Introductory Macroeconomics

Lecture 19: exchange rates, part one

Bruce Preston & Daeha Cho

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This Lecture

- Basics of exchange rates
  - nominal exchange rate
  - real exchange rate
  - theory of nominal exchange rates: Purchasing Power Parity
  - theory of nominal exchange rates: supply-demand analysis
- BOFAH chapter 17

Importance of Exchange Rates

- Changes in exchange rates have significant effect on the macroeconomy
  - affect GDP through changing quantities of exports and imports
  - expectation on exchange rates affect current GDP through changing capital inflow/outflow
  - for countries that adopt fixed exchange rates, monetary policy has less power in stabilising the domestic economy

Nominal Exchange Rate

- *Nominal exchange rate* is the rate at which two currencies are traded for each other and can be expressed in two ways
  - the amount of foreign currency needed to purchase one unit of domestic currency (more conventional for home countries):

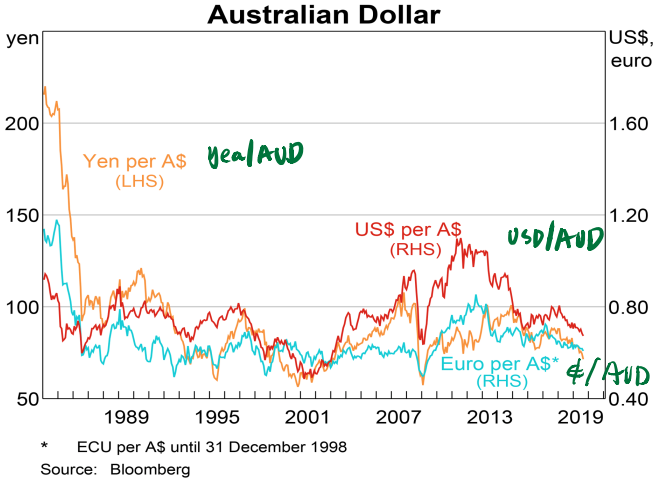
    if one Australian dollar can be exchanged for 200 Japanese yen, the nominal exchange rate is 200 yen/$ Australia as home country
  - the amount of domestic currency needed to purchase one unit of foreign currency

    if $\frac{1}{200}$ Australian dollars can be exchanged for 1 Japanese yen, the nominal exchange rate $\frac{1}{200}$ $/yen

Appreciation and Depreciation

- Let e be the amount of foreign currency needed to purchase one unit of domestic currency
- Appreciation corresponds to an increase e 200 yen/$ → 400 yen/$
  - an increase in the value of a domestic currency relative to foreign currencies
  - another expression for appreciation is strengthening of the domestic currency
- Depreciation corresponds to a decrease in e 200 yen/$ → 100 yen/$
  - a decrease in the value of a domestic currency relative to foreign currencies
  - another expression for depreciation is weakening of the domestic currency

Historical Nominal Exchange Rates



before 1983, value of AUD is float → fixed exchange rate

- In 1983, Australia moved to the floating exchange rate system

Exchange Rate System

- Flexible (floating) exchange rate
  - an exchange rate whose value varies according to the supply and demand for the currency
    determined by market force
- Fixed exchange rate
  - an exchange rate whose value is fixed by government
  - some countries fix their exchange rates in terms of the USD, Franc
  - gold standard: prior to the Great Depression, currency values were fixed in terms of ounces of gold
    1 ounce of gold = 10 USD
    problem ↑
    not infinite
    ⇒ total supply of USD is limited
    ⇒ US government lack

eg China: RMB

control of money supply

Real Exchange Rates

- *Real exchange rate* is the price of average domestic goods and services in terms of the average foreign goods and services when both prices are measured in the same currency
  - note that the nominal exchange rate is the price of the domestic currency in terms of a foreign currency
- Example: an Australian-made computer costs $2400 and a similar Japanese-made computer costs 242000 yen
  - nominal exchange rate is 110 yen/$
  - price of an Australian-made computer in terms of a Japanese-made computer, the real exchange rate, is

meaning: to purchase 1 unit of Aus computer, you need 1.09 unit of Japan computer

$$RER = \frac{\text{price of an Australian-made computer in \$}}{\text{price of a Japanese-made computer in \$}} = \frac{\$2400}{\$2200} = 1.09$$

