EFR summary

International Economics, FEB12004

2024-2025

Lectures 1 to 10

Weeks 1 to 4

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Details

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International economics – IBEB – Lecture 1, week 1
National income accounting and Balance of payments

National income accounts

National income = income earned by a country's factors of production

GNP

GNP: Value of all final goods and services produced by a country's factors of production in a given time period

GNP is the sum of the 4 types of expenditures

1. **Private consumption (C):** all expenditures by domestic private individuals or households
2. **Investments (I):** all expenditures by private households on capital, such as building, infrastructure and equipment
3. **Government consumption (G):** expenditures by government on products and services
4. **Current account (CA):** net expenditures by foreigners on domestic goods and services (exports-import)

More precise measures of national income take into account:
Depreciation of physical capital: Subtracted from GNP
Unilateral transfers: remittances, foreign aid and pension payments to expatriate retirees.
=> National income = GNP - Depreciation + Unilateral transfers

As depreciation and unilateral transfers are often exogenous to government policies, GNP and national income are used interchangeably.

GDP

GDP: the value of all final goods and services that are produced within a country in a specified time period.

Here, the geographic border is emphasised.

GDP = GNP – Payments from foreign countries to domestic factors of production
+ Payments to foreign countries for foreign factors of production

If GNP/GDP < 1, an economy's earnings are dominated by foreign factors of production.

Expenditures and production in an open economy

Y = C + I + G + CA
CA = EX - IM = Y - (C + I + G)

Exports > Imports

Exports > imports: the country earns more than it spends
=> Increasing net foreign wealth
=> In future periods, the domestic country can consume more than it produces.

Exports < Imports

Exports < imports: the country earns less than it spends
=> Decreasing net foreign wealth

National savings and the current account

National savings (S) are the part of national income (Y) that is not spent on consumption (C) or government purchases (G).

Y = National income of private households
C = Total expenditures on consumption of private households
T = total tax payments of private households
G = Government purchases

$S = S^p + S^g$ (national savings = private savings + government savings)
$=> \ (Y - C - T) + (T - G)$
$=> \ S = Y - C - G$

We know that
$CA = Y - (C + I + G)$
$=> \ CA = (Y - C - G) - I$
$=> \ CA \ = \ S - I$

Therefore
Current account = national savings - investment = net foreign investment

When imports are larger than exports, national savings are low relative to investments.

Government deficit = G - T

High government deficit can lead to a negative current account, assuming other factors are constant

Balance of payments (BoP)

Balance of payments: records all transactions between a domestic and a foreign country.

Note: Due to double-entry bookkeeping
- Each transaction enters the BoP twice, as a credit (+) and as a debit (-)
- The sum of balance of payment should always equal 0 (current account + financial account + capital account = 0)

Balance of payment accounts
1. **Current account:** imports and exports of goods and services
    - Merchandise (physical goods)

    - Services (eg payments for legal and shipping services)
    - Income receipts (interest and dividend payments, remittances and income from firms operating in foreign countries)
2. **Financial account:** imports and exports of financial assets or capital
3. **Capital account**: flows of special, typically non–market, non–produced, or intangible assets (eg debt forgiveness, copyrights and trademarks)

Financial inflow: domestic assets sold to foreigners are recorded as a credit (+) as the domestic country gains cash.

Financial outflow: domestic citizens' purchase of foreign assets is recorded as a debit (-) as it results in cash outflow.

While it is common to assess and rank countries based on national income figures, this is not always effective because there are for example differences in work culture.
=> National income is not the best representation of the citizens' welfare.
=> Broader measure to evaluate the nations' welfare: the **Human Development Index (HDI)**, which equals 1/3 life expectancy + 1/3 GNP per capita + 1/3 literacy rate.

International Economics – IBEB – Lecture 2, week 1
Money, interest rates and exchange rates

The interest rate is the opportunity cost of holding cash, i.e. the price of money in a country, while the exchange rate is the relative price of national currencies.

Money

Money is a means of payment that can be in the forms of currency in circulation, checking accounts, or debit card accounts.

Liquid asset: can be used to pay for goods and services without substantial transaction costs (but earns little or no interest)

- Examples: currency in circulation, checking deposits, debit card accounts, savings deposits, and time deposits

Illiquid assets: require massive transaction costs in terms of time, effort, or fees to be converted into means of payment (but they earn higher interest)

- Examples: bonds, loans, deposits of currencies, stocks, real estate, works of art

Money supply and demand

Money supply

Money supply

- Money supply is controlled by the central bank.
- The ESCB (European System of Central Banks) controls the monetary base and indirectly influences checking deposits, debit card accounts, and other monetary assets through banking regulations.

Money demand

Money demand: the amount of money people want to hold instead of the illiquid assets.

Determinants of individual money demand

(1) interest rates on non–monetary assets
(2) risk of unexpected inflation
(3) liquidity: the need for liquidity rises with price and the number of transactions

Determinants of aggregate money demand,

(1) interest rates on non-monetary assets
(2) prices (higher prices = higher money demand)
(3) Income (higher income = higher demand for goods and services = higher money demand)

Inflation is not important in explaining *aggregate* demand, because while lenders lose, borrowers gain (therefore the effect balances out and there's no effect on aggregate money demand)

Aggregate money demand: $M^d = P * L(R, Y)$

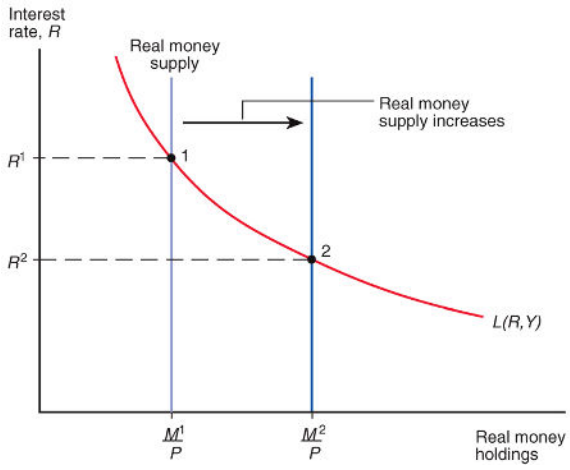
P = price level
Y = real income
R = interest rates on non–monetary assets
$L(R,Y)$ = aggregate real money demand.

The aggregate money demand is often written in the equivalent form: $M^d/P = L(R, Y).$

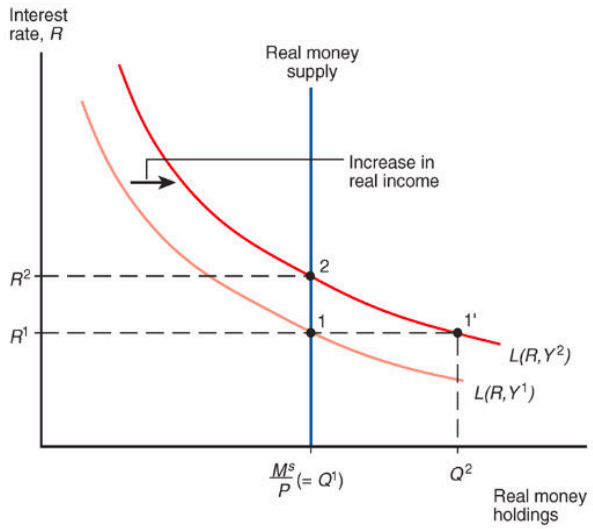
Money market equilibrium is acquired when the interest rate adjusts $M^s = M^d$ or $M^s/P = L(R, Y)$

$M^s > M^d$: the demand will not go up unless people pay a lower interest rate => interest rate falls and households will demand more money until their demand equals supply.

$M^s < M^d$: households willing to pay higher interest rates, thus the interest rate will increase money demand decrease to reach equilibrium.



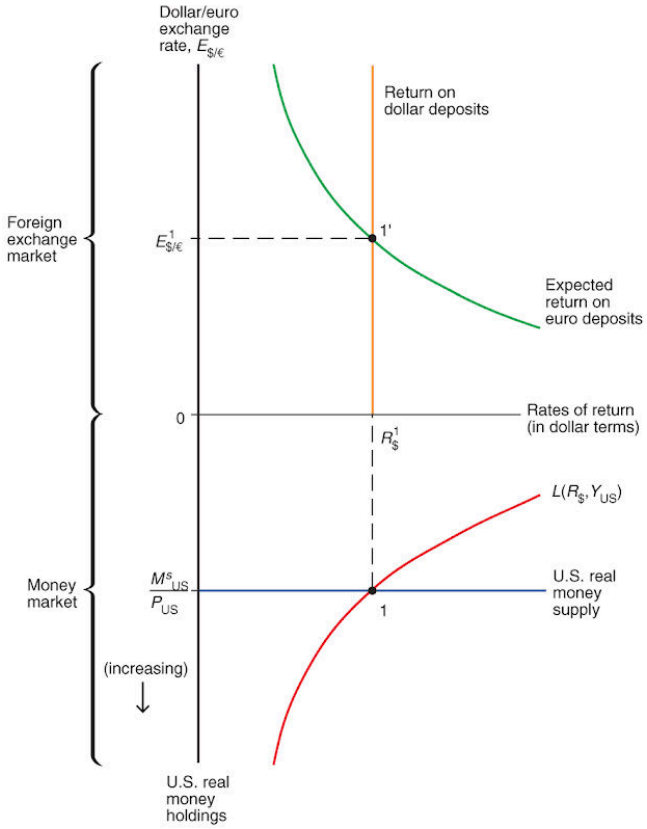
When **real money supply** increases, households will be willing to pay a lower interest rate, so the equilibrium will move to point 2. If the supply decreases, households would be willing to pay higher interest rates.
When Y (income) increases, this affects the demand for money, and $L(R,Y)$ shifts upwards, leading to higher interest rates in equilibrium.



If income increases for a given interest rate, the red curve shifts to the right.

Money supply and the exchange rate in the short-run

Short run is when goods prices are fixed due to 'menu costs'.



The lower part of the picture demonstrates the equilibrium for the home country – the US – in the money market. It is the same graph introduced previously but rotated by 90 degrees.

The upper figure represents the relationship between the returns on deposits and the $/€ exchange rate. Whenever the exchange rate increases, investors have to pay more dollars to get 1 euro, thus there is a **depreciation** of the US dollar.

