

Exchange Rates

15.012 Applied Macro and International Economics

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Class Outline

- Nominal exchange rates E
 - Short-run: market for local currency
 - Interest-rate parity
 - Long-run:
 - “Law of one price” and PPP
- Real Exchange rates $\rightarrow E$ and Prices

Nominal Exchange Rate

- Exchange Rate \rightarrow key price in open economies \rightarrow effect on trade and financial flows
- Nominal Ex. Rate = E = price of one currency in terms of another
- Two ways of expressing it:
 - Local currency per unit of foreign currency.
Eg Brazil: \$5 reals per dollar ($\uparrow E$ depreciation of local currency)
 - MORE INTUITIVE: Foreign currency per unit of local currency.
Eg Brazil: 0.2 dollars per real ($\uparrow E$ is appreciation of local currency)
- From now on, I will use the “intuitive” form...

Reals per 1USD



Last year....

Is the Real appreciating /depreciating?

Less Reals to buy dollar.....

Real is appreciating

Dollars per 1 Real



More dollars to buy real.....

Euros per 1USD



Last 5 days....

Is the Euro appreciating /depreciating?

Less Euros to buy dollar.....

Euro is **appreciating**

Dollars per 1EUR



More dollars to buy euro.....

Market for Local Currency

- The “price” is E (foreign currency per unit of local currency)
- $\uparrow E$ means local currency is more valuable (appreciates)

What affects E ?

