

# The Open Economy

## Module Objectives

- Know the major items in the Balance of Payments Accounts
- Know the determinants of the trade balance
- Know the major determinants of long-run movements in exchange rates
- Understand the concept of Purchasing Power Parity

Question: What determines the trade balance?

Comparative advantage determines the patterns of trade, i.e., which goods a country exports and which it imports.

Comparative advantage says little or nothing about the overall trade balance.

## Balance of Payments Accounts

- The *current account* measures transactions in currently produced goods and services
  - exports and imports
  - factor payments
  - gifts
- The *capital account* measures transactions in assets
  - “private” asset transactions
  - “official” asset transactions

### Convention

- debits -- payments to other countries
- credits -- receipts from other countries

## Saving, Domestic Investment, and Foreign Investment

$$Y = C + I + NX$$

Rearrange

$$Y - C = I + NX$$

Define

$$S = Y - C$$

So

$$S = I + NX = I + NFI$$

Net foreign investment (NFI) is investment abroad by domestic residents less investment in the domestic economy by foreigners. These investments could take the form of real assets (e.g., factories or real estate) or financial assets (either debt or equity). Loosely speaking, we say that a country with negative NFI is “borrowing” from abroad.

Is trade deficit good or bad?

Is capital account deficit good or bad?

Note that they are linked, by BOP accounts.

What drives them? Domestic saving and investment.

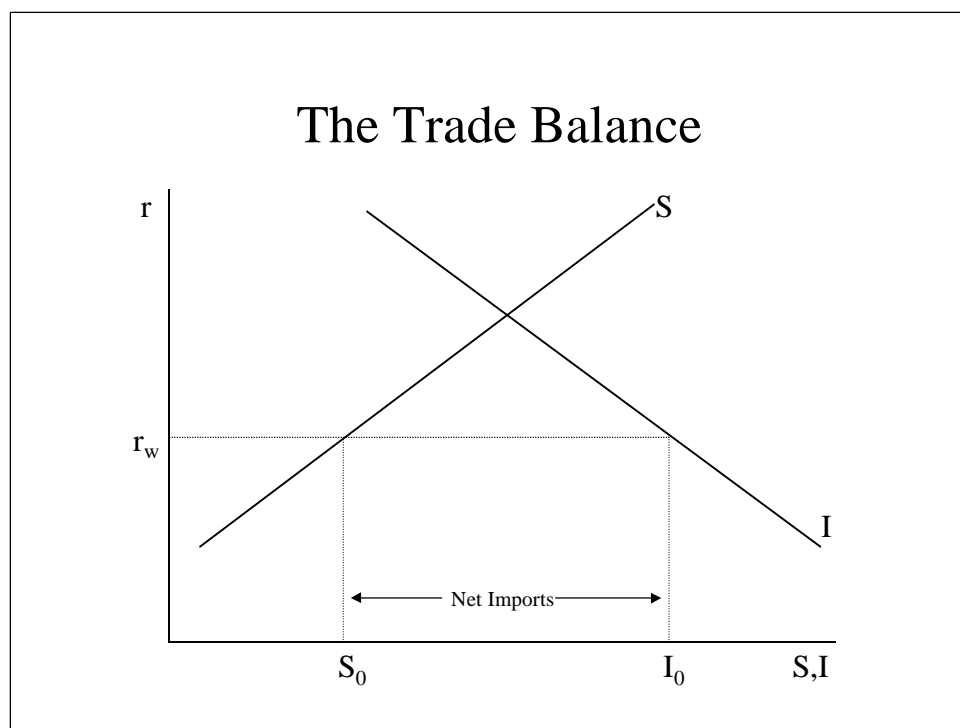
## Small Country Model

- Assume an integrated world credit market with a single interest rate,  $r$
- A small country is a price taker on world markets
- $r$  is given externally
- $NX = S - I$ 
  - Trade balance depends on domestic saving and investment

Question: What determines the trade balance?

Comparative advantage determines the patterns of trade, i.e., which goods a country exports and which it imports.

Comparative advantage says little or nothing about the overall trade balance.