Note that the returns on deposits denominated in US-$ are not influenced by the $/€ exchange rate. The yellow line which illustrates this fact is thus vertical. However, the returns on €-deposits decrease when the $/€ exchange rate increases. The reason is because investors have to pay more today regardless of future changes in the $/€ exchange rate. Hence, whenever the exchange rate increases, the value of the domestic currency relative to the foreign currency decreases.

At point 1, the two lines intersect so the money market is in equilibrium. There, the returns on investments of both types are identical, so the investors do not have an incentive to change $–deposits into €–deposits, i.e. to supply $ and demand €.

When the US Fed increases the money supply, the interest rate on US non-monetary assets in dollars decreases. As there are now higher interest rates for assets denominated in euros, the demand for it increases. Investors thus supply dollars and demand euros => the dollar depreciates.

Otherwise, there can be an increase in €–money supply. This decreases interest rates on non–monetary assets in the EU for a given exchange rate, and investors demand more assets denominated in dollars. Therefore, the green curve shifts to the left. This means that investors will sell more EU assets and demand US dollars => appreciation of the US dollar.

Short-run vs. long-run

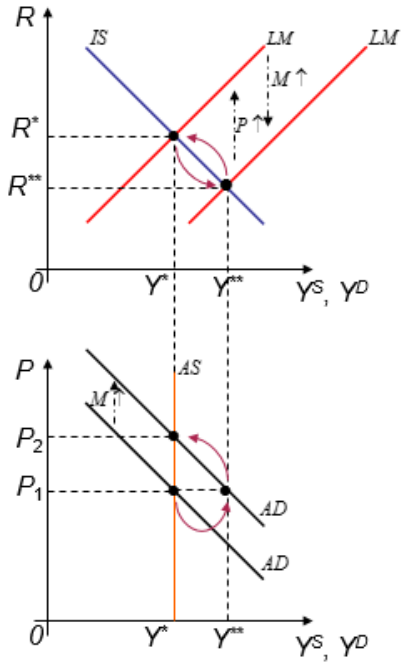
Short run: prices are fixed due to menu cost

Long run: Both final goods and factor prices are flexible, meaning factor prices adjust to clear factor markets. Then, real output and income level only depend on a country's factor endowments and technologies, and not on money supply.

Real output and income level are independent of money supply => interest rates are independent of money supply => price levels adjust so that real money supply does not increase.

If there is an increase in money supply, the LM curve (which shows the combinations of interest rates and levels of real income for which the money market is in equilibrium) shifts to the right.

=> Interest rate *R* decreases to establish an equilibrium in the money market again.
=> The lower interest rate *R* increases the domestic demand for investment goods, so *AD* increases for a given price level *P* (short–run equilibrium).



After a while, firms will understand that the increase in the money supply is permanent and will adjust prices to *P2*. This leads to a return to original equilibrium.

=> In the long–run, *R*, *Y*, *Ms* are unchanged.
=> An increase in money supply leads to a price increase which compensates for the higher level of money supply, so that real money supply stays unchanged.

Long-run relationship between money supply and price level

$$\frac{M^S}{P} = L(R,Y)$$

$$\rightarrow P = \frac{M^S}{L(R,Y)}$$

$$\rightarrow \ln P = \ln M^S - \ln L(R,Y)$$

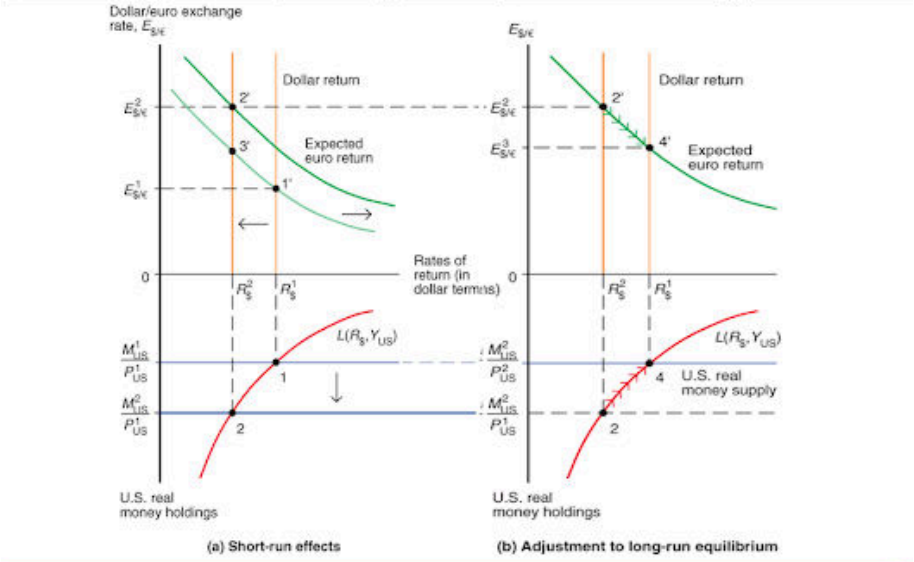
$$\rightarrow \frac{\Delta P}{P} = \frac{\Delta M^S}{M^S} - \frac{\Delta L(R,Y)}{L(R,Y)}$$

According to the above equation, when the money supply increases, prices increase as well if there are no simultaneous changes in L.

Long run effects

When there is an increase in US money supply, there is a decrease in interest rates on US non–monetary assets. In the long run, an important factor for consideration is the expectation about exchange rates in the future.

Following the decrease in interest rates, the increase in money demand causes investors to expect a future increase in money supply. The expected returns on €-denominated assets thus grow, i.e. the dollar is believed to be less valuable than the euro. Consequently, the green curve shifts to the right. Since at this point, the $/€ exchange rate has risen, the demand for $-denominated assets drops while the demand for €-denominated assets surges. In the foreign exchange market, then, increased demand for the € and increased supply of the $ result in a depreciation of the US–$ (panel a).



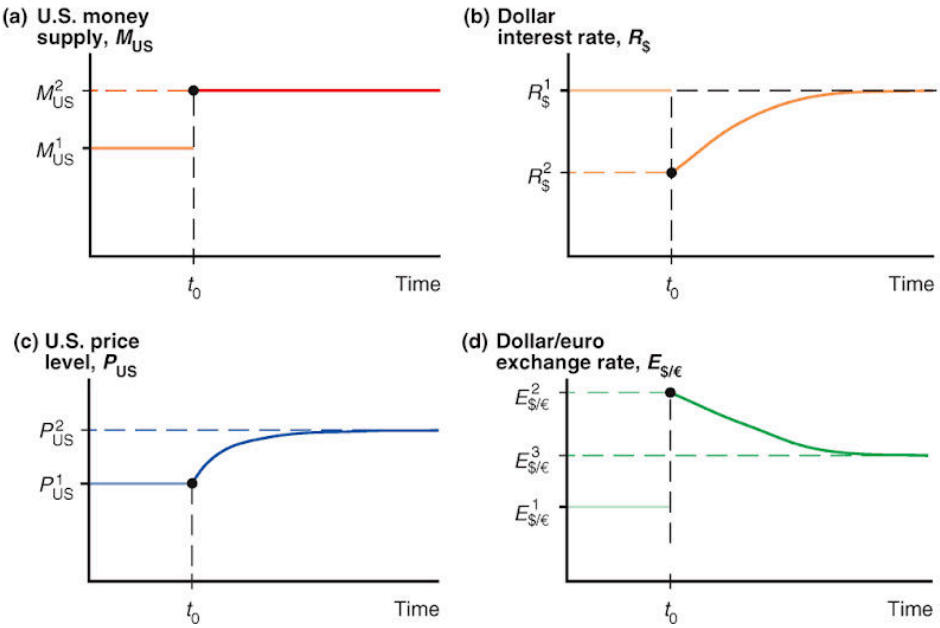
In the long run, workers demand wage compensation which increases production costs and, hence, prices. The money supply increase is now regarded as permanent.

This means that *real* money supply in the US declines. As a result, the interest rate hikes which implies that the returns on US–$ assets increase (lower panel, figure b). If the returns on US-$ assets increase, investors will demand more $-denominated assets and less €-denominated assets. Thus, more euros are supplied while more dollars are demanded. The US dollar appreciates (upper panel, b, leads to point 4'). Note that the equilibrium exchange rate in the long run is still higher (dollar has still depreciated) than the one before the increase in money supply in the US.

Exchange rate overshooting

The interest rate falls sharply and then improves over time (b), whereas prices adjust gradually (c). Finally, due to expectations, the exchange rate increases more than its new equilibrium (overshoots), and then eventually corrects to some degree by reaching a new equilibrium (d).

This large rise in the beginning for the exchange rate is called **exchange rate overshooting**. There is initially a great depreciation of the domestic currency, which is followed by a minor appreciation as prices adjust. The overshooting idea highly relies on the *sticky prices*' theory in the short run, as changes in nominal money supply have a *short–term effect on real money supply* but eventually real variables return to the original level.



Short-run vs. long-run in an open economy

Short-run reasoning is based on the idea that prices are sticky because of menu costs. The long run suggests that final goods prices and factor prices are flexible, real output and income level only depend on a country's factor endowments and technologies, and nominal influence cannot last long.
In the short run, a domestic increase in their money supply leads to a depreciation of domestic currency but an appreciation of foreign currency. Contrarily, a decrease in the domestic money supply leads to an appreciation of domestic currency and depreciation of foreign currency.

In the long run, however, an increase in money supply in the home country amends both the home market and the foreign market due to the expectations of investors.
=> In the end, an equilibrium is reached at the point where real money supply is at the same level as it was before the increase. The exchange rate jumps abruptly at first, and then decreases slightly afterwards.

International Economics – IBEB – Lecture 3 & 4, week 2
Price levels and the exchange rate in the long run

Law of one price and PPP

Law of One Price (LOP): when free trade is costless and the market is perfectly competitive, the prices of the same goods across countries are the identical when expressed in the same currency.

If prices differ across countries: **arbitrage trade**, which eventually would still lead to the same outcome of identical prices due to the forces of demand and supply.

However, LOP hardly holds in reality because

- Different taxes across countries.
- Transportation costs and differences in production costs under multinational activity (differences in regulations and taxes)
- Transportation costs combined with different forms of competition (a monopoly in the home market will charge higher prices at home while acting under perfect competition rules in the foreign market)

Purchasing Power Parity (PPP): application of the LOP for all goods and services (or a representative basket of goods and services) across countries.