242000 yen → 2200 $ × 1$ / 110 yen

Real Exchange Rates

- General formula

$$RER = \frac{P}{\frac{P^f}{e}}$$

  - P is the home country price level
  - P^f is the foreign country price level
  - e is the nominal exchange rate

- If the RER rises, goods and services produced in the home country are more expensive than those produced in a foreign country
  - a fall in export and a rise in import (↓ net export)
- If the RER falls, goods and services produced in the home country are cheaper than those produced in a foreign country
  - a rise in export and a fall in import (↑ net export)

Purchasing Power Parity

- In the short period, in which prices do not move much, the nominal exchange rate determines the real exchange rate, affecting GDP
- The most basic theory of how nominal exchange rates are determined is *Purchasing Power Parity* (PPP), which is a theory based on a fundamental economic concept, called the law of one price
  - the *law of one price* states that the price of traded goods must be the same in all countries if transport costs are small
- Example: iPhone costs 300$ in Australia and 60000 yen in Japan
  - the law of one price tells 300$= 60000 yen $1 = \frac{60000}{300} = 200$
  - the nominal exchange rate determined PPP is 200 yen/$

price of iphone

$P = 300\$$

$P^F = 60000$ yen

$\frac{P^F}{e} = 60000 \text{ yen} \times \frac{1\$}{100 \text{ yen}}$

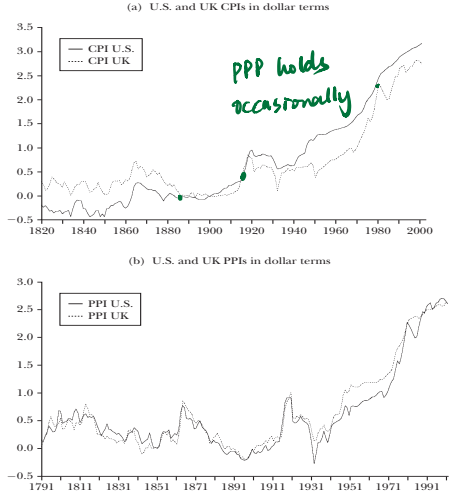
$= 300\$$

Prediction of PPP

- Currencies of countries that experience significant inflation tend to depreciate
- Suppose Australia experiences significant inflation so that the price of iPhone rises from 300$ to 600$
  - the law of one price tells 600$= 60000 yen
  - the nominal exchange rate is 100 yen/$ (depreciation of Australian dollars)
- If the nominal exchange rate is truly determined by PPP, then the price level of the two countries must be the same
  - in the data, this is the case in the long run but not in the short run

Empirical Relevance of PPP

Figure 1
Dollar-Sterling PPP Over Two Centuries



Notes: This figure shows U.S. and UK consumer and producer price indices expressed in U.S. dollar terms over roughly the last two centuries using a log scale with a base of 1900 = 0.

PPP holds in the long run

PPP holds occasionally

Why PPP Does not Hold

- Reasons for the observed short-run divergence in the average price level across countries
  - huge transportation costs even for similar goods produced in two countries
  - there are non-traded goods such as land, buildings, perishable foods
  - firms have high market power in certain products for which customers are willing to pay more than the other goods of similar characteristics

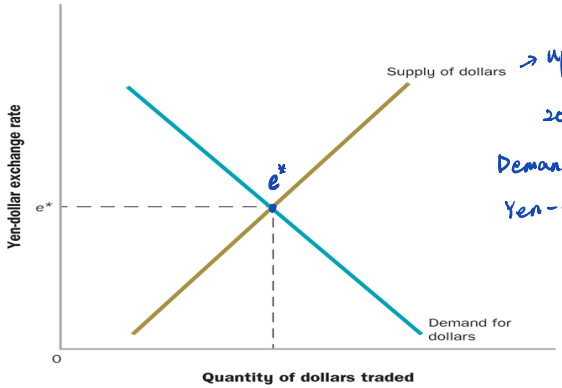
good & service in different country is different