This model assumes that capital is perfectly mobile internationally, so that capital flows instantaneously across national borders in response to any international difference in rates of return. The model does not explicitly deal with the riskiness of assets. It implicitly assumes that domestic and foreign assets are of similar risk, so that investors regard the two types of assets as perfect substitutes and demand similar rates of return on them.

This model is too simple to deal with phenomena like currency crises. To deal with those questions, we need a model in which domestic and foreign interest rates may differ, possibly because of perceived differences in risk and possibly because capital is not perfectly mobile internationally, although it may be highly mobile.

In a model with imperfectly mobile capital, another variable -- the exchange rate -- becomes important. So we must define the exchange rate before moving on to the case of imperfect capital mobility.

## Determinants of the Trade Balance

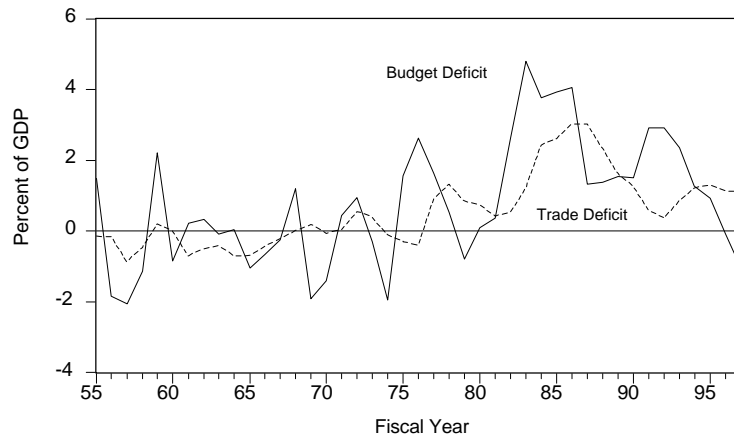
- Short run
  - cyclical shifts of saving and investment
- Longer term effects
  - domestic investment opportunities
  - private saving
  - government saving
    - “twin deficits” phenomenon

The question of short-run, cyclical shifts in saving and investment will be dealt with in the module on *Business Cycles*.

According to the traditional view, a government budget deficit reduces national saving, resulting in a smaller trade balance surplus or a larger trade balance deficit.

According to the Ricardian view, a government budget deficit has no effect on total national saving or the trade balance.

## Real Federal Deficit and Net Imports



## Nominal and Real Exchange Rates

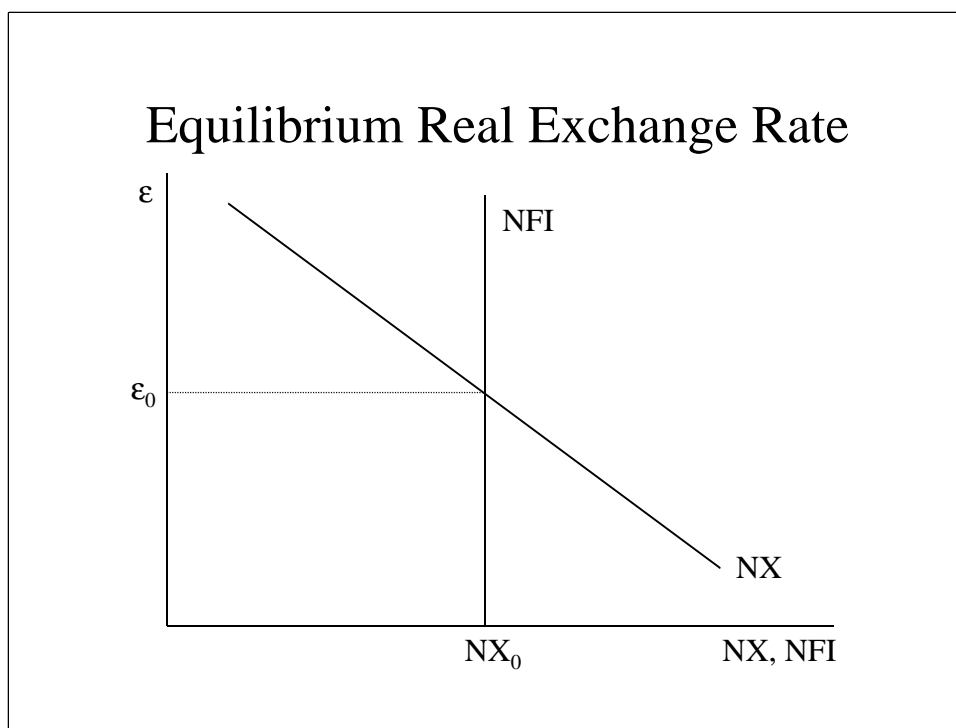
- The *nominal exchange rate*,  $e$ , is the rate of exchange between domestic and foreign currencies
- The *real exchange rate*,  $\varepsilon$ , is the rate of exchange between domestic and foreign goods
- $\varepsilon = eP^h/P^f$
- $\% \Delta \varepsilon = \% \Delta e + \pi^h - \pi^f$