PPP implies that the nominal exchange rate is equal to the ratio of average prices
For example: $\frac{P^{NL}}{P^{CH}} = E_{\frac{EUR}{CHF}}$

If the same basket of goods costs 100 A's currency and 200 B's currency, the exchange rate would be 1/2 if PPP holds.

There are two types of PPP:

1. **Absolute PPP**: holds if the exchange rate equals the level of relative average prices across countries
   => $\frac{P^{NL}}{P^{CH}} = E_{\frac{EUR}{CHF}}$
2. **Relative PPP:** holds if the change in exchange rate equals the change in relative prices.

Relative PPP will definitely hold if absolute PPP holds

In the long run, countries with higher inflation rate see their currencies depreciate. If the money supply increases making prices higher, domestic goods first lose competitiveness but then nominal exchange rate will lower to compensate.

PPP assumes that all households consume identical baskets of goods. However, as households in different countries consume different baskets, the **Big Mac index** has been developed to indicate the exchange rate at which hamburgers cost the same in America as abroad.

If a currency is undervalued: its market exchange rate is higher than the exchange rate derived from the Big Mac.

Monetary approach to exchange rates

Monetary approach: a long-run model in which prices are flexible and always adjust for absolute PPP to hold.

Consider the money market equilibrium in two countries:

$$P_{EU} = \frac{M^{S}_{EU}}{L(R_{EU}, Y_{EU})} \text{ and } P_{EU} = \frac{M^{S}_{US}}{L(R_{US}, Y_{US})}$$

If absolute PPP holds: $\frac{P_{US}}{P_{EU}} = E_{\frac{US}{EU}}$
The equilibrium exchange rate is determined by the exogenous factors Ms, R and Y of both countries.

US money supply increases:

- There is an excess supply of money, so price levels rise to compensate and bring the money market back to equilibrium.

- As PPP holds, the exchange rate then increases and there will be a proportional depreciation of the dollar relative to the euro.
- Because of higher prices, consumers demand fewer US goods, hence fewer dollars => Shift consumption partly from US goods to EU goods.

US interest rate increases

- Demand for US money decreases as it becomes more costly to hold money.
- In order to maintain the equilibrium on the US money market, prices increase.
- As PPP holds, US dollar depreciates proportionally relative to euro. This outcome is different from that in the previous model.

    If output/income of US households increases due to technological progress, for instance, real money demand rises, leading to excess demand. This can be compensated by a decrease in the US price level. From PPP, the dollar appreciates relative to the euro.

In general, the monetary approach implies that: since prices can adjust quickly to maintain market equilibrium after changes in Ms, R, Y, and that PPP holds, the exchange rate also adjusts accordingly.

The Fisher effect

The Fisher effect indicates that the difference between nominal interest rates is equal to the difference between inflation rates.

Interest parity condition:

$$R_{EU} - R_{US} = \frac{E^{e}_{\frac{EU}{US}} - E_{\frac{EU}{US}}}{E_{\frac{EU}{US}}}$$

In this case, investors do not have any incentive to relocate their investments as the interest rate difference equals the expected appreciation of the domestic currency.

Under relative PPP, changes in the relative aggregate prices equal changes in the exchange rates such that:

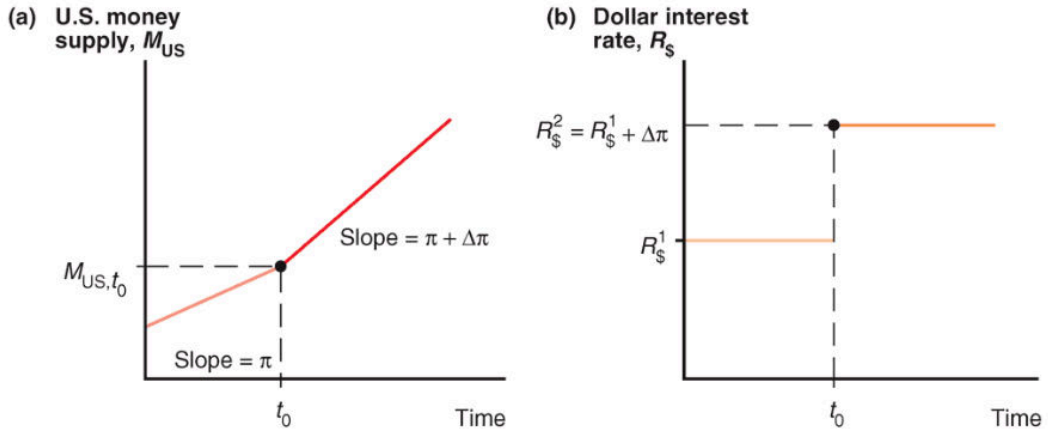
$$\pi_{EU,t} - \pi_{US,t} = \frac{E_{\frac{EU}{US},t} - E_{\frac{EU}{US},t-1}}{E_{\frac{EU}{US},t-1}}$$

Combining two above equations leads to:

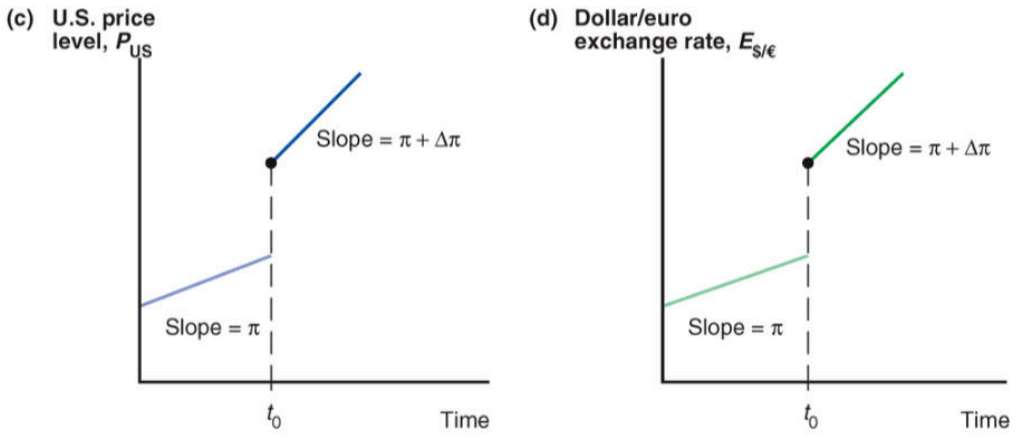
$$R_{EU} - R_{US} = \pi^{e}_{EU,t} - \pi^{e}_{US,t}$$

The Fisher effect states that an increase in the expected domestic inflation rate ceteris paribus leads to an equal increase in the interest rate on domestic assets.

To understand the interaction of interest rates and exchange rates under the monetary approach, consider the graphs below. They illustrate the effect of a sudden acceleration of the US money supply growth on the foreign exchange market.



Increase in US inflation rate immediately increases US interest rate



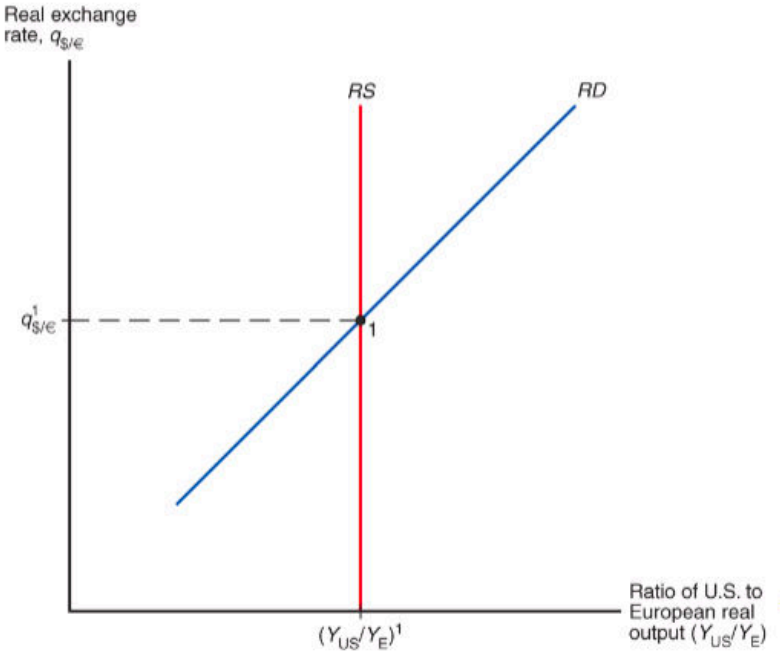
c) Increase in US interest rate decreases real money demand => price level has to increase to reach equilibrium
d) Due to PPP, an increase in US price level leads to depreciation of US dollar

Real exchange rate approach

Real exchange rate: $q_{\frac{US}{EU}} = \frac{E_{\frac{\$}{€}} * P_{EU}}{P_{US}}$

Determinants of the real exchange rate:

1. nominal exchange rate
2. world relative demand for US goods (tradables and non–tradables): increase in relative demand for US goods increases relative price of US goods => increase of value of US goods relative to EU goods, real appreciation of the $
3. relative supply of US goods: increase in relative supply of US goods decreases relative price of US goods => decrease of value of US goods relative to EU goods, real depreciation of the $



The relative supply (RS) of US goods is vertical because the RS is independent from the real exchange rate: in the long run, relative supply depends on the technologies and factor endowments of a country. The RD has a positive slope which is implied in the real exchange rate definition. An increase of the real exchange rate implies that US goods become cheaper relative to European goods, thus the demand for US goods also increases.

Consider now a change in preferences. Suppose US goods become more popular. Consequently, the relative demand for US goods increases and the RD shifts to the right. The new equilibrium real exchange rate will be at a lower level, which means a

real appreciation of the dollar. Suppose there is some form of technological progress in Germany, inferring that the relative supply of EU goods increases. As a result, the RS moves to the left. The price of EU goods drops relative to the price of US goods. The new RS curve implies that the real exchange rate declines.

