic yield.

Sources: IMF, *Data Template on International Reserves and Foreign Currency Liquidity* and *International Financial Statistics*; Bloomberg; Datastream.

Interest rate differential!

- EME bonds offer higher yield!
- US bonds offer low yield!

Technically, central bank is selling Higher-yield bond to acquire lower-yield bond

As market stress grows, so does the role of FX reserve buffers in containing risk

Dependent variable: sovereign risk premia in EMEs (five-year CDS spread)

Table 4

	Estimated at:				
	10th percentile (low CDS spread)	25th percentile	Median CDS spread	75th percentile	90th percentile (high CDS spread)
FX reserves/imports	-0.096 (0.098)	-0.286** (0.125)	-0.464*** (0.159)	-0.702*** (0.305)	-1.016*** (0.370)
CPI inflation	0.041*** (0.010)	0.063*** (0.011)	0.072*** (0.014)	0.097*** (0.018)	0.108*** (0.022)
Fiscal balance/GDP	-0.051*** (0.010)	-0.057*** (0.012)	-0.071*** (0.014)	-0.118*** (0.017)	-0.161*** (0.030)
Debt service/GDP	0.148*** (0.019)	0.138*** (0.025)	0.185*** (0.038)	0.292*** (0.048)	0.300*** (0.083)
GDP growth	-0.032*** (0.008)	-0.030*** (0.009)	-0.029*** (0.009)	-0.042*** (0.013)	-0.041*** (0.019)
Exchange rate appreciation	-0.019*** (0.005)	-0.020*** (0.005)	-0.021*** (0.004)	-0.025*** (0.008)	-0.049*** (0.015)
US interest rate	-0.138*** (0.015)	-0.148*** (0.017)	-0.149*** (0.021)	-0.143*** (0.030)	-0.112** (0.048)
VIX	0.021*** (0.216)	0.025*** (0.300)	0.032*** (0.326)	0.036*** (0.582)	0.074*** (1.581)
Estimation method	Quantile regression				
Country fixed effects	Yes				
Number of observations	945				
Pseudo R ²	0.438	0.434	0.425	0.424	0.500

The sample covers Q1 2000–Q4 2015; quarterly data. All explanatory variables are lagged. ***/**/* denotes results significant at the 1/5/10% level. Standard errors, in parentheses, obtained via bootstrapping. Countries covered are Brazil, Chile, China, Colombia, the Czech Republic, Hong Kong SAR, Hungary, India, Indonesia, Israel, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, Singapore, Thailand, Turkey and South Africa.

Source: Authors' calculations.

Benefit?

1. Many have argued that having “excess” foreign reserve is good; **buffer for the capital outflow! (Much like why we have a precautionary saving.)**

2. **FX reserve buffers help containing risk**

Sovereign risk premia down with respect to high “FX reserves/Imports”

APPLICATION: QES AND EMERGING MARKET CURRENCY

- Old thoughts, revisited! The Controls on capital inflows:
 - Lead to a lending boom and excessive risk taking by financial intermediaries
 - Controls may block funds for production uses
 - Produce substantial distortion and misallocation
 - Lead to corruption

APPLICATION: QES AND EMERGING MARKET CURRENCY

- Controls on capital outflows:
 - Promote financial instability by forcing a devaluation
 - Seldom effective and may increase capital flight
 - Lead to corruption
 - Lose opportunity to improve the economy