- To understand the short-run movements of exchange rates, we need an alternative theory

Demand and Supply Analysis

- Currencies are traded in foreign exchange markets
- In the market for Australian dollars, the equilibrium value of Australian dollars in terms of foreign currencies, the equilibrium exchange rate, is determined when the supply of Australian dollars and the demand of Australian dollars
- Suppliers of Australian dollars
  - Australian households and firms that want foreign currencies to buy foreign goods, services, and assets
- Demanders of Australian dollars
  - foreign households and firms that want Australian dollars to buy Australian goods, services, and assets

Demand and Supply in the Yen-Dollar Market



→ upward sloping
if exchange rate ↑
2000 yen / $ → 4000 yen / $ → supply $ more

Demand curve: downward sloping
Yen-dollar exchange rate ↓
↓
AUD cheaper
↓
demand more AUD

- The more yen each dollar can buy, the more dollars Australians are willing to supply
- The more yen needed to buy one dollar, the fewer dollars Japanese are willing to demand

Determinants of the Supply of AUD

- An increased preference for Japanese goods that arises from the invention of popular goods or services

supply more AUD for yen

- An increase in Australia's real GDP leads to an increased consumption for Japanese-made goods

richer → supply more on foreign market

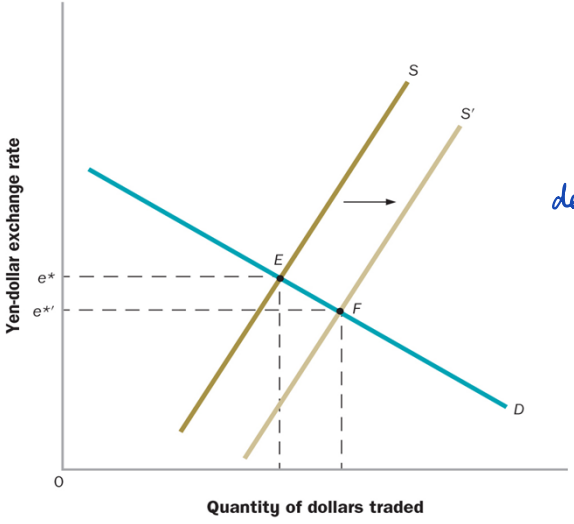
- An increase in the real interest rate on Japanese assets makes saving in Japan more attractive

expected return of Japanese stock is greater than Australian stock

↓

supply AUD on foreign market

Increase in the Supply of AUD



decline in e*

Determinants of the Demand of AUD

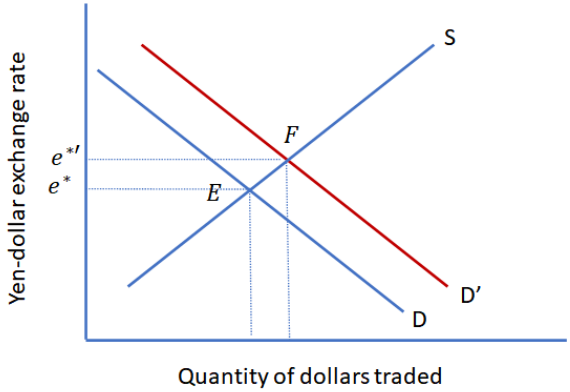
- An increased preference for Australian goods that arises from the invention of popular goods or services
- An increase in Japan's real GDP leads to an increased consumption for Australian-made goods

on average, Japanese is richer

- An increase in the real interest rate on Australian assets makes saving in Australia more attractive

Australia stock

Increase in the Demand of AUD



Next Lecture

- More on exchange rates
  - monetary policy and the exchange rate
  - fixed exchange rate
  - speculative attacks