Now let's consider a change in nominal variables. For example, a change in the US money supply. In the long run, this increases the price level, but the real exchange rate stays constant and there are no real significance in terms of change. A more general use of the real exchange rate approach is to explain variations in the nominal exchange rate. If we rewrite the expression for the real exchange rate, we obtain:

$$E_{\frac{\$}{€}} = q_{\frac{US}{EU}} \cdot \frac{P_{US}}{P_{EU}}$$

Increase in US money supply: leads to variations in price levels in the long run. The nominal exchange rate rises proportionally (the monetary approach) and there is no change of the real exchange rate.

Increase in the US inflation rate: leads to a higher interest rate (the Fisher effect)
=> money demand in the US will be reduced and the US price level increased. The real exchange rate does not change, only the nominal exchange rate does (same result was observed in the monetary approach)

Increase in the relative demand for tradable and non-tradable domestic goods:
Increases the US price level
=> decreases the long-run real exchange rate since US baskets have become more expensive.
However, the long-run national price level is unchanged, as it only depends on money supply and aggregate money demand => for the above equation to hold, there must also be a fall in the long-run nominal exchange rate.

Increase in the relative supply of domestic products: As a result, the relative price of US goods lowers and the dollar depreciates in real terms. In addition, increased relative supply brings about increased aggregate US real money demand and drives down long-run US price levels.
=> the net effect on the nominal exchange rate is ambiguous since real exchange rate and US price level work in opposite directions

Note

- Monetary factors only change the nominal exchange rate, not the real value of goods.
- Real factors change the real value of goods as well as the real exchange rate.

Interest rate differences

Expected relative change in real exchange rate = expected relative change in nominal exchange rate - expected inflation rate difference

The relationship between interest rates and inflation rates (Fisher effect) was based on relative PPP. We know that:

$$q_{\frac{US}{EU}} = E_{\frac{\$}{\epsilon}} * \frac{P_{EU}}{P_{US}}$$

Taking the logarithm, we end up with:

$$\frac{q^{e}_{\frac{US}{EU}} - q_{\frac{US}{EU}}}{q_{\frac{US}{EU}}} = \frac{E^{e}_{\frac{\$}{\epsilon}} - E_{\frac{\$}{\epsilon}}}{E_{\frac{\$}{\epsilon}}} - (\pi^{e}_{US} - \pi^{e}_{EU})$$

Combining with the interest parity condition:

$$R_{EU} - R_{US} = \frac{E^{e}_{\frac{EU}{US}} - E_{\frac{EU}{US}}}{E_{\frac{EU}{US}}}$$

We end up with the augmented Fisher equation:

$$R_{US} - R_{EU} = \frac{q^{e}_{\frac{US}{EU}} - q_{\frac{US}{EU}}}{q_{\frac{US}{EU}}} + (\pi^{e}_{US} - \pi^{e}_{EU})$$

If the real exchange rate is expected to remain unaffected, the numerator of the first term on the right-hand side is equal to 0 and absolute PPP holds. Thus, we get the simple Fisher effect formula.

Differences in real interest rate

The real interest rate can be written as follows: $r^{e} \approx R - \pi^{e}$

R = nominal interest rate

π^{e} = expected inflation

r^e= expected real interest rate.

Exact definition of the real interest rate:

$$\frac{1+R}{1+\pi}=1+r$$

However, the two expressions are similar when R and π are insignificant.

Real interest parity condition:

$$r^e_{US}-r^e_{EU}=\frac{q^e_{\$/€}-q_{\$/€}}{q_{\$/€}}$$

This formula results from combining two equations:

1. The predicted differences in real interest rates across countries:
   $$r^e_{US}-r^e_{EU}=\left(R_{US}-\pi^e_{US}\right)-\left(R_{EU}-\pi^e_{EU}\right)$$
2. The augmented Fisher equation.

If productivity in the US improves, the real value of the US dollar falls
=> Real exchange rate increases and the value of a US bundle of goods decreases relative to the value of an EU bundle of goods.

Nonetheless, investors do not have an incentive to switch from US assets to EU assets if they expect that the real depreciation of the US dollar would be exactly outweighed by the real interest rate difference (real interest parity condition).

International Economics – IBEB – Lecture 5, week 3
Exchange rates and open economy macroeconomics

Aggregate demand

Components of aggregate demand

1. private consumption (C)
2. private investment (I)
3. government consumption and investments (G)
4. net expenditure by foreigners: the current account (CA).

Determinants of aggregate demand

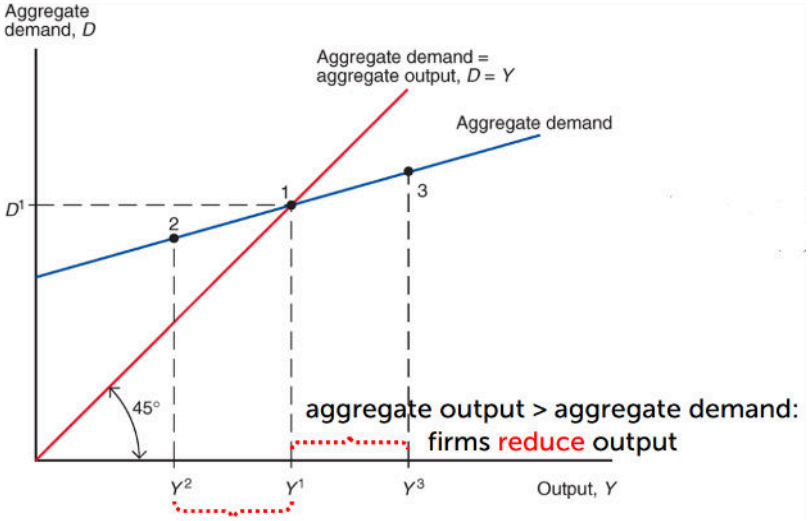
1. Net income: Private demand for consumption depends on disposable income, which is given as Y–T. An increase in disposable income will raise the consumption (but not proportionally, as a part of income goes to savings) and lower the current account as domestic households will consume more imports (CA = EX – IM).
    - Assumption: 'home-bias' (the rise in C has a larger effect than that of the fall in CA.)

2. Real exchange rate: With an increase in the real exchange rate, domestic demand increases

Aggregate demand can be expressed as:
$Y^D = C(Y - T) + I + G + CA(q, Y - T)$ or in other words
$Y^D = Y^D(q, Y - T, I, G)$

Short-run equilibrium in the goods market

Short run: prices are sticky so production adjusts to clear the goods market and the equilibrium is $Y^S = Y^D(q,\ Y - T,\ I,\ G)$



AD has a positive Y-intercept because the private demand for investment goods I and G are positive (they are given) even if there is no output.

When there is a rise in nominal exchange rate, domestic goods become cheaper relative to foreign goods, so the aggregate demand curve shifts upwards and aggregate output increases accordingly. We can now draw the relationship between the nominal exchange rate and output, the DD curve. The DD curve illustrates all combinations of the exchange rate and income which lead to an equilibrium in the domestic goods markets.

DD curve

Determinants of DD curve

1. Increase in government expenditure: Higher governmental demand for goods and services increases aggregate demand for a given exchange rate E
   => DD–curve shifts to the right.
2. Decrease in T: Raises disposable income which induces higher aggregate demand for domestic goods
   => DD-curve shifts to the right.

3. Increase in I: Increases aggregate demand for a given E
   => DD-curve shifts to the right.
4. Decrease in P relative to P*: domestic goods are inexpensive relative to foreign goods, so the domestic demand for domestic goods increases and also export demand increases.
   => DD shifts to the right.
5. Increase in consumer preferences for today: makes C increase while saving and investment decrease. We assume that aggregate demand increases by more than the corresponding decrease in investments as they are partly financed by credit.
   => DD shift to the right.
6. Increase in the home bias: households have higher demand for domestic goods relative to the demand for foreign good
   => DD shifts to the right.

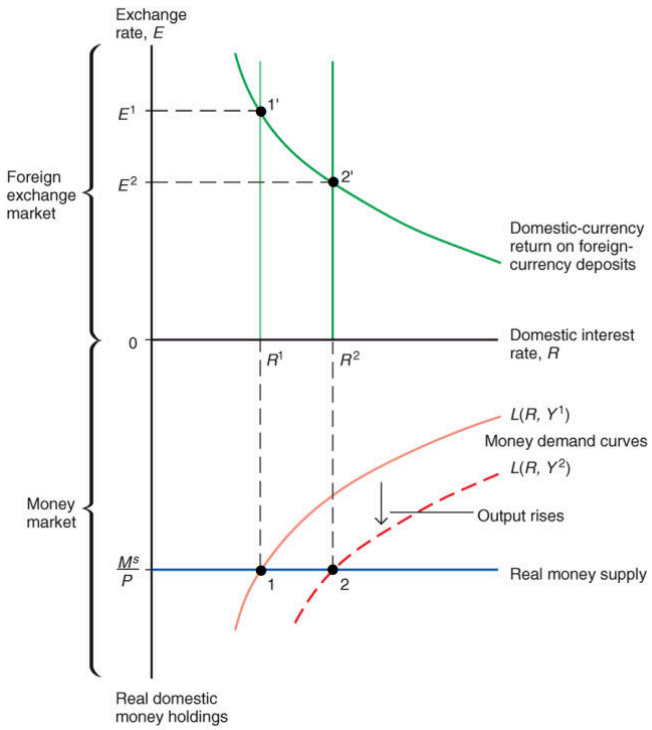
Short run equilibrium in the money and foreign exchange market

For equilibrium to hold

- The interest parity condition has to hold: $R^{EU} - R^{US} = \frac{E^{e}_{\frac{EU}{US}} - E_{\frac{EU}{US}}}{E_{\frac{EU}{US}}}$ and
- The money market is in equilibrium: $\frac{M}{P} = L(r, Y)$.

Relationship between Y and the nominal exchange rate is as follows: Suppose the domestic income increases

- Real money demand increases so the money demand curve moves downwards.
- At the new intersection between the money supply and money demand curves, the domestic interest rate has become higher than before, as prices are fixed in the short-run.
- Thus, we end up in point 2 where the nominal exchange rate has dropped from E1 to E2. This implies that we have a negative relationship between income and the exchange rate.



AA curve

The AA curve describes the relationship between exchange rates and output levels where the money and foreign exchange market are in equilibrium.

