



# THE OPEN ECONOMY

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# Role of Net Exports

$$Y = C^d + I^d + G^d + EX$$

- The sum of first three terms is domestic spending on domestic goods & services
- EX is foreign spending on domestic goods & services

$$C = C^d + C^f$$

$$I = I^d + I^f \quad \text{Where f stands for foreign goods and services}$$

$$G = G^d + G^f$$

- $C^f + I^f + G^f = IM$  (expenditure on Imports)

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

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

Most common form of national income accounts identity

$$\text{or } NX = Y - (C + I + G)$$

- NX is **net exports** ( $EX - IM$ ), which is equal to Output minus Domestic spending
- NX is also named as **trade balance** as it tells us how our trade in goods & services departs from the benchmark of equal imports and exports.

- If output exceeds domestic spending, we export the difference: net exports are positive.
- If output falls short of domestic spending, we import the difference: net exports are negative.
- Alternatively,  $EX - IM = Y - A$  where  $A = C + I + G$ . A stands for **absorption**.
- The value of exports, which is a demand for a country's currency, can increase relative to the value of imports, which is a supply of a country's currency, if the country's production increases relative to its absorption.
- It follows that, *ceteris paribus*, a country's currency will appreciate if production in the country, perhaps from increased productivity, expands more than the demands on the production by the country's residents.

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

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

We know that  $Y - C - G = S$ , hence  $S = I + NX$  or  $S - I = NX$

- It shows that an economy's net exports must always equal the difference between its saving and its investment.  $S - I$  is called as **net capital outflow** (or sometimes called as **net foreign investment**)
- If net capital outflow is positive, our saving exceeds our investment and we are lending the excess to foreigners. If it is negative, i.e.,  $I$  exceeds  $S$ , we are financing the extra investment by borrowing from abroad.

- If  $S - I$  and  $NX$  are **positive**, we have a **trade surplus**. We are net lenders in world financial markets and exporting more goods than we are importing.
- If  $S - I$  and  $NX$  are **negative**, we have a **trade deficit**. We are net borrowers in world financial markets and we are importing more goods than we are exporting.
- If  $S - I$  and  $NX$  are exactly **zero**, we are said to have **balanced trade** because the value of imports equal the value of exports.
- *The national income accounts identity shows that the international flow of funds to finance capital accumulation and the international flow of goods and services are two sides of the same coin.*

International Flows of Goods and Capital: Summary		
This table shows the three outcomes that an open economy can experience		
Trade Surplus	Balanced Trade	Trade Deficit
Exports > Imports Net Exports > 0 $Y > C + I + G$ Savings > Investment Net Capital Outflow > 0	Exports = Imports Net Exports = 0 $Y = C + I + G$ Savings = Investment Net Capital Outflow = 0	Exports < Imports Net Exports < 0 $Y < C + I + G$ Savings < Investment Net Capital Outflow < 0

# Capital Mobility and the World Interest Rate



- Consider the case of a **small open economy** with *perfect capital mobility*
- By “small” we mean that this economy is a small part of the world market and can itself have only negligible effect on the world interest rate
- By “perfect capital mobility” we mean that residents of the country have full access to world financial markets, in particular, govt. does not impede international borrowing or lending
- Due to above assumptions, the interest rate in our small economy must equal the **world interest rate  $r^*$** , the real interest rate prevailing in world financial market
- Residents of the small open economy need never borrow at any interest rate above  $r^*$ , because they can always get a loan at  $r^*$  from abroad. Similarly, the residents need never lend at any interest rate below  $r^*$  because they can always earn  $r^*$  by lending abroad
- The equilibrium of world saving and world investment determines the world interest rate.
- As our small economy has negligible effect on world saving and investment, hence our small economy takes the world interest rate as exogenously given.

