1. *Business Cycle Theory: The Economy in the Short Run:* Prices are sticky. Designed to analyze short-term economic fluctuations, happening from month to month or from year to year

2. *Classical Theory: The Economy in the (Long) Medium Run:* Prices are flexible; hence, monetary policy is ineffective. Output is fixed by factors of production. Best suited for analyzing a time horizon of at least several years

3. *Growth Theory: The Economy in the (very) Long Run :* Builds on the classical model, but assumes growth in the capital stock, the labor force, and technology

A Closed Economy in the Medium Run

The Role for Money and Market Clearing

- In any economy the following equation must hold:

$$M * V = P * T$$

  - P is the price of a typical transaction
  - T represents the total number of transactions in the economy during some period of time
  - M is the quantity of money
  - V is the velocity of money exchange between the agents of the economy

- Assume V is fixed, and T is equal to real GDP that is shown by Y, then

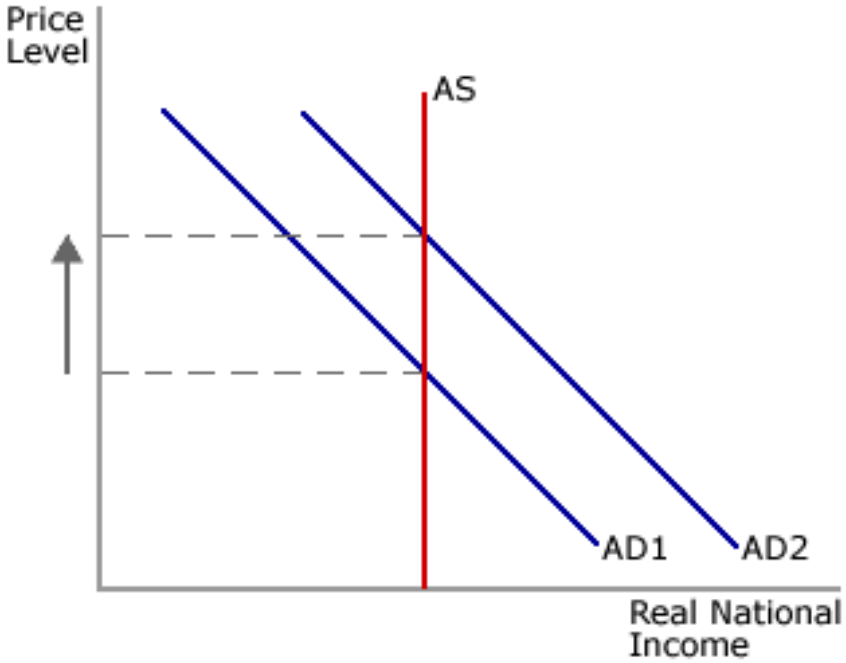
$$M * \bar{V} = P * Y$$

- In the medium run we assume that Y is fixed by the production capacity of the economy ($\bar{Y}$). Hence, this equation implies that the changes in P must be parallel to the changes in M
- *Example 1:* Suppose the economy produces 100 units of typical good in a year. The velocity of money is equal to 1. What would be price of typical good if the money supply is equal to 100 tl?

– The Answer: 1 tl

- *Example 2:* Suppose the money supply is increased to 200 tl. What would be the new price level in the economy?

  – The Answer: If people own 200 tl, and if the price level is 1 tl, the demand for goods will increase to 200 units. But output is only 100 units. Prive level has to rise to 2 tl so that once again demand and supply comes into a balance



- Notice that in both cases the real money supply (the amount of goods and services that money can buy) is the same

$$\frac{M}{P} = \frac{100}{1} = \frac{200}{2} = 100$$

  only nominal money supply (100 or 200) differs

- That is in the medium run there is market clearing. Prices are flexible and respond to the changes in the money supply.

Who Consumes the Goods and Services?