We will use the convention that the nominal exchange rate is foreign currency per unit of domestic currency.

This means that an appreciation of the domestic currency corresponds to an increase in the nominal exchange rate.

We will use the same convention for the real exchange rate.

The real exchange rate measures the relative price of foreign and domestic goods. Therefore, the real rather than the nominal exchange rate affects net exports.

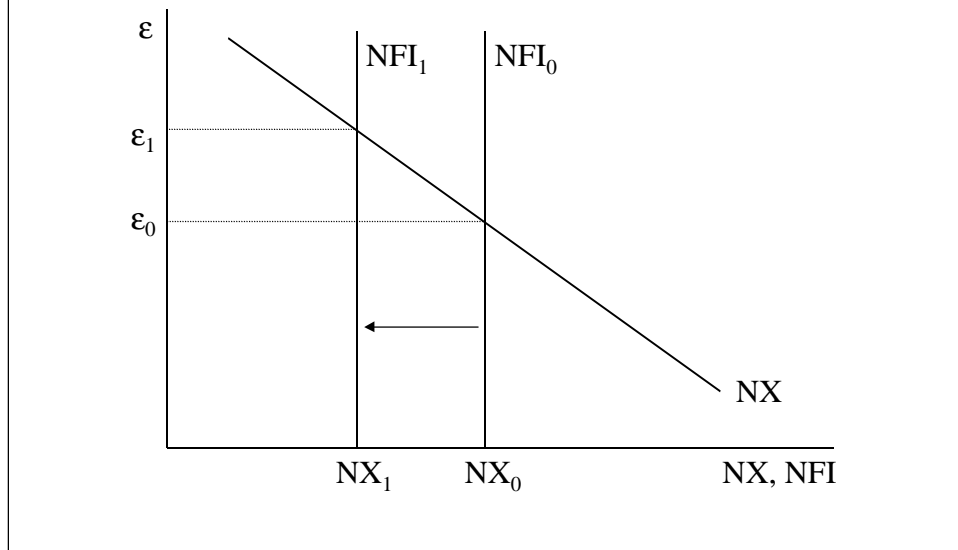


This diagram shows the mechanism by which net exports are equal to saving minus domestic investment. We know that the difference between saving and domestic investment is net foreign investment. For given values of saving and domestic investment, net foreign is fixed, as shown by the NFI curve. From the BOP accounts, we know that for a country with a floating exchange rate,  $NX = NFI$ . The real exchange rate adjusts to bring about this equilibrium.

This reasoning holds regardless of whether or not capital is perfectly mobile internationally. It applies to the small, open-economy model discussed above as well as to the more complicated models to be discussed below.

There is some debate about the slope of the NX curve. Many people think that both exports and imports are fairly price inelastic in the short run. Loosely speaking, this would give a steep NX curve. In the long run, the NX curve is likely to be much flatter, indicating greater responsiveness of exports and imports to the real exchange rate. This view accords with the general idea, which may be familiar from microeconomics, that long-run elasticities are likely to be greater than short-run elasticities.