- To build the model of the small open economy we take three assumptions:
- Economy's output  $Y$  is fixed by the factors of production & production function:  
$$Y = \bar{Y} = F(\bar{K}, \bar{L})$$
- Consumption  $C$  is positively related to disposable income  $Y - T$ :  $C = C(Y - T)$
- Investment  $I$  is negatively related to the real interest rate  $r$ :  $I = I(r)$
- Now, rewriting accounting identity:  $NX = (Y - C - G) - I$  or  $NX = S - I$
- Substituting our three assumptions and condition that interest rate equals world interest rate, we obtain:  $NX = [\bar{Y} - C(\bar{Y} - T) - G] - I(r^*) = \bar{S} - I(r^*)$
- It shows that what determines saving  $S$  and investment  $I$  and thus the trade balance
- Saving depends on fiscal policy: lower  $G$  or higher  $T$  raise national saving.  $I$  depends on the world real interest rate  $r^*$ , therefore trade balance depends on these variables
- ***The trade balance is determined by the difference between saving and investment at the world interest rate.***
- What about mechanism that causes trade balance to equal the net capital outflow
  - When saving falls short of investment, investors borrow from abroad, when saving exceeds investment, the excess is lent to other countries.



# How Policies Influence the Trade Balance

- **Fiscal Policy at Home:** Let  $G$  is increased (or  $T$  is decreased) which reduces national saving by shifting the saving curve to the left. With an unchanged world real interest rate,  $I$  remains the same. Therefore,  $S$  falls below  $I$  and some investment must now be financed by borrowing from abroad. Because  $NX = S - I$  the fall in  $S$  implies a fall in  $NX$ . The economy now runs a **trade deficit**. *Hence, starting from balance trade, a change in fiscal policy that reduces national saving leads to a trade deficit.*
- **Fiscal Policy Abroad:** Consider now what happens to a small open economy when foreign govt. increases their  $G$ . If these foreign countries are a small part of the world economy, then their fiscal change has a negligible impact on other countries. But if these foreign countries are a large part of the world economy, their increase in  $G$  reduces world saving and causes the world interest rate to rise.
- The increase in  $r^*$  raises the cost of borrowing and thus reduces investment in our small open economy. Because there has been no change in domestic saving, saving  $S$  now exceeds  $I$  and some of our saving begins to flow abroad. The reduction in  $I$  must also increase  $NX$ . Hence, reduced saving abroad leads to a **trade surplus at home**.
- The domestic  $S$  and  $I$  remains unchanged and the only change is an increase in the world interest rate  $r^*$ . *Hence, an increase in the world interest rate due to a fiscal expansion abroad leads to a trade surplus at home.*

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- **Shifts in Investment Demand:** Consider what happens to our small open economy if its  $I$  schedule shifts outward i.e., if the demand for investment goods at every interest rate increases. This shift would occur if govt. changed the tax laws to encourage investment by providing an investment tax credit.
  - At a given world interest rate,  $I$  is now higher, because the saving is unchanged, some investment must now be financed by borrowing from abroad, which means that net capital outflow is now negative. In other words, the increase in  $I$  implies a decrease in  $NX$ .
  - ***Hence, an outward shift in the investment schedule causes a trade deficit.***



# Exchange Rates

- **The Nominal Exchange Rate:** is the relative price of the currency of two countries. For e.g. one dollar is exchanged for 120 yen in the world market.
- **The Real Exchange Rate:** is the relative price of the goods of two countries, i.e., it tells us the rate at which we can trade the goods of one country for the goods of another. This is sometimes called the **terms of trade**.
- To see the relation between the nominal and real exchange rates, consider a single good produced in many countries' cars. Suppose an American car costs \$10,000 and a similar Japanese car costs 2,40,000 yen. To compare the prices of the two cars, we must convert them into a common currency. If a dollar is worth 120 yen, then the American car costs 1,20,000 yen. Comparing the price of an American car (1,20,000 yen) and Japanese car (2,40,000 yen), we conclude that the American car costs one-half of what the Japanese car costs. In other words, at current prices, we can exchange two American cars for one Japanese car.
- **Real Exchange Rate = [(120 yen/dollar) x (10,000 dollars/American car)] / (2,40,000 yen / Japanese car) = 0.5 [Japanese car / American car]**

$$\text{Real Exchange Rate} = \frac{\text{Nominal Exchange Rate} \times \text{Price of Domestic Good}}{\text{Price of Foreign Good}}$$