- In a closed economy the national income identity can be written as

$$Y = C + I + G$$

  - where Y is the total production (or equivalently total income) of the economy, and the right hand side is the total demand
  - C is the private consumption
  - I in the real investment carried out by firms
  - G is the government expenses

Consumption and Saving

- People use their income on taxes, consumption and saving

$$Y = T + C + S^p$$

  here S^p is called the private saving

- There is also government saving, the difference between government's income and its expenses

$$S^g = T - G$$

- The total saving in the economy is

$$S = S^p + S^g = Y - C - G$$

as you see T disappears. It is an income for the government but an expsense for individuals

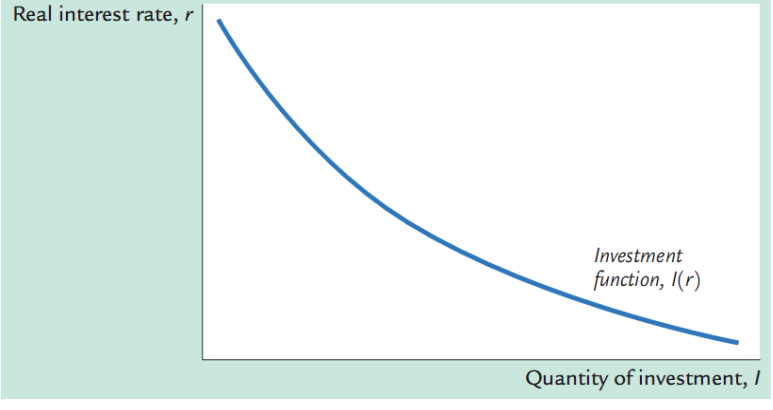
- Combining with the national income identiy we find that

$$I = S$$

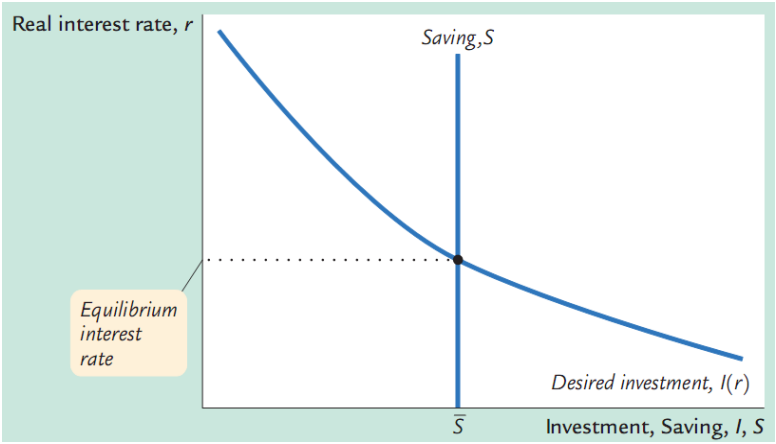
- Therefore, in a closed economy saving is used for investment
- How do we know that these two come to a balance?

Investment $I=I(r)$

- Firms invest if thereal return from investment is higher than the real cost of borrowing money (r)
- As a result, higher the cost of borrowing money, the lower the number of profitable projects



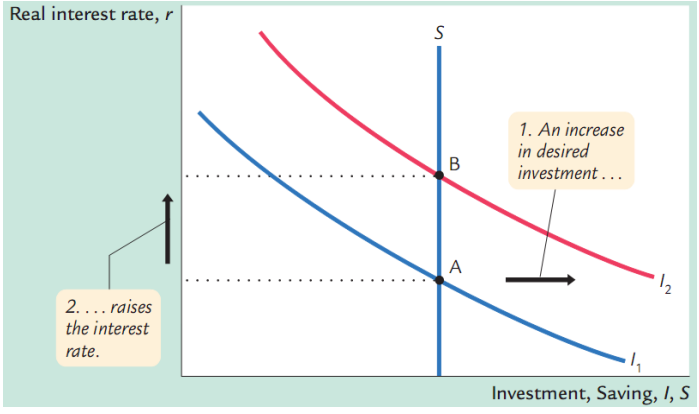
- Suppose saving is constant, then we find that