## Change in Net Foreign Investment



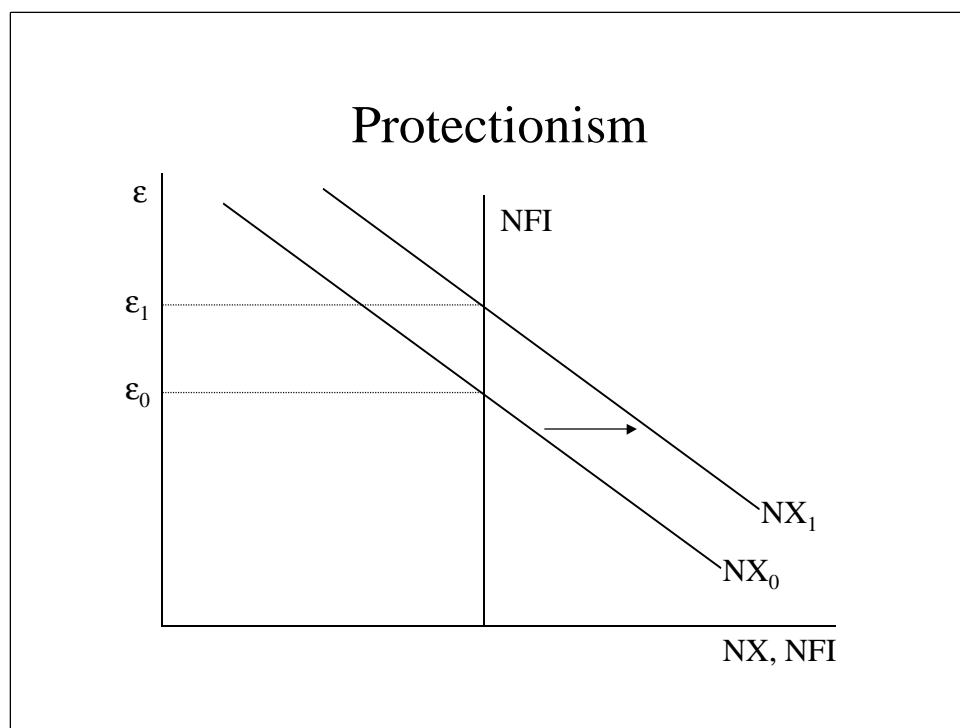
A reduction in net foreign investment can occur for a variety of reasons. For example, suppose that domestic residents save less. Because  $NFI = S - I$ , the reduction in saving reduces NFI. After funding domestic investment, domestic residents now have fewer funds to invest abroad. This reduces their demand for foreign currency, causing the exchange rate to increase.

Alternatively, suppose that foreigners suddenly decide to invest in the domestic economy. This amounts to a reduction in NFI. To carry out this investment, foreigners must buy more domestic currency, thus driving up the exchange rate.

Regardless of the reason why it occurs, the effect of a reduction in NFI is to increase the exchange rate, thus reducing net exports. This illustrates how a change in the capital account can cause a corresponding change in the current account of the balance of payments.

How does a government budget deficit affect the real exchange rate?

According to the traditional view, the budget deficit reduces national saving, thus reducing NFI and causing the real exchange rate to appreciate. According to the Ricardian view, the budget deficit has no effect on national saving, NFI, or the real exchange rate.



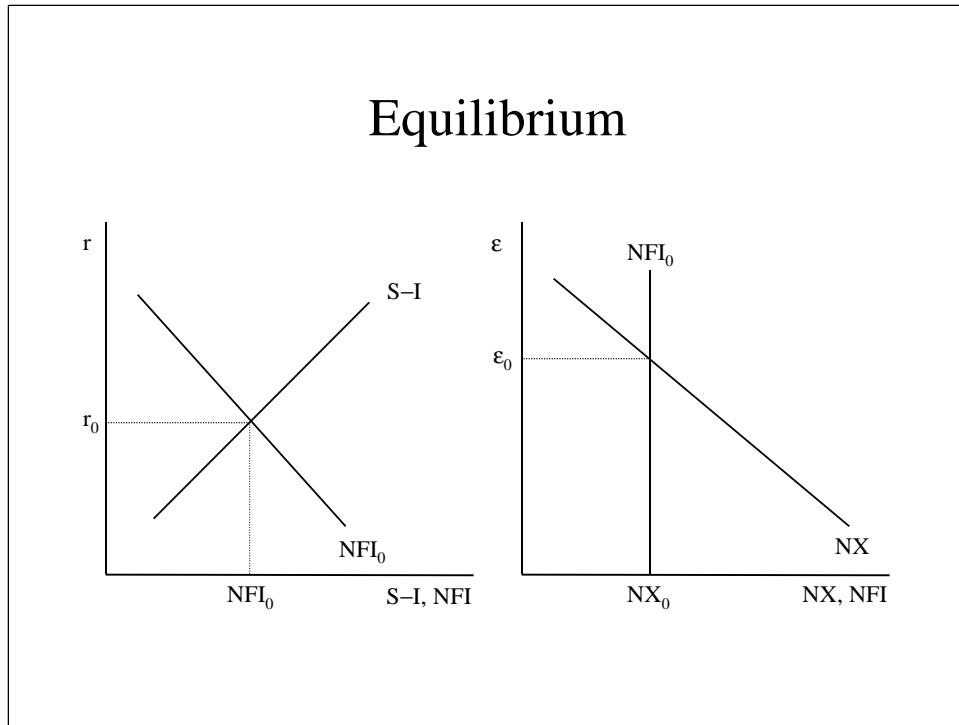
Economists often say that protectionist trade policies like tariffs and quotas do not increase a country's trade balance. This diagram illustrates why.