Determinants of AA curve

1. Increase in money supply: Reduces interest rate => depreciate domestic currency
   => Shift AA curve upwards
2. Increase in the domestic price level: Real money supply decreases => interest rate increases => domestic currency appreciation
   => Shift AA curve downwards.
3. Decrease in preferences for liquidity: Real money demand decreases => interest rate decreases to match money demand and money supply => Domestic currency depreciate
   => Shift AA curve upwards.
4. Increase in the foreign interest rate: Investors shift to assets denominated in foreign currency and this results in higher demand for foreign currency => domestic currency depreciates
   => Shift AA curve upwards

5. Increase in **the expected nominal exchange rate:** Investors expect the domestic currency to depreciate in the future, so they will demand more foreign deposits today => depreciation of the domestic currency occurs today
   => E increases
   => Shift AA curve upward

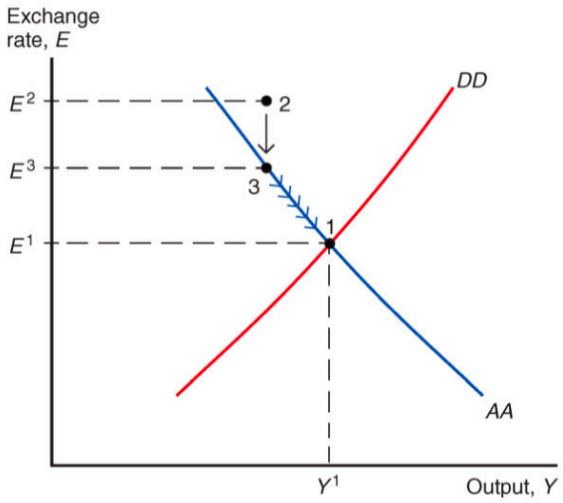
Simultaneous equilibrium in all markets

(1) Equilibrium in goods market: $Y^S = Y^D$ in goods market

(2) Equilibrium in the forex market (interest parity condition): $R^{EU} - R^{US} = \frac{E^e_{\frac{EU}{US}} - E_{\frac{EU}{US}}}{E_{\frac{EU}{US}}}$

and equilibrium in the money market: $\frac{M}{P} = L(r, Y)$.

Adjustment to equilibrium



Combine the DD (which gives all the equilibrium points of the goods market) and the AA (which shows all the equilibrium points for the money and exchange markets), we can determine the general equilibrium and the resulting equilibrium nominal exchange rate in all markets.

In reality, countries are typically not in equilibrium, so we start our analysis by looking at point 2. Here, there is excess demand for domestic output as the nominal exchange rate is too high. The point is above the AA curve for either one of two

reasons: the exchange rate is too high for equilibrium on the foreign exchange market or income is too high for equilibrium on the money market. In this case, we assume that the exchange rate adjusts faster than income.

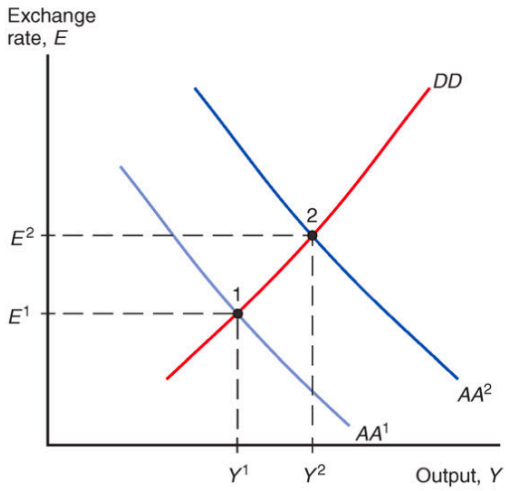
As E falls to point 3, the foreign exchange and money market are in equilibrium, meaning the expected returns are equalised for both domestic and foreign deposits. Nonetheless, point 3 is still above the DD curve so demand for domestic goods is still excessive. To match this excess demand, firms start to increase their output and at the same time the domestic currency slowly appreciates until point 1 is reached (a rise in output causes money demand to rise and thus interest rate goes up
=> To maintain interest parity, E appreciates.

Temporary changes in monetary and fiscal policy

Policy measures would not influence future expectations as they are only temporary.

1. Monetary policy: Central bank changes money supply
2. Fiscal policy: Government changes government expenditure and taxes

Increases money supply (monetary policy)



Money market:

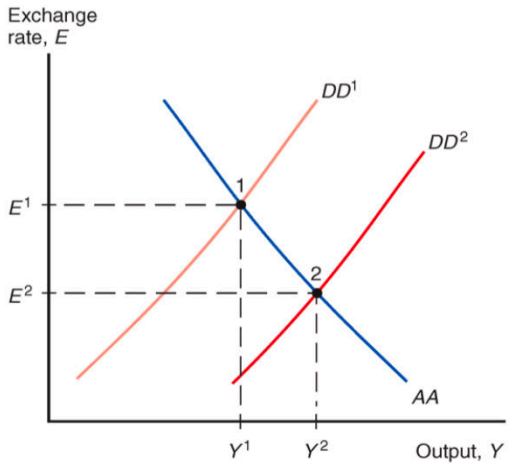
- We have excess supply and there has to be a decrease in R to restore equilibrium.

- Due to this R change, in the foreign exchange market, demand for domestic deposits and domestic currency decreases.
- The exchange rate E increases for a given Y, so the AA curve shifts upwards.

Goods markets:

- The increase in E makes domestic goods cheaper relative to foreign goods, so the demand for them increases which leads to a production increase.
- The equilibrium point moves along the DD curve.

Surges expenditures G or cuts tax T (fiscal policy)



Goods market:

- Demand for domestic goods as well as production rises, so the DD curve shifts to the right

Money market:

- Real money demand increases due to an increase in Y, and the interest rate increases for equilibrium to be achieved.

Foreign exchange market:

- Increase in the interest rate makes domestic deposits more attractive than foreign ones, and thus E decreases. This makes the new equilibrium move along the AA curve to the south-east.

Policies to maintain full employment

Assume that in the first place, there is no involuntary unemployment (but still some voluntary) and output is at its natural level in this open economy. Then, a shock occurs.

The two policies that can be implemented are fiscal policy, which can impact the DD curve, and monetary policy, which can impact the AA curve.

Problems with stabilisation policies:

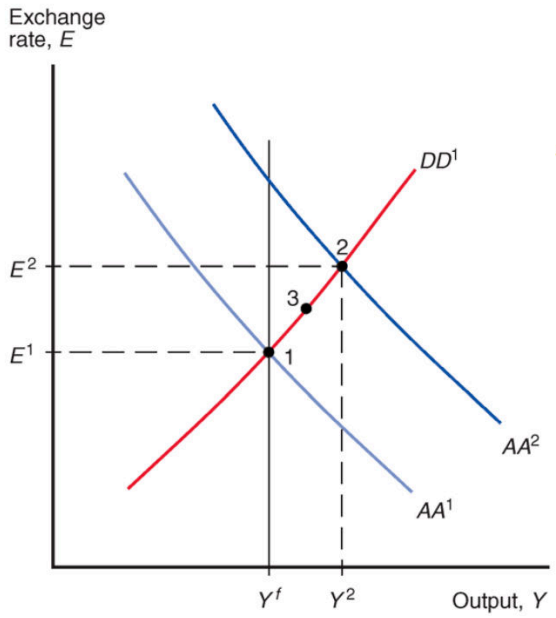
1. There might be an *inflationary bias* as households' reactions augment the effect of policy measures.
    - For example, if policies are adjusted to ensure high employment, unions will demand higher wages and firms thus increase prices, so workers demand even higher wages, etc.
2. In reality, it is difficult for policy makers to interpret data and make decisions about which policies are necessary in order to reach full employment again.
3. There might be an *implementation lag*: there is some time between the decision to implement a policy, the actual implementation of the policy, and the results of the policy. In some cases, therefore, anti-cyclical policies may actually convert to pro-cyclical.
4. Rent-seeking behaviour, which supports personal interests of political actors at the expense of the public, could occur.

Permanent changes in monetary and fiscal policy

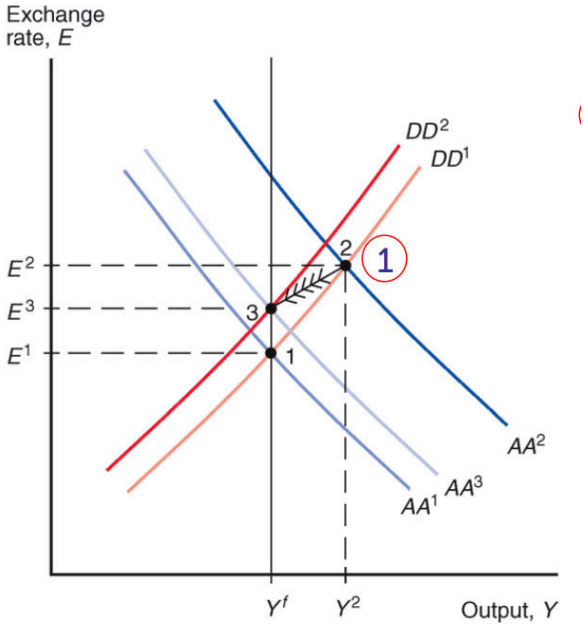
Increase in money supply (monetary policy)

Short run

AA curve shifts further upwards than before since investors also expect future depreciation
=> There's a larger decrease in demand for domestic assets
=> Larger decrease in demand for domestic currency and hence a larger depreciation (self–fulfilling expectations)



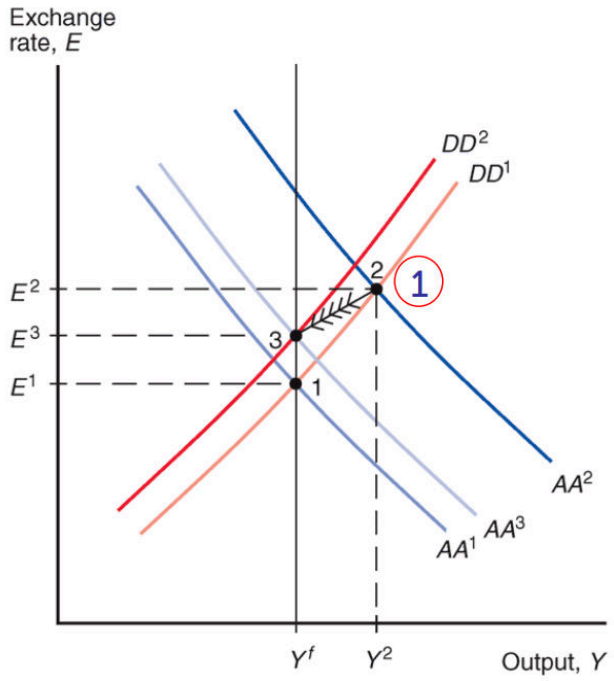
Long run



1. Domestic prices increases => decrease demand for domestic goods => DD–curve to the left
2. There are higher domestic prices => decrease domestic real money supply leading to an appreciation of domestic currency => AA–curve shift downwards