- There is an unique r which equates investment demand to the loan supply

Changes in Investment Demand

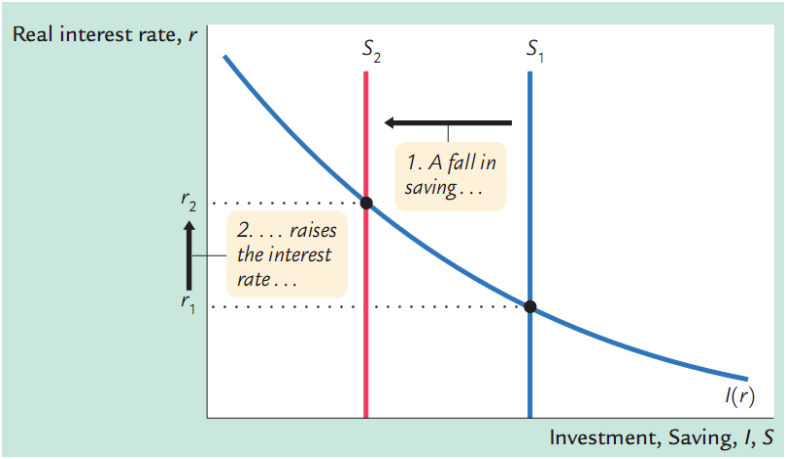
- Suppose there is a government tax program that stimulates investment (at every interest rate)



- Since saving is fixed, investment does not increase, only interest rate rises

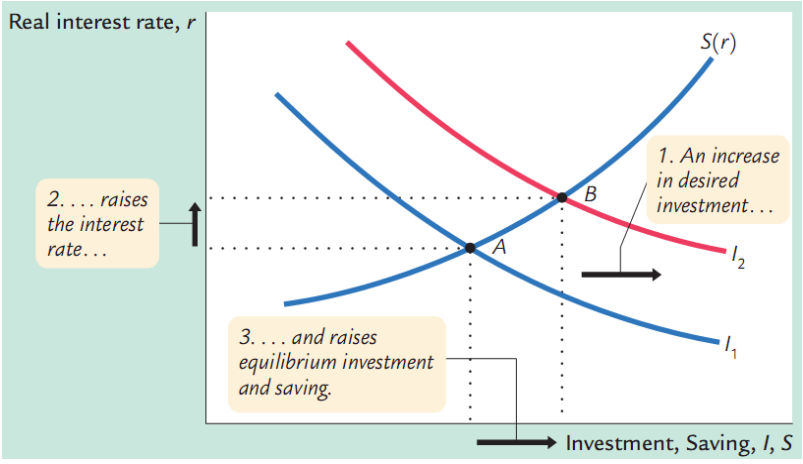
Increse in Government Purchases

- An increase in government purchases reduces public saving, and as a result, reduces national saving. At the initial interest rate, the demand exceeds the supply. As a result interest rate rises, investment falls

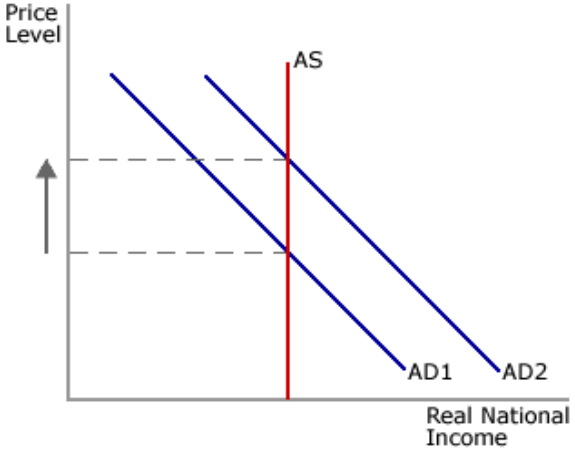


What if Saving Depends on Interest Rate

- The higher interest rate may induce people to save more. In this case they carry consumption from today to future