Suppose that a country imposes import restrictions in order to increase the trade balance. These restrictions reduce imports, and therefore increase net exports, at any real exchange rate. This effect is represented by the rightward shift in the NX curve. For given values of saving and domestic investment, however, NFI is unchanged. Therefore, equilibrium NX must also remain unchanged. How does this come about? The reduction in imports lowers the demand for foreign currency by domestic residents, increasing the exchange rate. The higher real exchange rate depresses exports, resulting in unchanged net exports. The effect of the protectionist policies is on the real exchange rate rather than on the trade balance.

## Imperfect Capital Mobility

- Domestic and foreign assets may be viewed by investors as imperfect substitutes
  - The two assets can have different rates of return
- Given the world interest rate  $r_w$ ,  $NFI$  is negatively related to the domestic interest rate  $r$

## Equilibrium

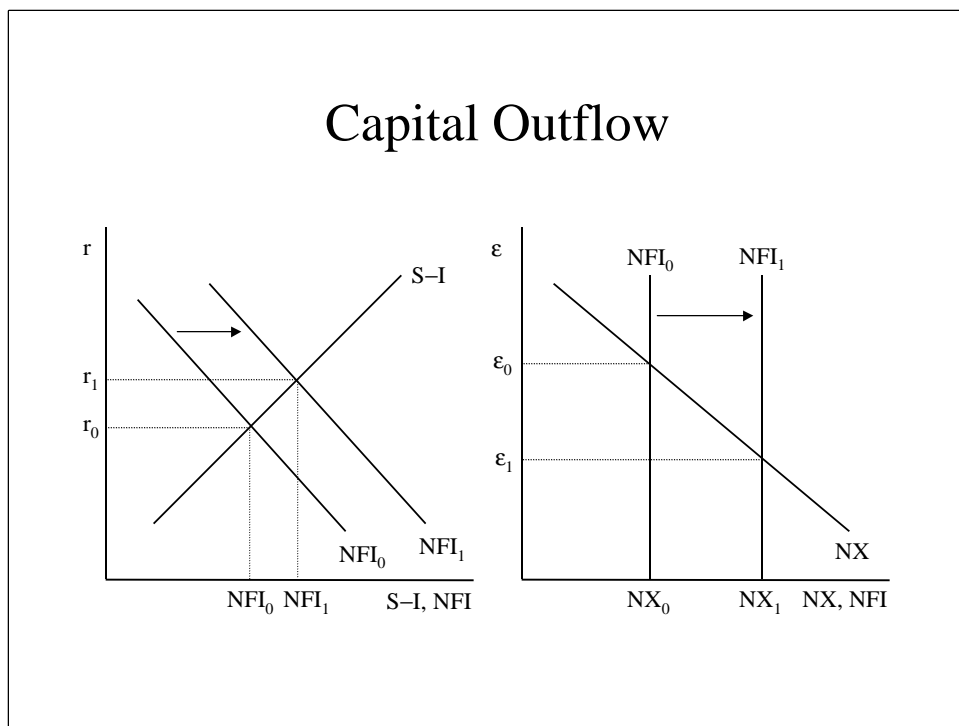


The left-hand panel above shows domestic investment and saving and NFI as functions of the domestic interest rate, holding constant the world interest rate. Domestic saving is positively related to the interest rate, and domestic investment is negatively related to the interest rate. Thus,  $S - I$  is positively related to the interest rate.