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- **Real Exchange Rate ( $\epsilon$ ) = Nominal Exchange Rate ( $e$ ) X Ratio of Price Levels ( $P/P^*$ )**
  - *If the real exchange rate is high, foreign goods are relative cheap, and domestic goods are relatively expensive.*
  - **If the real exchange rate is low, foreign goods are relatively expensive, and domestic goods are relatively cheap.**
  - Suppose first that the real exchange rate is low, causing domestic goods to be cheap rather than foreign goods. So, the demand for domestic goods will be high by domestic people as well as foreigners. This, quantity of our net exports demanded will be high and vice-versa.
  - $NX = NX(\epsilon)$  i.e. net exports are a function of the real exchange rate. There is negative or inverse relationship between the two i.e., lower the real exchange rate, greater is our net exports (because less expensive are the domestic goods relative to foreign goods).

# The Determinants of the Real Exchange Rate

- The real exchange rate is related to net exports. (negatively related)
- The trade balance (net exports) must equal the net capital outflow, which in turn equals saving minus investment. Savings is fixed by the consumption function and fiscal policy; investment is fixed by the investment function and the world interest rate.
- At the equilibrium real exchange rate, the supply of dollars available from the net capital outflow balances the demand for dollars by foreigners buying our net exports.

# How Policies Influence the Real Exchange Rate

- **Fiscal Policy at Home:** If  $G$  increases then  $s$  falls causing saving schedule to shift left creating trade deficit. Now, equilibrium real exchange rate adjusts to ensure that  $NX$  falls. Shift in  $S - I$  curve causes the lower supply of dollars to be invested abroad. This causes equilibrium real exchange rate to rise upward i.e., the dollar becomes more valuable. Because of the rise in the value of the dollar, domestic goods become more expensive relative to foreign goods, which causes exports to fall and imports to rise. Both act to reduce net exports.
- **Fiscal Policy Abroad:** Expansionary fiscal policy abroad reduces world saving and raises the world interest rate. The increase in the world interest rate reduces investment at home, which in turn raises the supply of dollars to be exchanged into foreign currencies. As a result, the equilibrium real exchange rate falls.
- **Shifts in Investment Demand:** An increase in investment demand raises the quantity of domestic investment as a result, the supply of dollars to be exchanged into foreign currencies falls. This fall in supply raises the equilibrium real exchange rate.

# The Effects of Trade Policies

- Most often, trade policies take the form of protecting domestic industries from foreign competition – either by placing a tax on foreign imports (**a Tariff**) or restricting the amount of goods that can be imported (**a Quota**).
- A protectionist trade policy such as a ban on imported cars, shifts the net exports schedule rightward which raises the real exchange rate and sets the equilibrium at higher real exchange rate without changing the equilibrium level of net exports.
- This do not affect trade balance. Thus, the appreciation of the real exchange rate offsets the increase in net exports that is directly attributable to the trade restriction.
- They do affect the amount of trade by reducing both the quantity of exports and imports.
- This causes the economists to protest against the protectionist trade policies as it diminishes the gains from trade.