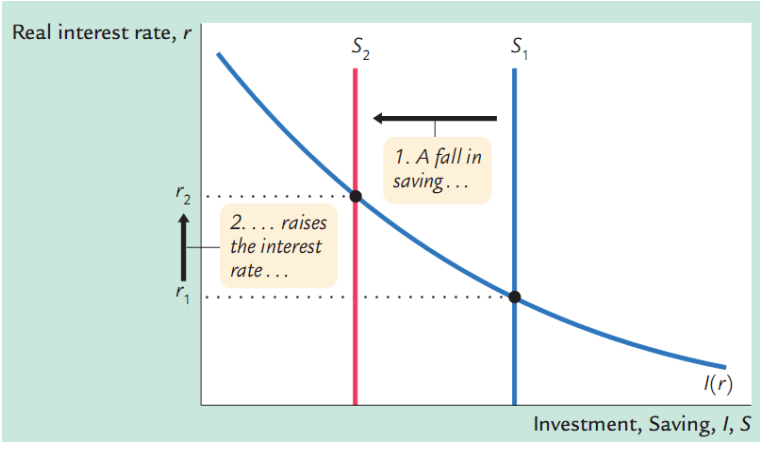


- Result 1: Higher M, in the medium run only increases P



- r is constant

- Result 2: Higher G increases the real interest rate



- Notice that increase in interest rates also increases velocity of money, which means higher effective money supply. As a result, the prive level rises as well

Ch5 - An Open Economy in the Medium Run

The International Flows of Goods

- In an open economy the national income identity can be written as

$$Y = C + I + G + EX - IM$$

where

$$NX = EX - IM$$

  - for instance when $NX > 0$: the country produces more than it uses domestically, and lends the difference to abroad

The International Flows of Capital Interpretation of NX

- If we rearrange the national income identity

$$Y - C - G = I + NX$$

here Y is the total income of a country in nominal terms

- Since $Y - C - G = S$ is the total savings in an economy, we find that

$$S - I = NX$$

- $S - I$ is the difference between domestic saving and domestic investment (also called net capital outflow or net foreign investment)

The World Interest Rate

- The interest rate in our small open economy, r, must equal the world interest rate r^*

$$r = r^*$$

  - This is because investors of the small open economy can always get a loan at r^* from abroad, so they would not pay higher than r^* to the residents of home country
  - Similarly, residents of this economy need never lend at any interest rate below r^*
  - Thus, the world interest rate determines the interest rate in our small open economy

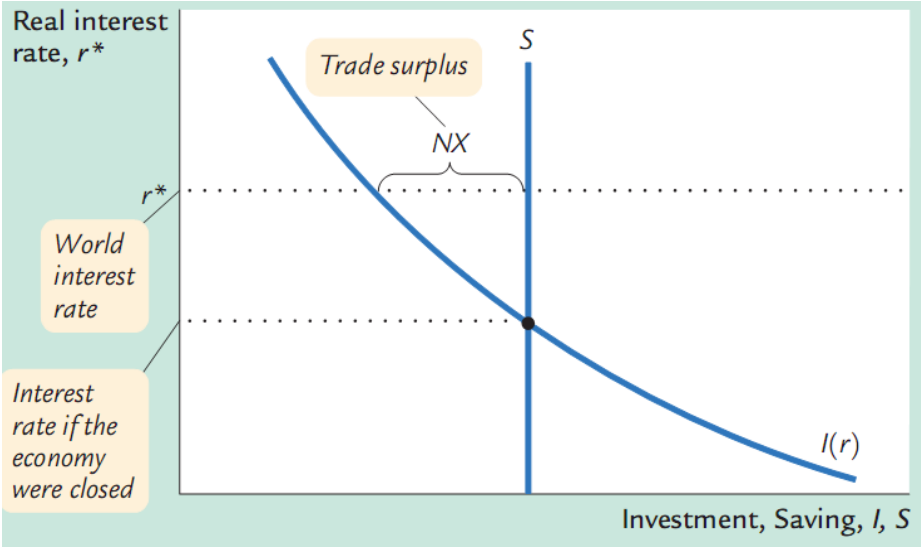
- Therefore,

$$S = I(r^*) + NX$$

- or

$$NX = \bar{S} - I(r^*)$$

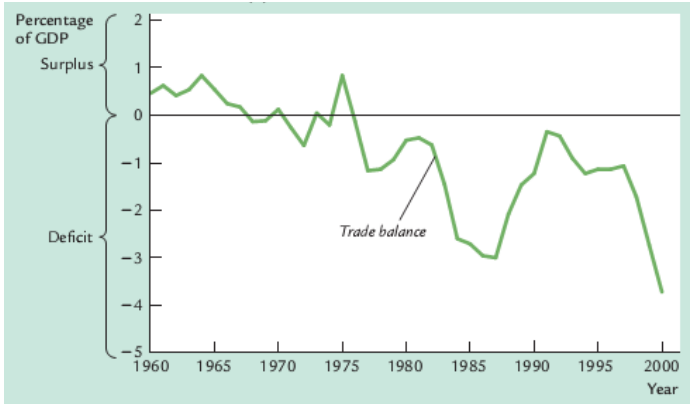
- In a closed economy, the real interest rate adjusts to equilibrate saving and investment. However, in a small open economy, the interest rate is determined in world financial markets (r^*) (where world saving is equal to world investment demand)
- The difference between saving and investment determines the trade balance