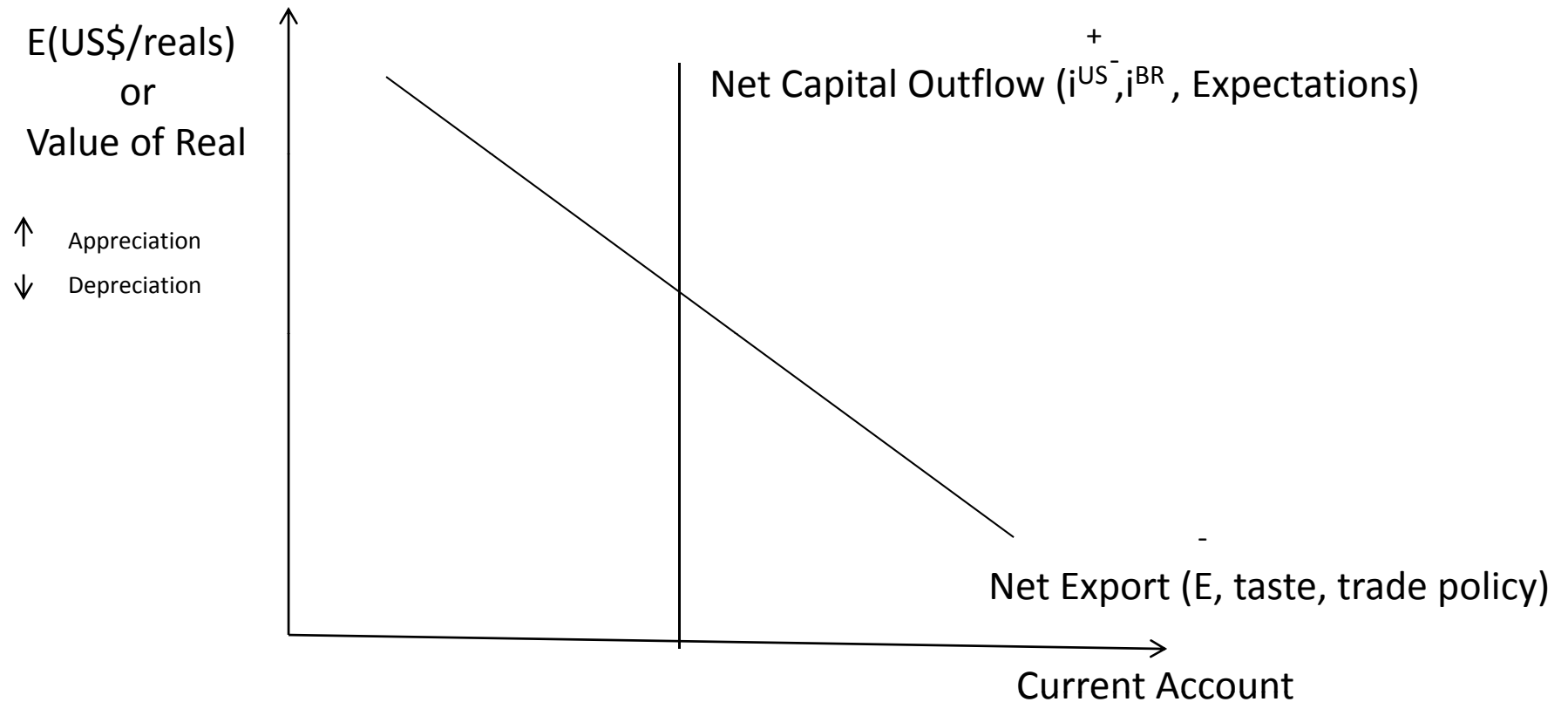
- Exports & Imports
- Financial Flows

Market for Local Currency

- Example: Brazil
 - Imports → need to buy dollars to purchase goods abroad → supply reals
 - Exports → bring dollars from abroad, need to exchange them for reals → demand reals
 - Capital Outflows (away from brazil) → supply reals
 - Capital Inflow (coming to brazil) → demand reals

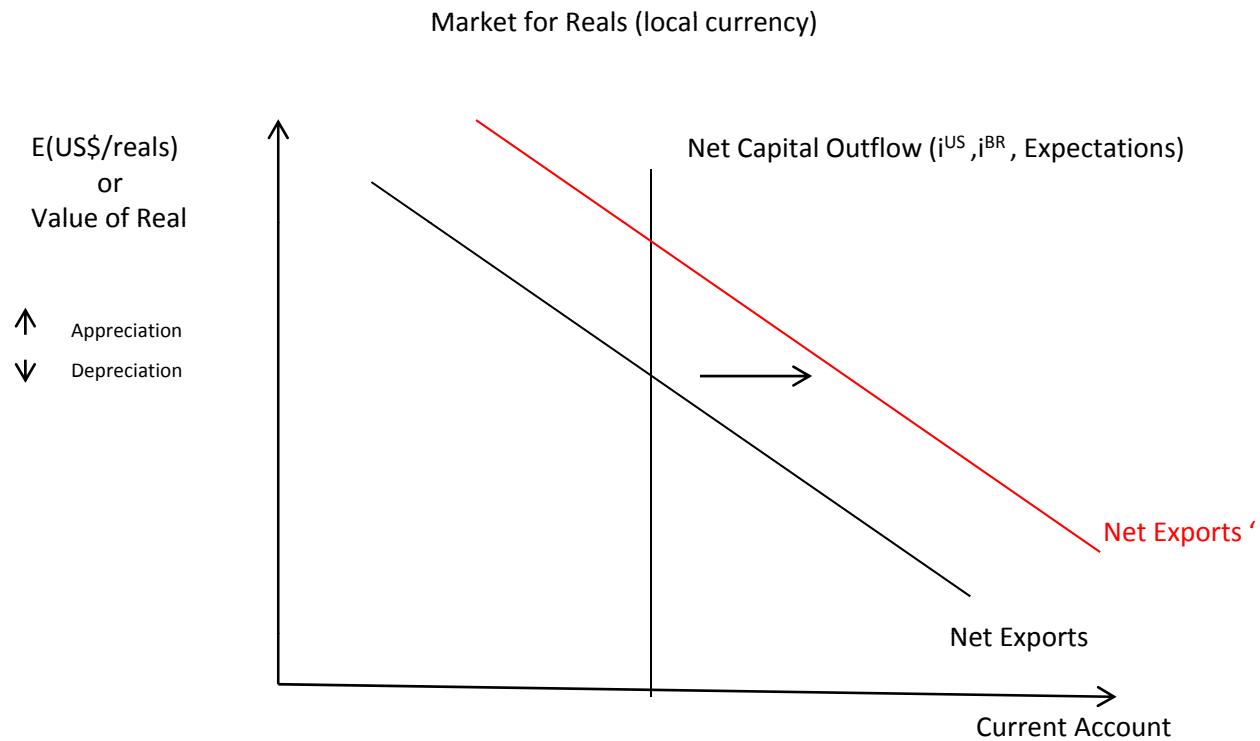
Short-run: Currency Market

Market for Reals (local currency)