Overall effect: In the long–run, output returns to the initial level which is only determined by factor endowments and technologies. Here, the exchange rate overshoot

Permanent increase in government demand (fiscal policy)

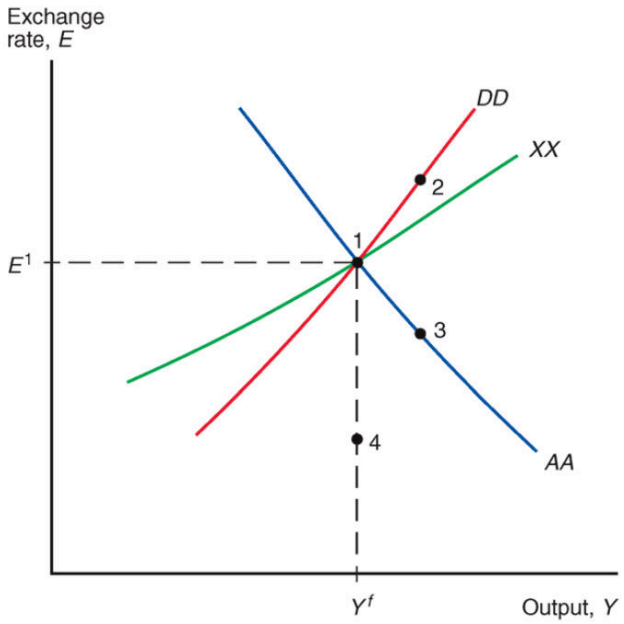


1. Permanent in increase in G: investors expect exchange rate to decrease in the future expected exchange rate
2. Further appreciation of domestic currency => AA–curve downwards
3. Exports decrease and imports increase

Overall: Long run and short run output returns to initial level and public demand crowds out private demand

Macroeconomic policies and the current account

We incorporate a current account curve into the the graph



Positive slope because an increase in exchange rate increases exports and decreases imports
=> CA increases

$CA(E * \frac{P^*}{P}, Y - T) = X$

Note: XX curve is flatter than the DD curve

International Economics – IBEB – Lecture 6, week 3
Fixed exchange rates and foreign exchange intervention

Types of exchange rate regimes

1. **Fixed exchange rate:** Central bank commits to one fixed exchange level.

2. **Managed floating:** The exchange rate is determined by market forces but if it goes outside of a certain predetermined band, the CB intervenes to adjust it.
3. **Flexible exchange rate:** Exchange rate is solely determined by market forces of supply and demand on the foreign exchange market.

Central bank assets and liabilities

Assets:

- Foreign government bonds
- Domestic government bonds
- Foreign currency reserves
- Gold
- Loans to domestic banks

Liabilities:

- Deposits of domestic banks
- Domestic currency in circulation

Due to double-entry bookkeeping, whenever the value of assets decreases (or increases), the value of liabilities has to decrease (increase) as well.

How the central bank can influence the exchange rate

1. CB sells part of its foreign currency reserves and buys domestic currency
2. CB buys foreign currency and sells domestic currency

Now assume that the CB commits to a fixed exchange rate, implying that the expectations about the exchange rate are set at today's exchange rate. The right side of the interest parity formula $R - R^* = \frac{E^e - E}{E}$ is thus equal to 0

Monetary policy with fixed exchange rates

In the short run, monetary policy is non-existent under fixed exchange rates. This can be explained as we consider how changes in the supply of the domestic currency affect the exchange rate in the foreign exchange market. As the CB increases the domestic supply of money, the supply of domestic currency rises while that of the foreign currency falls, causing a relative depreciation of the domestic currency and E increases. Without intervention, AA shifts upwards. However, the CB wants to commit

to a fixed exchange rate, so it intervenes again by buying domestic currency for foreign currency. In the end, the CB should not intervene at all in the first place.

Fiscal policy with fixed exchange rates

Fiscal policy is more effective under a fixed exchange rate regime in the short run. When G increases, Y also increases, leading to an excess demand for domestic assets; thus, the interest rate has to increase and it causes an appreciation of the domestic currency. Under a flexible rate regime, public demand crowds out private demand due to the caused appreciation. However, when there is a fixed exchange rate, there is no crowding-out effect.

When G increases, demand for domestic goods, and hence income, increases given an exchange rate, so DD shifts to the right. With higher real money demand, interest rate rises and the demand for domestic currency surges. If there is no intervention, the exchange rate would react by falling. However, the CB intervenes to keep E fixed by increasing the money supply. In this way, they can lower the interest rate and depreciate the domestic currency. AA thus shifts upwards and reaches the new equilibrium where E is unchanged (domestic interest rate and demand for domestic assets are also unchanged).

In the long run, wages will increase, and so will the prices. This decreases demand for domestic goods, so DD shifts left and AA shifts down to their initial positions, reaching the same output Y. Therefore, when prices increase and output decreases in the long run, real money demand and real money supply both fall. It is important to note that though nominal exchange rate remains constant, real exchange rate will fall as domestic prices are raised.

Devaluation and revaluation

Depreciation and appreciation: used as the main terms when there is an flexible exchange rate and the value of a currency changes only due to market forces.
Devaluation and revaluation: used when the fixed exchange rate and the value of a currency changes due to central bank interventions in the foreign exchange market.

Financial crises and capital flights

Fixing the exchange rate can cause some trouble. If demand for the domestic currency decreases, the CB compensates by increasing its own demand for domestic currency in exchange for foreign currency. Then, when investors expect that the domestic currency will soon be devalued, they sell all domestic assets and buy foreign assets instead, resulting in a sharp devaluation of the currency today.

The decrease of the foreign exchange reserves of the CB is accelerated. At this point, we observe a **capital flight**; that is, a sharp outflow of financial capital. In order to fight against the capital flight, the CB decreases the money supply further to increase the domestic interest rate

However, it has other consequences as the high interest rates reduce the demand for investment goods. In the end, domestic output and employment decrease. We can claim that the self-fulfilling expectations continue to hold as foreign investors' expectations about domestic assets contribute to the financial crisis.

Investors can engage in **speculative attacks** where they expect that the CB reserves of foreign currency are scarce. E is kept fixed, and the value of domestic currency is relatively high compared to the foreign currency, so investors exchange domestic currency into foreign currency at a favourable exchange rate. When the CB currency reserves are used up, there is a devaluation of the domestic currency. Then, investors change foreign currency into domestic currency again at a favourable exchange rate, so the speculators **gain real wealth in the short run if prices are fixed**.

Conclusion: Policies that influence the money market will also influence the foreign exchange market, thus monetary policies are not independent with a fixed exchange rate.

Imperfect asset substitutability and increasing independence of monetary policy

Types of risk:

- **Default risk**: the risk that the borrower cannot pay his debt

- **Exchange rate risk**: the risk that foreign currency depreciates. In that case, it will lead to lower expected returns for assets denominated in that currency.

These types of risks vary between countries due to the imperfect substitutability between domestic and foreign assets and the fact that investors demand different returns to compensate for different risk levels. With such a variety of returns on assets, there should thus be an **adjusted interest parity condition** where is a risk premium ρ is added for foreign investors when they invest in domestic assets:

$R - R^* = \frac{E^e - E}{E} + \rho$

Note that when ρ increases, R also increases.

The risk premium depends on

- The difference between returns on regular stocks and government bonds
- The difference between government bonds of different countries.

The CB can influence the risk premium. For example, when the perceived risk of domestic assets investment rises, demand for domestic deposits falls which leads to domestic currency depreciation, or that E rises.

However, to keep the exchange rate fixed, the CB increases the domestic money supply which then raises the interest rate. This consequently lowers the exchange rate back to its constant level.

International Economics – IBEB – Lecture 7, week 3
International monetary system

Fixed exchange rate regimes

1. **Gold Standard Era** (1870-1914): the exchange rate between gold and domestic currency is fixed

2. **Reserve currency system** (1945-1971): the exchange rate between the domestic currency and the foreign reserve currency is fixed. The most prominent examples are the US dollar in the 1944-1973 period and the Eastern European countries within the EU but outside the euro.

Macroeconomic equilibrium

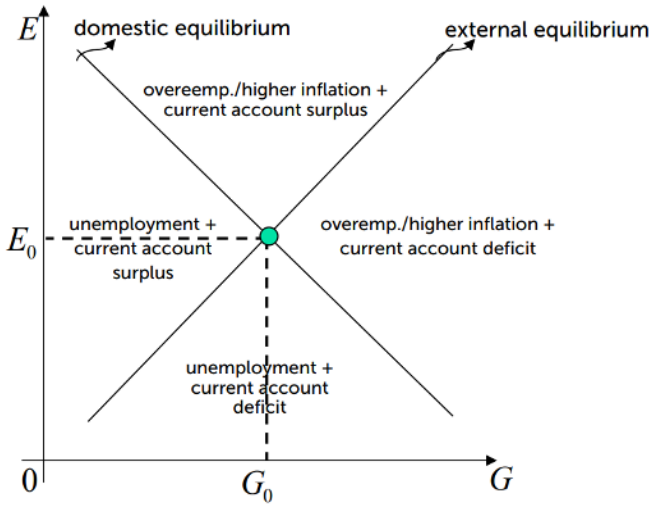
Domestic equilibrium

Domestic equilibrium: output level at the natural rate of unemployment
$Y = Y(C, T, I, G, E)$

External equilibrium

External equilibrium: combination of G and E that leads to a balanced CA
$CA = CA(G, T, E)$

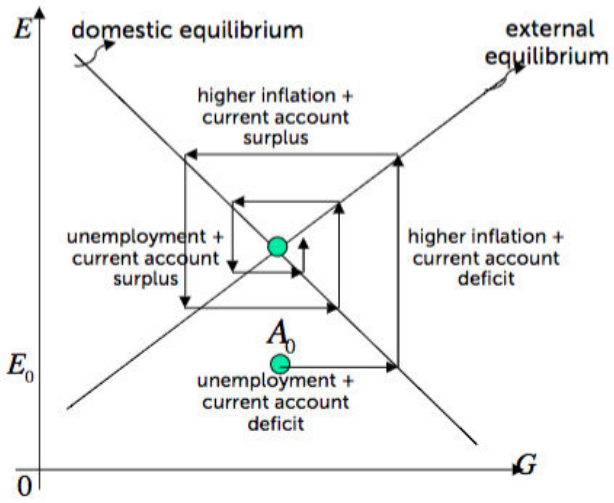
The macroeconomic equilibrium is thus formed:



Problems with fixed exchange rate regimes

The government can only choose between reducing unemployment or reducing the current account deficit

Tinbergen rule: the government can only achieve a particular number of policy objectives if it has at least that same number of independent policy instruments available.