# The determinants of Nominal Exchange Rate

- $\% \text{ change in } e = \% \text{ change in } \epsilon + \% \text{ change in } P^* - \% \text{ change in } P$
- **Percentage change in Nominal Exchange Rate = Percentage change in real Exchange Rate + Difference in Inflation Rates**
- *If a country has a high rate of inflation relative to the United States, a dollar will buy an increasing amount of the foreign currency over time.*
- *If a country has a low rate of inflation relative to the US, a dollar will buy a decreasing amount of the foreign currency over time.*
- *This shows how the monetary policy affects the nominal exchange rate.*

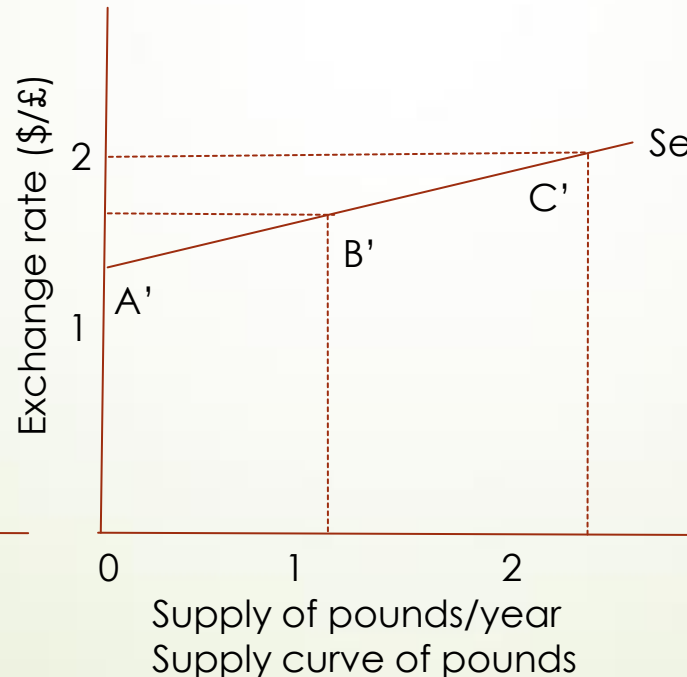
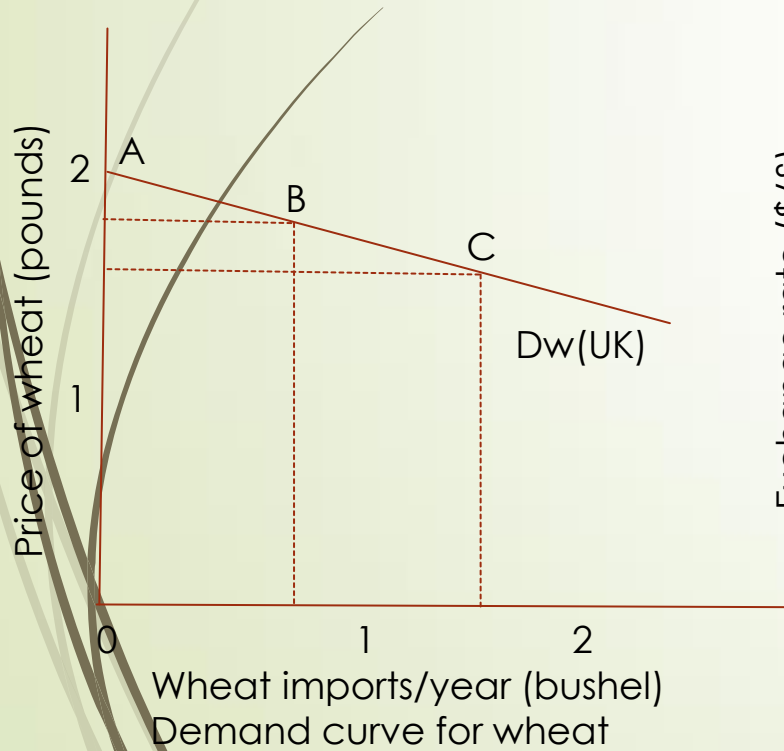


# The Balance of Payments Account



- The balance of payments account provides a tabulation of the amounts of a country's currency that are demanded and supplied for various purposes during an interval of time.
- The factors giving rise to a demand for a country's currency are listed as **credits** and are preceded by a (+) in the BoP account.
- The factors giving rise to a supply of a country's currency are listed as **debits** and are preceded by a (-).
- *The balance of payment account lists the reasons why a currency is demanded and why it is supplied, and shows the amounts demanded and supplied for various purposes during an interval of time.*
- Exports cause a demand for the exporter's currency. Imports cause a supply of the importer's currency.