At a given world interest rate, domestic residents choose to invest more abroad the lower is the domestic interest rate. Likewise, foreigners choose to invest less in the domestic economy the lower is the domestic interest rate. Thus, NFI is negatively related to the domestic interest rate.

Equilibrium NFI is determined in the left-hand panel. This becomes a fixed amount of NFI in the right-hand panel. The right-hand panel is the same as on previous slides.

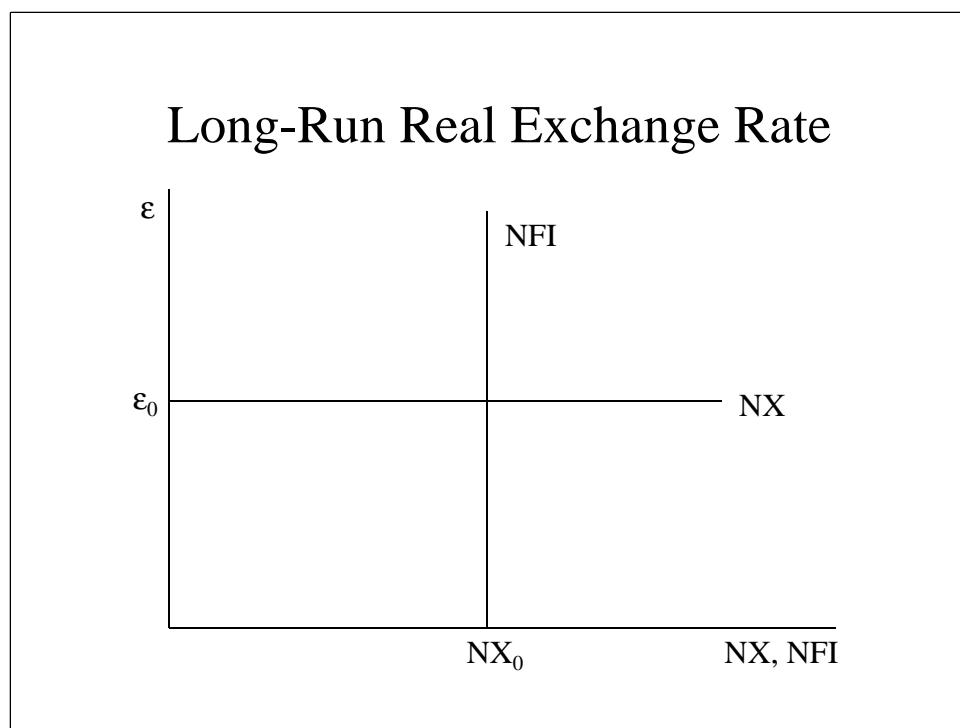
## Capital Outflow



A capital outflow is represented by a rightward shift in the NFI curve and can occur for several reasons.

First, suppose that the world interest rate increases. This external event has no effect on either the domestic saving or investment schedule, so the  $S-I$  curve is unchanged. Foreign assets become relatively more attractive, however, shifting NFI. The outflow (or reduced inflow) of funds raises the domestic interest rate. The increased NFI also means reduced foreign demand for domestic currency and/or increased domestic demand for foreign currency, lowering the exchange rate. Interest rates in the United States increased just before the collapse of the Mexican peso in late 1994.

Second, suppose that investors, either foreign or domestic, lose confidence in the domestic economy. This also causes NFI to shift rightward, with most of the same effects as discussed above. The only difference is that the changed perceptions of the domestic economy may reduce domestic investment demand, causing  $S-I$  to shift rightward. If domestic investment demand were to decline by the same amount as NFI increased, then the two curves in the left-hand panel would shift rightward by the same distance, and the domestic interest rate would be unaffected.



Suppose that, in the long run, the domestic demand for imports and the foreign demand for domestic exports are both infinitely elastic with respect to the real exchange rate. Then the NX curve is horizontal, and the long-run equilibrium value of the real exchange rate is  $\epsilon_0$ .