Changing exchange regimes

A nation might have several objectives:

1. **Monetary policy independence** which gives the ability to adjust the money supply to the economic conditions, e.g. the labour market conditions
2. **Fixed exchange rate** which gives more transparency about the exchange rate that influences international transactions decisions
3. **International capital mobility** which implies that transaction costs equal zero and assets are perfectly substitutable. This benefits a country as it allows for investments into the most profitable projects worldwide.

Problem: only two of these three objectives are accessible simultaneously (trilemma) because of the interest parity condition and transaction costs.

Typically, it is costly to buy foreign assets, so we adjust the interest parity condition by adding transaction costs:

$$R_{EU} - R_{US} = \frac{E^e_{€/\$} - E_{€/\$}}{E_{€/\$}} + transaction\ costs$$

- If transaction costs equal zero, the “true” interest parity condition holds and the difference in interest rates between countries equals the changes in exchange rate.
- However, if there is a fixed exchange rate, then $R = R^*$
  => Nations face a trade-off between monetary independence and a fixed exchange rate.

Regimes over time

Gold standard (1870–1914): fixed exchange rate system: countries valued their currencies in terms of gold, so banknotes are backed by gold
=> In reality: exchange rates fluctuated in narrow margins due to costs of shipping gold

Disadvantages gold standard

- When new gold sources are found, the supply of gold increases causing inflation
- When economies grow, there might not be a corresponding amount of gold for circulation, causing deflation and unemployment.
- Countries with large gold reserves naturally become powerful.
- No monetary policy available to fight unemployment

In the period 1914—1945, the two world wars were financed by printing more money. In addition, countries were more interested in domestic economic conditions than in the international economic system, so they were prone to devaluing their domestic currencies at other countries’ expense (beggar-thy-neighbour policies) during the Great Depression.
=> Crises were aggravated and unemployment became larger
=> The Bretton Woods agreement was signed by 44 nations

Consequences:

- IMF and World Bank establishment
- New system of the international economic order in place: Free trade and no ‘beggar thy neighbor’ policies and a stable international monetary system to foster international trade flows

With this agreement, US $ become an international reserve currency which is fixed at the price of gold at 35$ per ounce (gold standard again)

=> Pegging of other currencies to US–$ within 1%–band

However, because of the n–1 problem, the Bretton woods system broke down in 1973

N-1 problem:

- Other countries have no freedom in monetary policy
- The US has complete freedom in monetary policy => during the Vietnam war there is a high inflation in US => other countries have to buy US–$ => enormous US–$ reserves of other countries => break down of Bretton Woods system

Potential organisations of exchange rate regimes

- Conventional fixed–peg arrangements: country pegs its currency at foreign currency or basket of foreign currencies
- Pegged exchange rates within horizontal bands: like fixed–peg arrangement, but currency can fluctuate within the band around fixed exchange rate
- Crawling peg: fixed exchange rate is adjusted periodically
- Crawling band: central exchange rate or margins of band are adjusted periodically
- Managed floating: central bank influences exchange rate without commitment to a specific exchange rate
- Independently floating: exchange rate is determined by market forces

International Economics – IBEB – Lecture 8, week 3
International financial institutions

Theory of optimum currency areas

The theory of Optimum Currency Areas (OCA) states that countries want to join fixed exchange rate areas closely linked to their own economies through trade and factor mobility.

In general, monetary union is advantageous in that it helps avoid currency crises since there is only one currency. However, there is also a disadvantage. Consider the scenario in which Italy and Germany are hit by asymmetric demand shocks: Italy by a positive demand shock while Germany by a negative one. Following this, demand and employment increase in Italy but decrease in Germany, so there is no equilibrium on either country's labour market.

Typically, countries can adjust by changing the exchange rate so that there is a real appreciation of the Italian currency relative to the German currency. However, with a common currency, adjustment in E is not possible, so goods prices have to adjust. But prices depend on wages and wages are inflexible => Real exchange rate cannot adjust.

Alternative adjustment mechanisms:

- Workers could migrate from Germany to Italy in case of large labour mobility within Europe.
- Transfer of additional tax revenues from Italy to Germany. These tax revenues would be introduced in the form of unemployment benefits and thus increase demand in Germany. However, this solution can be unrealistic unless the EU budget was large and solidarity between these countries was sufficient.

Adjustment is not necessary if the size of the shock is rather small or if the economy is highly diversified. Since European countries are highly diversified (not a single governing sector in the economy), real exchange rate modification is less essential.

EMU will be an optimal currency area if European countries possess these characteristics:

1. Wage flexibility (goods prices can adjust to the shock)
2. Labour mobility (migration can counteract the shock)
3. Large budget (monetary transfers can shield from the shock)
4. Solidarity between countries (for possibility of monetary transfers)
5. Diversified production structure (shock would impact less)
6. Homogeneous preferences (identical response to the shock)

Case study: is Europe an optimum currency area?

International Economics – IBEB – Lecture 9, week 4
World trade: an overview

Overview

Total world exports are enormous. However, it is not equal among countries. While some developing countries are catching up, most trade is with developed countries. The Gravity Model built by Jan Tinbergen will propose main drivers of trade that can well predict practical trends.

The gravity model by Jan Tinbergen (1962)

T_{ij}: value of trade between the two countries

Y_i and Y_j: GDP of country i and country j respectively

D_{ij}: trade impediments between the two countries

a, b and c: The relative significance of each component

The Gravity Model:

$$T_{ij} = \frac{(Y_i)^a (Y_j)^b}{(D_{ij})^c}$$

According to the formula, the size of the economies – measured by **Gross Domestic Product (GDP)** – is *positively* related to the amount of trade with other economies. On the other hand,

Latest evidence of the model:

- Estimates of the effect of distance (c): a 1% increase in the distance between countries is typically associated with a decrease in the volume of trade of 0.7% to 1%
- Estimates of the effect of countries' size (a and b): a 1% increase in a country's economic size is typically associated with an increase in the volume of trade of about 1%

What influences the value of trade

1. **Size of economies (measured by GDP):** Economies with greater gross domestic product have greater national income thus they import more goods, produce more goods and export more.
2. **Distance:** Longer distances between countries increases transportation costs, which reduces incentives to trade.
3. **Cultural affinity**: countries with similar cultural and historical ties are more likely to trade with each other and develop stronger economic ties
4. **Geographic factors**: countries with more water bodies and less obstructions like mountains increase ease of international transportation and thus increases trade
5. **Borders (trade policies)**: rules and regulations, especially tariffs, are imposed between countries which can cost money and time. The harder it is to "cross" the border, the less incentive there is to trade, thus less volume of trade.

Globalisation overtime

Technologies have enhanced trade and globalisation by reducing trade impediments, yet, as distance still matters, and the location of a country on the globe is still of great relevance when it comes to how easy it is to get into markets. Also, the political factors can change trading patterns much more significantly than technologies do.

Examples of political factors include the sharp decline of trade due to WWII and the Great Depression. Only around 1970 had trade increased and returned back to the pre-war levels. Now, it has become more important due to the big reduction in trading barriers of developing countries and events such as the end of the Soviet Union and the decision of China to open up to world markets.

Changing composition of trade

- In the past: trade consisted mainly of agricultural products and natural resources.
- Nowadays: in developed and some developing countries, the main component of trade is **manufactured products** (around 54%), then come services (23%), mineral/natural resources products (12%), and agricultural products (8%).

Two important recent developments

1. **Trade in intermediate goods** (used for production not consumption)
   => More complex international supply chains
   => Increasing internationalisation of production networks (Allows countries to specialise which increases efficiency but also increases vulnerability of production processes)
   => Companies diversify their intermediate goods production to different countries

2. **Trade in services:** Advances in modern communication technology allow more and more tasks to be outsourced
   => Service outsourcing (offshoring) occurs when a firm providing services moves its operations to a foreign location (usually occur for services that can be transmitted electronically)
   => Services outsourcing is currently not a significant part of trade, but it is increasing
   => A large part of services are still non-tradable (eg hair cuts)
   => More and more services jobs will become outsourceable (e.g radiologists, and lecturers)

International Economics – IBEB – Lecture 10, week 4
The Ricardian model

Theories of trade - 2 categories

1. Models emphasising ***the differences between countries***, particularly in labour skills, natural resources, physical capital, and technology (Eg Norway and Spain trade fish for oranges, and Saudi Arabia and the US trade iPads for oil)
2. Models emphasising ***economies of scale***, where the concerned countries have no a priori differences but can benefit from economies of scale if they specialise in a few products only and then trade.

Ricardian model

The two fundamental concepts of the Ricardian Model are opportunity cost and comparative advantage:

- **Opportunity cost**: the highest benefit of using resources to produce goods other than what is being produced at the same time. Since there is a limited amount of resources, there is a trade-off between how many goods A and B to produce.
- **Comparative advantage**: whichever country has the lower opportunity cost of producing a good compared to other countries has a comparative advantage.