# Exchange Rates and Currency Supply

- Let us see how to plot the value of currency supplied against the exchange rate by considering British imports of wheat. Let us suppose that world price of wheat is \$3/bushel and Britain buys such a small proportion of a global wheat output that the world price of wheat is not influenced by the amount that Britain imports.
- At an exchange rate of \$1.5/£ the pound prices of wheat is  $\$3 \div (\$1.5/\text{£}) = \text{£}2/\text{bushel}$

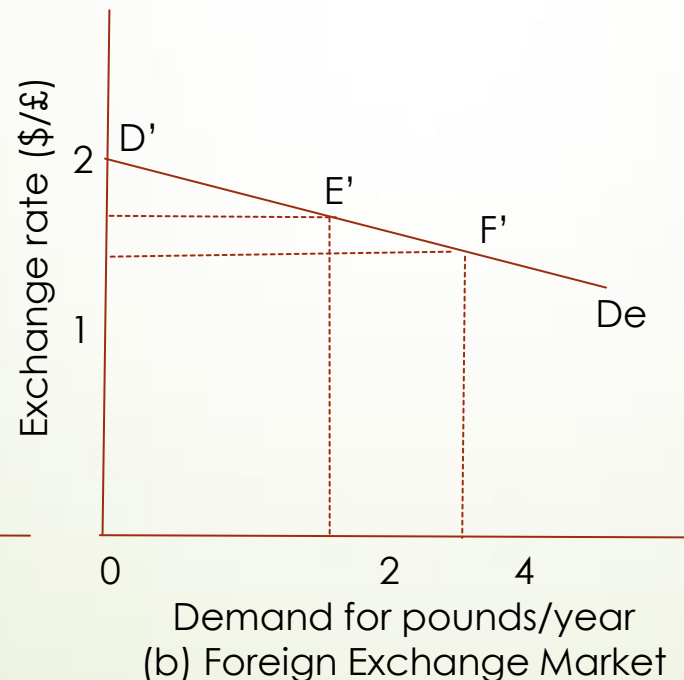
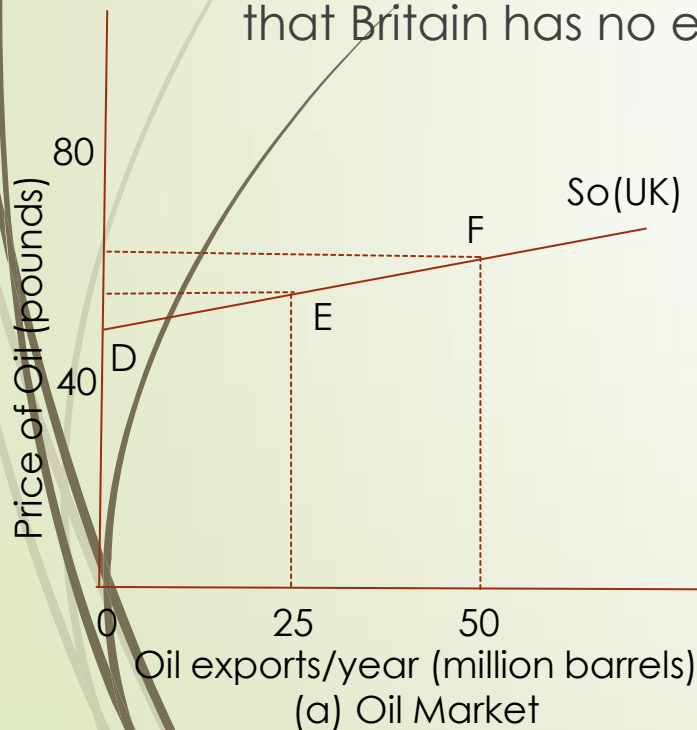