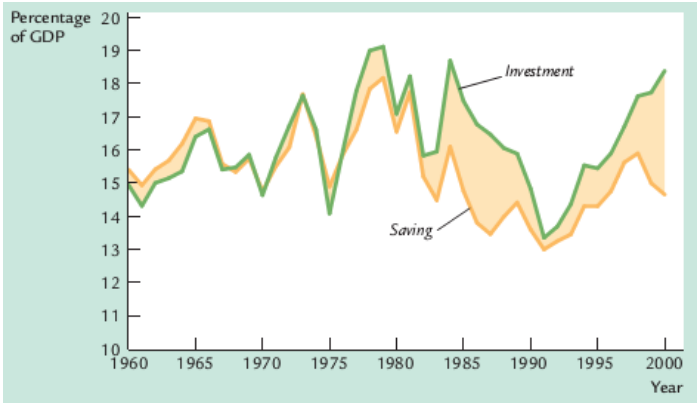
- In the figure country saves more than it invests. The difference is exported abroad

CASE STUDY: The U.S. Trade Deficit

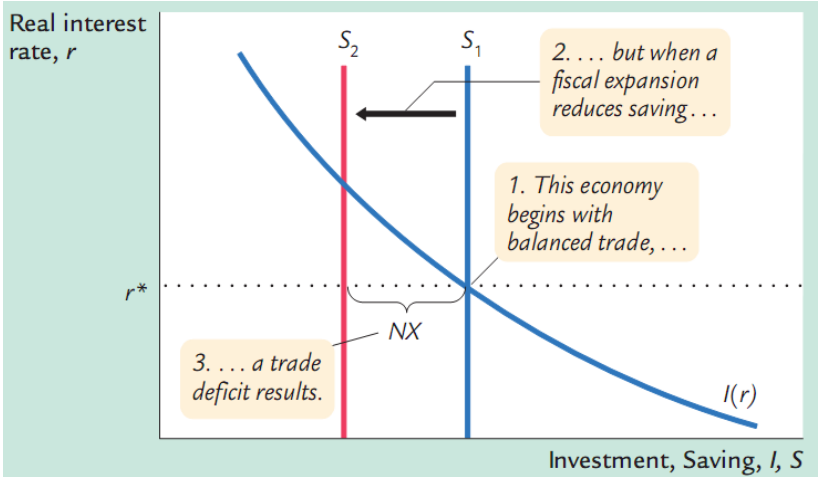
The U.S. Trade Balance



The U.S. Saving and Investment

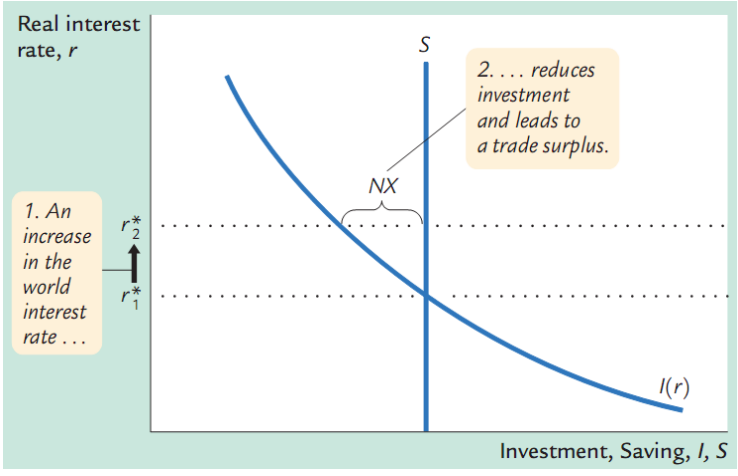


A Fiscal Expansion at Home



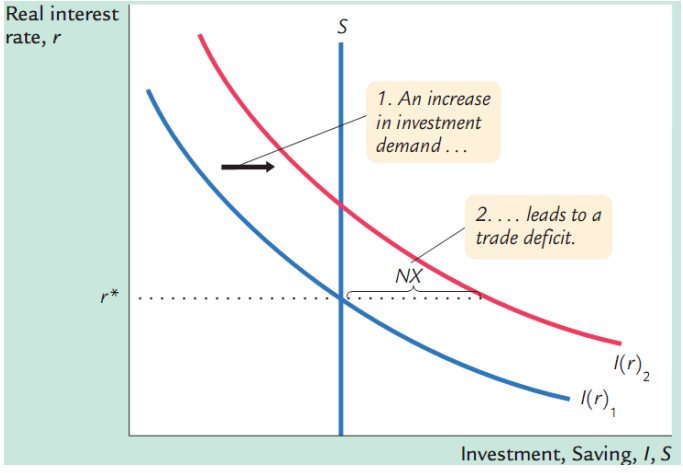
- An increase in government purchases or a reduction in taxes reduces national saving
- The result is a trade deficit