If the real exchange rate is constant, then Purchasing Power Parity (PPP) holds. The real exchange rate may not be absolutely constant over time but may instead deviate from  $\epsilon_0$  in the short run (because the short-run NX curve may be downward sloping). If the long-run NX curve is horizontal, however, these deviations are eventually reversed, so that the real exchange rate returns to  $\epsilon_0$ , and PPP holds in the long run.

## Purchasing Power Parity

- (Absolute) PPP states that one unit of domestic currency will buy equal quantities of domestic and foreign goods
- Short-run PPP:  $\varepsilon$  is constant
- Long-run PPP:  $\varepsilon$  returns to some long-run average level

Absolute PPP implies that the real exchange rate is 1.

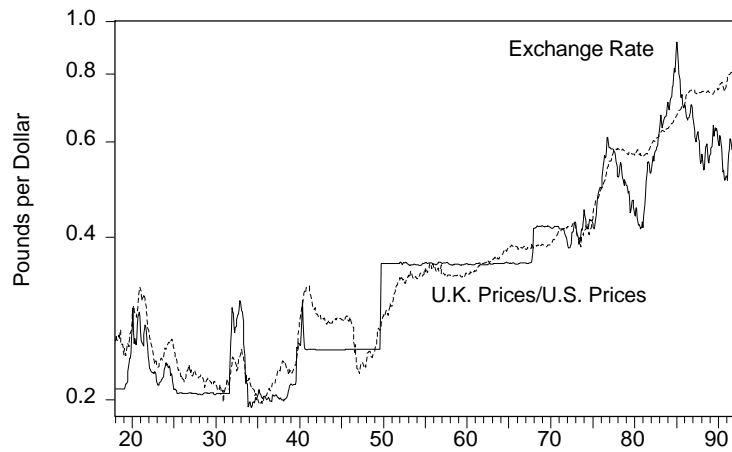
This may not be true because of tariffs, quotas, transport costs, etc. It may also fail to hold if the price of nontraded goods relative to traded goods is different in the two countries. (See the writeup containing a numerical example.) Thus, we may have relative rather than absolute PPP.

Even with relative PPP, it is still true that:

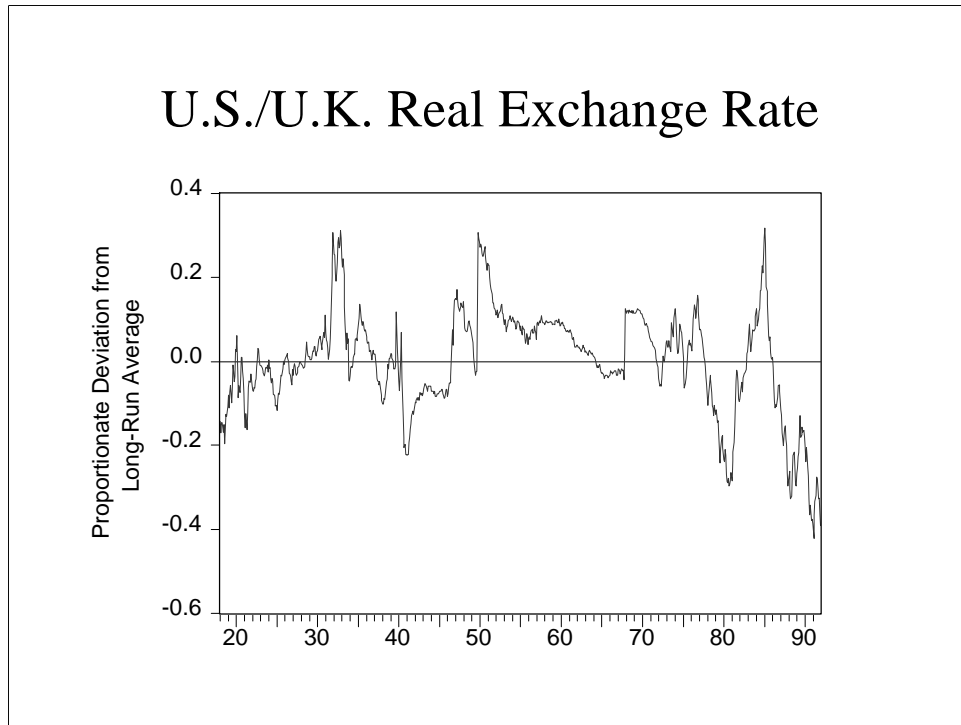
- $\% \Delta \varepsilon = \% \Delta e + \pi^h - \pi^f$
- $\varepsilon$  is constant if short-run relative PPP holds
- $\varepsilon$  returns to some long-run average level if long-run PPP holds