Example: Country X can produce 5 units of good A or 10 units of good B, while country Y can produce 5 units of A or 7.5 units of B. The opportunity cost for country X to produce 1 unit of good A is 2 units of good B, and for country Y to produce 1 unit of A it sacrifices 1.5 units of B. Thus, country Y has a ***comparative advantage*** *(less sacrifice of good B) in good A. For one unit of B, country X sacrifices less of good A and therefore has a comparative advantage in good B.*

When opening to trade, countries specialise in the product in which they have a comparative advantage.
=> World output increases

A one-factor Ricardian Model

The one-factor Ricardian Model makes these assumptions:

1. Labour is the sole resource in the economy.
2. Labour productivity is different across countries but uniform within one.
3. Labour supply in each country is constant.
4. The two goods represented are the only important goods produced and consumed.
5. There is perfect competition and free entry or exit barriers among firms.
6. Labour is perfectly mobile across sectors.
7. The world is represented by two countries only (Home and Foreign).

Production possibilities

The production possibility frontier: shows the maximum possible combinations of two goods that an economy can produce with its given resources. The production possibilities in each country are dependent on the labour available and the time required to produce a single unit of both goods:

$$a_{LC}Q_C + a_{LW}Q_W \leq L$$

L = total amount of labor resources (number of hours worked in an economy if all labourers are employed which is constant by assumption)

Q_A and Q_B = quantity of A and B produced

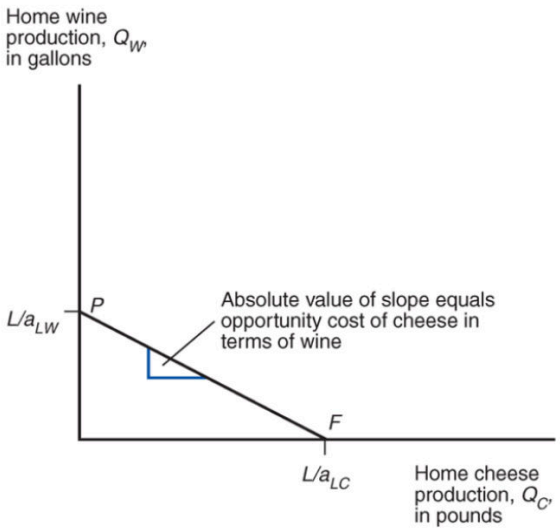
a_{LC} and a_{LW} = **unit labour requirement** (hours of labour required to produce 1 unit of A or B). The higher the unit labour requirement for a good, the lower the labour productivity.

Country's maximum cheese or wine production:

$Q_C = L/a_{LC}$ when $Q_W = 0$ or $Q_W = L/a_{LW}$ when $Q_C = 0$

The equation of the downward-sloping PPF can be represented as:

$$Q_W = \frac{L}{a_{LW}} - \frac{a_{LC}}{a_{LW}} Q_C$$



where the absolute value of the slope of the PPF a_{LC}/a_{LW} is the **opportunity cost** of producing an extra unit of B in terms of A.

Actual production

Actual production also depends on the **prices** since they represent how many hours will be spent to produce as well as how much people are willing to buy each good.

Since firms make normal profit = 0 in perfect competition, the difference between the total revenue and total cost is therefore zero.

$$Q_C P_C - w_C L_C = 0 \Leftrightarrow w_C = P_C(Q_C/L_C) \Leftrightarrow w_C = P_C/a_{LC}$$

$$Q_W P_W - w_W L_W = 0 \Leftrightarrow w_W = P_W(Q_W/L_W) \Leftrightarrow w_W = P_W/a_{LW}$$

Q indicates the respective units of B and A while w is hourly wage, L is fixed labour hours and P is the price.

If $(P_C/a_{LC}) = \mathbf{w_C} < \mathbf{w_W} = (P_W/a_{LW})$, or equivalently if $P_W/P_C > a_{LW}/a_{LC}$ workers will only produce wine.

Workers only produce a good if it offers them a higher hourly wage (P_C / a_{LC} or P_W/a_{LW}), and if the price of the more time-consuming goods at least compensates until the hourly wage is equivalent to the other good. Workers are indifferent when the hourly wage is the same ($P_C/a_{LC} = P_W/a_{LW}$) for two goods, and production occurs when the relative price equals the opportunity cost of producing a good ($P_C/P_W = a_{LC}/a_{LW}$). Therefore, a combination of both goods can be produced, leading to the state of **autarky**. This involves no trade and no specific specialisation in the economy.

Trade in Ricardian model

Absolute advantage: one country is clearly more efficient at producing goods compared to another producer (it possesses greater labor productivity or lower unit labor requirement).

- An absolute advantage in good A and B for a home country over a foreign country (marked with *) is represented as $a_{LC} < a^*_{LC}$ and $a_{LW} < a^*_{LW}$

Comparative advantage: the country is more efficient in producing one good compared to producing goods. Thus, a country with a comparative advantage in good B will use its resources most efficiently when it produces good B as compared to producing good A.

Suppose the home country is comparatively better in production of cheese over foreign:

$$a_{LC}/a_{LW} < a^*_{LC}/a^*_{LW}$$

Similarly, foreign is comparatively better in the production of wine over home:

$$a_{LW}/a_{LC} > a^*_{LW}/a^*_{LC}$$

Since the home has a comparative advantage in production of cheese, the state of **autarky** will cause the relative price of cheese to be lower at home than in foreign, similarly the relative price of wine will be lower in foreign than in the home.

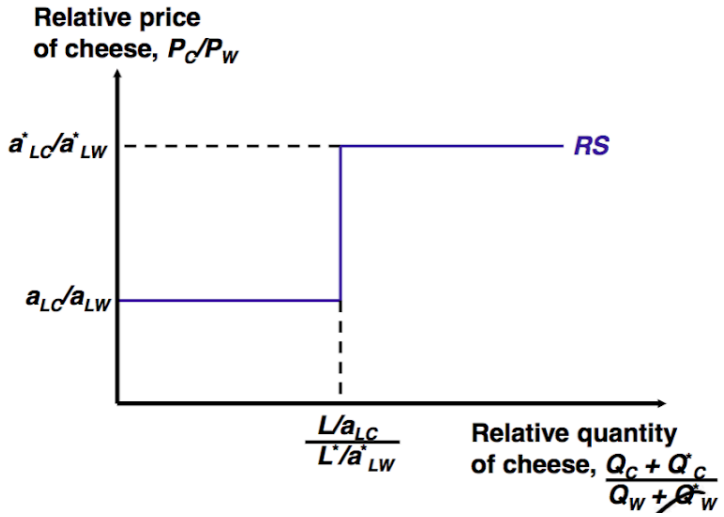
$$P_C/P_W = a_{LW}/a_{LW} < a^*_{LC}/a^*_{LW} = P^*_C/P^*_W$$

Mutual trade is thus beneficial for both countries.

The trade will be determined by the market forces of demand and supply.

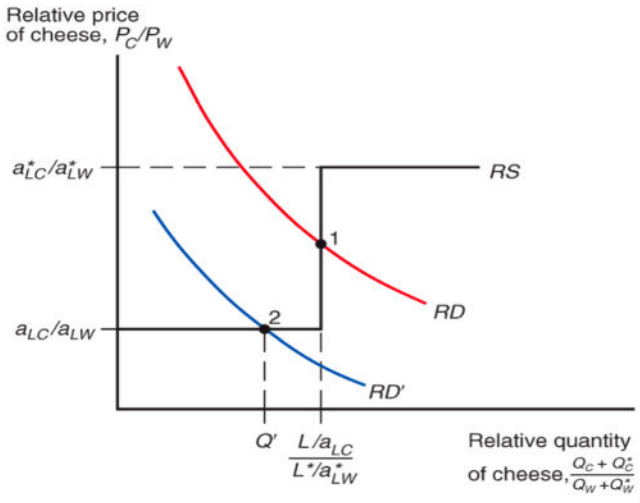
Relative supply of good B is **RS** = $(Q_C + Q^*_C)/(Q_W + Q^*_W)$

- If the relative price is below the opportunity cost of cheese in both countries, no country will be willing to supply, thus the relative quantity supplied = 0
- If the relative price is above the opportunity cost of cheese in both countries, they both will be eager to supply cheese => Relative supply will be infinite with both countries not supplying A at all
- If the relative price of cheese is equal to its opportunity cost at home, then the worker's hourly wage makes domestic workers indifferent between both goods, while foreign workers produce only wine
- If the relative price is equal to the opportunity cost of cheese in foreign then worker's hourly wage makes them indifferent between both goods; domestic workers produce only cheese
- If the relative price is between the opportunity cost of cheese at home and foreign, specialisation will take place and the relative quantity supplied will be $(L/a_{LC}) / (L^*/a^*_{LW})$, domestic workers produce only B, and foreign workers produce only wine



Relative demand (RD): the quantity of that good demanded in all countries relative to the quantity of A demanded in all countries.

When the price of cheese rises, consumers worldwide tend to buy less cheese and more wine, driving down the relative demand for cheese. The other way around applies to wine. Therefore, RS and RD together determine prices, which can be adjusted to set RS = RD.



Generally, opening up to trade sets the relative prices of goods between both countries' autarky levels:

$$P_C/P_W < P^{world}_C/P^{world}_W < P^*_C/P^*_W$$

References

Namini, E. (2024). *Lecture 1 - National income accounting and BoP* [PowerPoint slides]. Retrieved from: https://canvas.eur.nl/courses/47693/files/99446061

Namini, E. (2024). *Lecture 2 - Money, interest rates, and exchange rates* [PowerPoint slides]. Retrieved from: https://canvas.eur.nl/courses/47693/files/99429773

Namini, E. (2024). *Lecture 3+4 - Price levels and long-run exchange rate* [PowerPoint slides]. Retrieved from: https://canvas.eur.nl/courses/47693/files/99471844

Namini, E. (2024). *Lecture 5+6 - Exchange rates and open economy macroeconomics* [PowerPoint slides]. Retrieved from: https://canvas.eur.nl/courses/47693/files/99528695

Namini, E. (2024). *Lecture 7 - International monetary system* [PowerPoint slides]. Retrieved from: https://canvas.eur.nl/courses/47693/files/99527628

Namini, E. (2024). *Lecture 8 - International financial institutions*[PowerPoint slides]. Retrieved from: https://canvas.eur.nl/courses/47693/files/99582066

Bosker, M. (2024). *Lecture 1 - World Trade overview* [PowerPoint slides]. Retrieved from: https://canvas.eur.nl/courses/47693/files/99625200

Bosker, M. (2024). *Lecture 2 - The Ricardian model* [PowerPoint slides]. Retrieved from: https://canvas.eur.nl/courses/47693/files/99625205