A Fiscal Expansion Abroad



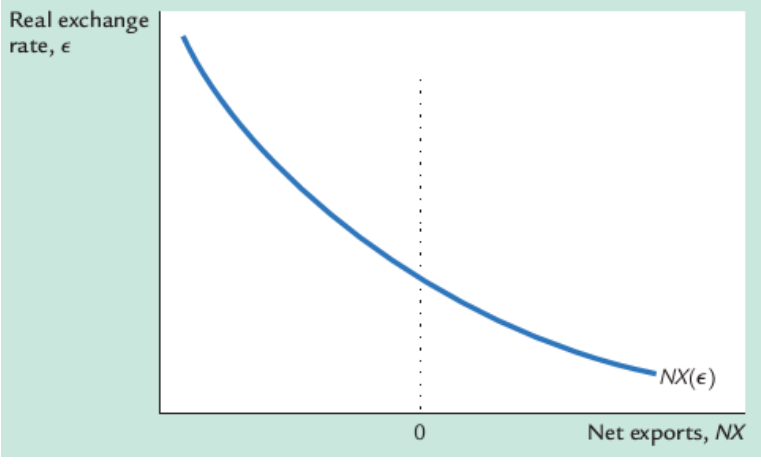
- A fiscal expansion in a foreign economy large enough to reduce world saving raises the world interest rate from r_1^* to r_2^*, causing a trade surplus in a small open economy

Shifts in Investment Demand



- Suppose the government changed the tax laws to encourage investment
- The result is a trade deficit

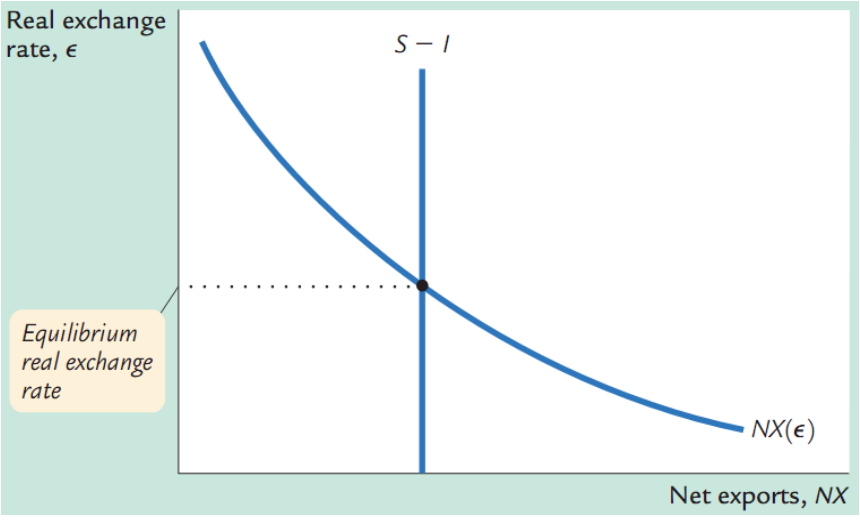
The Real Exchange Rate and the Trade Balance