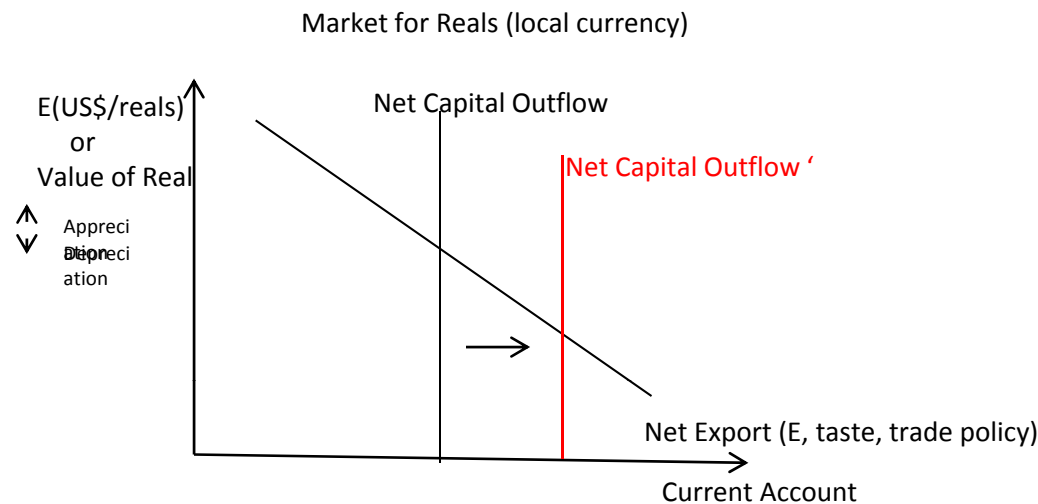
What affects the nominal E?

- Exports are more desirable $\rightarrow \uparrow NX \rightarrow \uparrow E \rightarrow$ appreciation



What affects the nominal E?

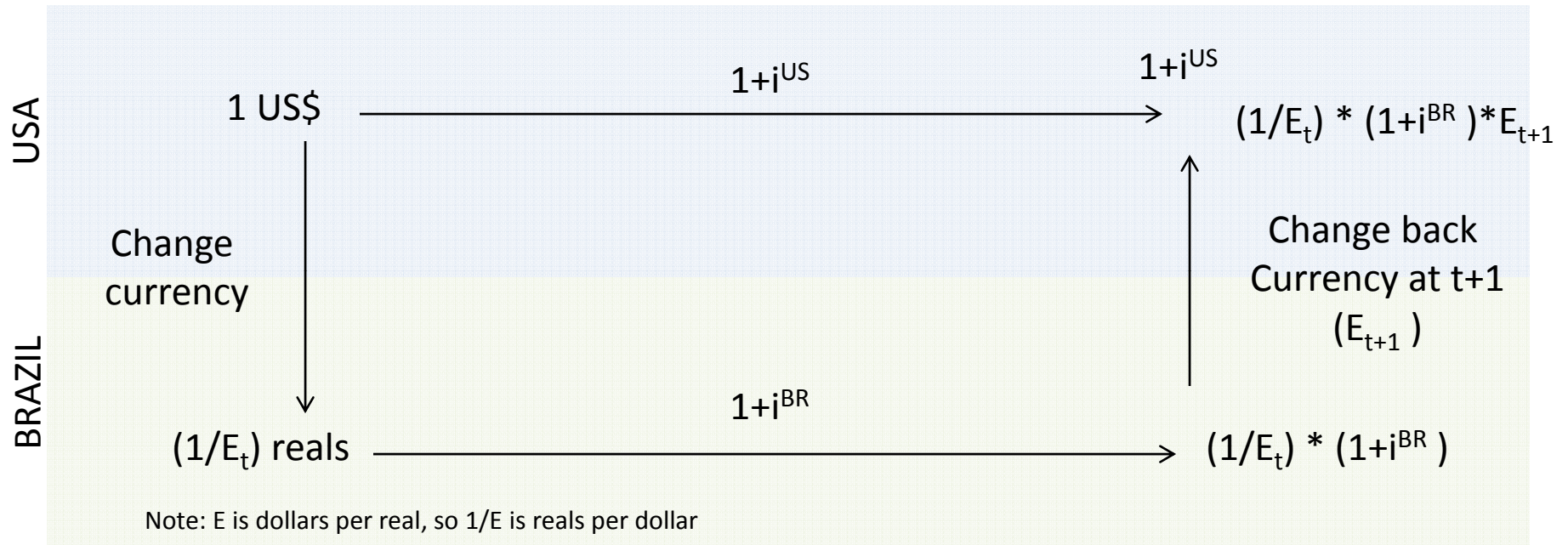
- If interest rates go down \rightarrow capital outflows \rightarrow \downarrow E \rightarrow depreciation
- If investors leave in panic \rightarrow capital outflows \rightarrow \downarrow E \rightarrow depreciation