- At £2/bushel Britain's production of wheat equals Britain's consumption of wheat so that Britain is precisely self-sufficient at this price. With zero imports the number of pounds supplied is zero at the exchange rate \$1.5/£ (A')
- If the exchange rate is \$1.7/£ the pound price of wheat is  $3 \div (\$1.7/\text{£}) = \text{£} 1.76 / \text{bushel}$
- Point B shows that at this price, wheat imports are approx. 0.75 billion bushels. Thus,  $1.76 \times 0.75 = \text{£}1.32$  billion per year (as B')
- Similarly, at exchange rate \$2/£ the pound price of wheat is £1.5 /bushel. At point C, the expenditure for import demand of 1.5 billion bushels is  $1.5 \times 1.5 \text{ billion} = \text{£}2.25 \text{ billion}$  (C')

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- *Higher import prices, ceteris paribus, reduce the foreign exchange value of a country's currency*
  - *Higher export prices, ceteris paribus, increase the foreign exchange value of a country's currency*
  - The price of a country's exports relative to the price of its imports is referred to as the country's **terms of trade**
  - A country's terms of trade are said to improve when the price of its exports increase relative to the price of its imports.
  - A country's terms of trade are said to worsen when the import prices increase relative to export prices.

# Exchange Rates and Currency Demand



- The demand curve for a currency shows the value of the currency that is demanded at each exchange rate. A currency's demand curve can be derived from the country's export supply curve. This curve shows the quantity of exports sold at each price of exports. The value of exports at each exchange rate is then obtained by multiplying the price of exports and the quantity of exports
- We assume that Britain exports Oil only. Suppose the world price of oil is \$100/barrel & that Britain has no effect on this price when it changes its oil exports.



- If we begin with an exchange rate of \$2/£, the pound price of oil is  $\$100/\$2/\text{£} = \text{£}50/\text{barrel}$  where oil exports are zero
- If the exchange rate is \$1.8/£ the pound price of wheat is  $100 \div (\$1.8/\text{£}) = \text{£} 55.55 / \text{barrel}$  & oil exports are approx. 25 million barrels per year
- The value of oil exports & quantity demanded of pounds per year at \$1.8/£ is  $\text{£}55.55 \times 25 = \text{£}1.389$  billion per year (as E')
- Finally at \$1.5/£ the price of oil is  $100 \times \$1.5/\text{£} = \text{£}66.67$  per barrel & exports are approx. 50 million barrels (F). Thus, the value of oil exports at \$1.5/£ is  $\text{£}66.67 \times 50 = \text{£}3.33$  billion per year (F') pound demanded.

# Other Factors affecting Exchange Rates

- Besides, Prices and Quantities of imports and exports of merchandise, other factors that influence exchange rate are:
  - **Service Exports and Imports** (excluding debt service)
  - **Unilateral Transfers** (receipt or payment of foreign aid and gifts)
  - **Private Holdings of foreign Assets** (net investments made by residents in foreign assets)
  - **Direct Investment** (DI are those where the foreign investor holds 10% or more of voting share)
  - **Private Holdings of Domestic and Foreign Securities** (increasing interest rates and expected dividend rates in a country relative to other countries increases investment in the country's securities like bonds and stocks)
  - **Changes in Official Assets and Reserves**
  - **Statistical Discrepancy** (incorrectly recorded)

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- Until the beginning of 20<sup>th</sup> century the international financial system was based on gold, known as **gold standard**
  - Govt. fixed the prices of their paper currencies to gold, and thereby fixed exchange rates between their paper currencies.
  - A new exchange system was built after the World War II to avoid currency wars
  - The law of one price applied to the international marketplace is called **purchasing power parity**