- The relative price of domestic and foreign goods affects the demand for these goods. The lower the real exchange rate, the cehaper the domestic goods compared to the foreign goods. Thus net exports increases

The Determinants of the Real Exchange Rate

- Remember that: $NX = \bar{S} - I(r^*)$
- This means the amount of net export has already been determined. We also know that there is one unique real exchange rate for each net export value. Thus we can find the equilibrium real exchange rate



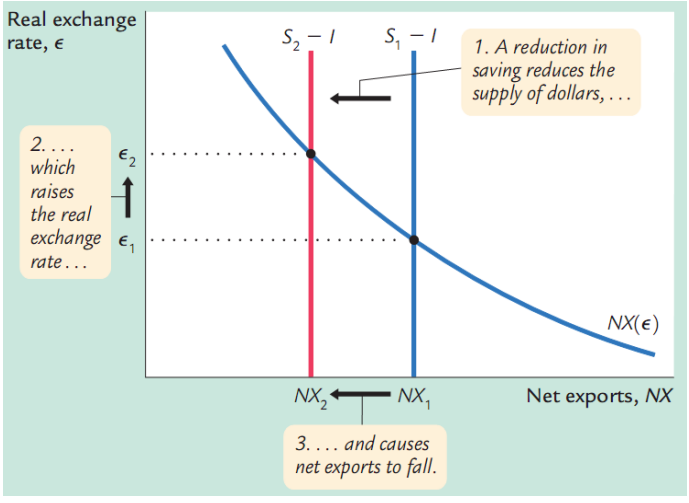
- Now we also observe that It is the real exchange rate that secures the equilibrium in the national income identity

$$\bar{Y} = C(\bar{Y} - \bar{T}) + \bar{I}(r^*) + \bar{G} + NX(\epsilon)$$

Financial Markets Interpretation of the Determination of the Real Exchange Rate

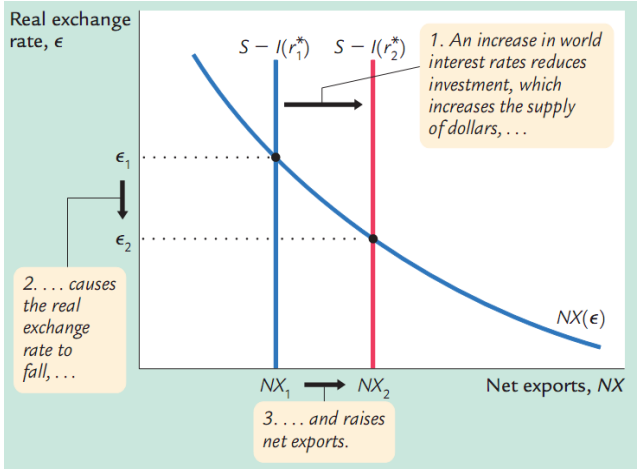
- The vertical line, S-I, represents the net capital outflow and thus the supply of domestic currency to be exchanged into foreign currency and invested abroad.
- The downward-sloping line, NX, represents the net domestic currency demand of foreigners to buy net exports from the home country.
- At the equilibrium real exchange rate, the supply of home currency available from the net capital outflow balances the demand for home currency

Expansionary Fiscal Policy at Home



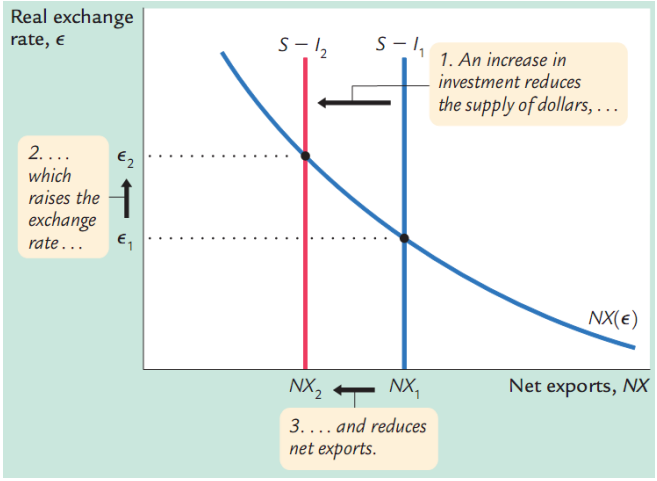
- Increase in government purchases or a cut in taxes, reduces national saving. The fall in saving reduces the supply of dollars to be exchanged into foreign currency