Short-run

- In the short-run → mostly about financial transactions → capital outflows and inflows
- Depend on interest rates + current and expected exchange rates

Interest Rate Parity



$$\underbrace{1+i^{US}}_{\text{Invest in US}} = \underbrace{(1/E_t) * (1+i^{BR}) * E_{t+1}}_{\text{Invest in BRAZIL}}$$

If $\downarrow i^{US}$, $\uparrow i^{BR}$ or expect appreciation or real $\uparrow (E_{t+1}/E_t)$

$\rightarrow 1+i^{US} < (1+i^{BR}) * (E_{t+1}/E_t) \rightarrow$ more capital flows to Brazil (example of "carry trade")

Long Run Theories

- Purchasing Power Parity (PPP)
- Based on “Law of one price”
 - same good should sell for the same amount (expressed in same currency) in two countries
 - Otherwise → arbitrage opportunity

$$\underbrace{p^{US}}_{\text{Cost US (dollars)}} = \underbrace{p^{BR} \cdot E_{(US\$/Real)}}_{\text{Cost in Brazil (dollars)}}$$

PPP

- If PPP holds, in the long run:

$$E(\text{US\$}/\text{Real}) = P^{\text{US}} / P^{\text{BR}}$$

- Intuition: If $\uparrow P^{\text{US}} / P^{\text{BR}} \rightarrow$ US is expensive, Brazil cheap \rightarrow buy goods in brazil, sell in US \rightarrow demand for real goes up (think exports) $\rightarrow \uparrow E(\text{US\$}/\text{Real})$

Does PPP hold in the data?

- “Big Mac” Index

US vs UK

$$\text{US\$}3.73 = \text{£} 2.29 * 1.61(\text{dollars/pound}) = \text{US\$}3.61$$

Us vs Norway

$$\text{US\$}3.73 = \text{K}45 * 0.175(\text{dollars/kroner}) = \text{US\$}7.87$$

- Find it online.....for US and UK

- Ipod classic 160gb

http://store.apple.com/us/browse/home/shop_ipod/family/ipod_classic?mco=MTM3NTMxMzA

- Apple TV

http://store.apple.com/uk/browse/home/shop_ipod/family/apple_tv?mco=MTkxMTAxNTI

- Top selling MP3 Song in Amazon

PPP fails because

- Non-tradable goods
- Transport Costs
- Taxes
- Items not identical to consumers
- Market conditions (taste, competitors)
→ “Pricing-to-market”

Long Run Theories

- PPP → use as an approximation
- Another long-run theory: BB-NN → not in this class. Roberto teaches it in 15.014 next year

Real Exchange Rate

- Exports and Imports are affected by E and the price level in each country

$$\text{Real } E^{\text{BR}} = \frac{E_{(\text{US\$/real})} \cdot P^{\text{BR}}}{P^{\text{US}}}$$

- If $\downarrow E$ or $\downarrow P^{\text{BR}}$ or $\uparrow P^{\text{US}} \rightarrow$ real depreciation
 \rightarrow brazil relatively cheaper \rightarrow exports more

Depreciation as a policy tool

- In the short-run $\rightarrow P^{BR}$ fixed
- Expansionary Monetary Policy $\uparrow M \rightarrow \downarrow i \rightarrow \downarrow E \rightarrow$ real depreciation \rightarrow more exports
- In long-run \rightarrow inflation $\rightarrow \uparrow P^{BR} \rightarrow$ real appreciation
- So? \rightarrow more printing, nominal depreciation, inflation \rightarrow again \rightarrow can spiral out of control

Remember

- E is determined....
 - Short-run: capital flows → currency market
 - Long-run: PPP
- Real E matters for trade
 - E and Prices

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