It is not generally possible to evaluate whether absolute PPP holds. This is because we only observe price indexes. With a price index, the U.S. price level in a given year is measured not in absolute dollar terms but relative to the price index in some base year. Likewise, we measure U.K. prices not in absolute pound but relative to some base year. We can use these price indices to check for relative PPP, however.

## U.S./U.K. Nominal Exchange Rate and Price Level Ratio



The price level ratio and the nominal exchange rate seem to move roughly in proportion to each other in the long run, which is evidence in favor of long-run relative PPP.



The real exchange rate is not constant, indicating substantial deviations from short-run PPP

- these deviations are very persistent
- the deviations can be on the order of  $\pm 30\%$
- the deviations are not permanent
- relative PPP seems to hold in the long run

The *Economist* Big Mac standard is a crude test of absolute PPP using a very specialized commodity basket containing only a single good.

- (PPP of \$) =  $P^f/P^{US}$
- PPP  $\Rightarrow P^f/P^{US} = e$
- $(P^f/P^{US} - e)/e =$  local currency overvaluation

## Long-Run Movements in Nominal Exchange Rates

$$\% \Delta e = \% \Delta \varepsilon + \pi^f - \pi^h$$

- In the long run,  $\varepsilon$  is stable relative to  $P^h$  and  $P^f$  ( $\% \Delta \varepsilon$  is relatively small)
- Flexible exchange rates
  - $e$  is largely determined by  $\pi^f - \pi^h$
- Fixed exchange rates
  - Devaluation ( $\% \Delta e < 0$ ) means  $\pi^h > \pi^f$
  - No devaluation means  $\pi^h = \pi^f$

Evidence: scatter plot of inflation differentials and nominal exchange rate changes.

Investment implications:

- if  $\varepsilon$  is near long-run mean, then long-run changes in  $e$  will be offset by changes in  $P^f/P^h$
- if  $\varepsilon$  is temporarily high, this makes investment abroad relatively more attractive
  - $e$  may be temporarily high, so that one gets a lot of foreign currency per dollar
  - $P^f$  may be temporarily low relative to  $P^h$  and will rise, so the cost of building a plant abroad is temporarily low

## Fixed vs. Flexible Exchange Rates

- With flexible rates, each country can choose its own rates of money growth and inflation
- Real exchange rates are more stable with fixed nominal exchange rates

## Interest Rate Parity

- Uncovered IRP

$$i^f - i^h = (e_{t+1} - e_t)/e_t = \% \Delta e$$

- Covered IRP

$$i^f - i^h = (f_{t+1} - e_t)/e_t$$

Compare two investment strategies:

- invest \$100 in U.S. assets at time t
  - have  $\$100(1+i^a)$  at t+1
- invest \$100 in U.K. assets at time t
  - buy  $\pounds 100e_t$  at time t
  - have  $\pounds 100e_t(1+i^b)$  at t+1
  - convert to  $\$100e_t(1+i^b)/e_{t+1}$

Uncovered IRP

- assume no capital controls or transactions costs
- the two expected returns should be equal
- $1+i^b = (1+i^a)e_{t+1}/e_t = (1+i^a)(1+\% \Delta e)$
- approximate condition is  $i^b - i^a = \% \Delta e$

Covered IRP

- with forward contracts, have  $\$100e_t(1+i^b)/e_{t+1}$  at t+1
- approximate no-arbitrage condition is  $i^b - i^a = (f_{t+1} - e_t)/e_t = \text{forward premium}$

## Extensions

- Two-Country Model
  - intermediate between small-country and closed-economy cases
  - each country affects world interest rate
- International Transmission of Business Cycles
- Changes in Terms of Trade
  - act just like productivity shocks