Expansionary Fiscal Policy Abroad



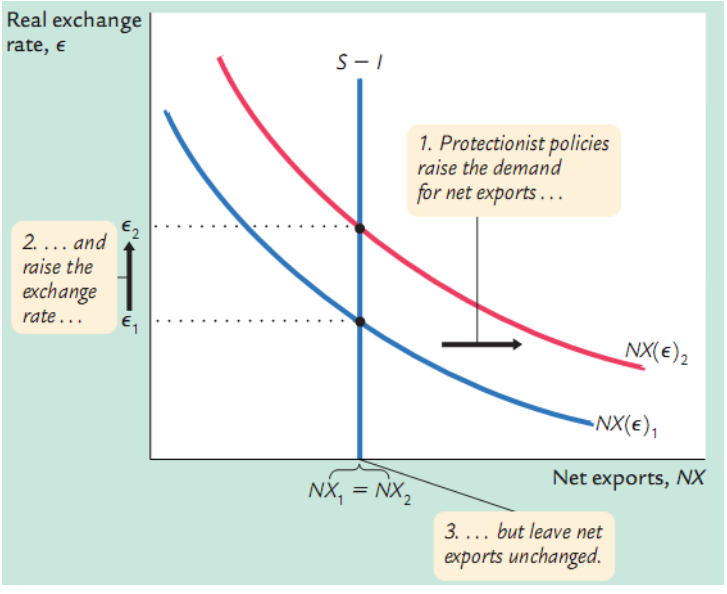
- The world saving is reduced and raises the world interest rate raises from r_1^* to r_2^*. The increase in r^* reduces investment

The Impact of an Increase in Investment Demand



- As a result of an increase in investment demand, the net exports (the supply of goods and services to abroad, or supply of dollars) reduces. Hence, their price increases

The Impact of Protectionist Trade Policies



- Policies such as a ban on imported cars, raises the real exchange rate from ϵ_1 to ϵ_2 but leaves the level of net

exports unchanged.

- This is because when a country restricts imports, it has to replace imported good consumption (or investment) by the domestic goods. Hence, net exports reduces as well
- n other words, investment and savings are unchanged, so does the net exports

The Determinants of the Nominal Exchange Rate

- The nominal exchange rate depends on the real exchange rate and the price ratios of two countries

$$e = \epsilon * (P^*/P)$$

where foreign country is shown by (*)

- Put it differently,

$$\frac{ForeignCurrency}{HomeCurrency} = \frac{ForeignGood}{HomeGood} * \frac{Foreign(Price/Good)}{Home(Price/Good)}$$

- Taking natural logarithm (ln) of both sides

$$\ln(e) = \ln(\epsilon) + \ln(P^*) - \ln(P)$$

  which implies that

$$\begin{aligned} \%Change\ in\ e\ = &\ \%Change\ in\ \epsilon + \%Change\ in\ P^* \\ &- \%Change\ in\ P \end{aligned}$$

- and

$$\%Change\ in\ e = \%Change\ in\ \epsilon + (\pi^* - \pi)$$

- If a country has a high (low) rate of inflation relative to the home country, domestic currency will buy an increasing (decreasing) amount of the foreign currency over time
- In result:
  - Private and public saving decisions of a country determines its net exports, which determines the real exchange rate
  - The real exchange rate, combined with countries' monetary policies, determine the nominal exchange rate.

A Note on a Large Open Economy

- We call an open economy a large one if its saving decisions can affect the world interest rate
- In this case you may consider a large open economy as a mixture of closed economy and a small open economy
- For instance, if a large open economy decreases its savings (where $S = I(r) + NX(\epsilon)$), it experiences both a decline in investment (as interest rates are higher now), but also a decline in net exports