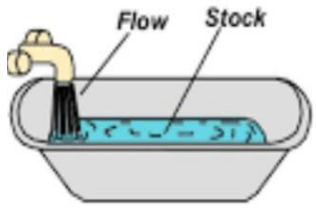
Main important concepts

Class 01

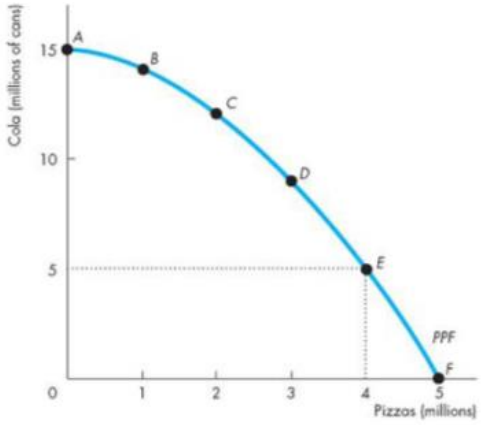
- **Macroeconomics -** deals with aggregate phenomena (not a particular market or sector), what explains their performance and how policy influences them; the economy as a whole **vs Microeconomics -** deals with individuals and businesses choices, the way they interact in specific markets and how they are influenced by government policy.
- **Ceteris paribus –** means all other things equal
- **Positive analysis –** make a claim about how the world works (descriptive) that may be confirmed or refuted by examining evidence; "what it is" – it might be right or wrong and we can test it. **vs Normative analysis -** make a claim about how the world should be (prescriptive), which cannot be judged using data alone… it depends on an opinion, a value judgment; "what *should be"*- more subjective, opinion-oriented.
- **Production Possibilities Frontier (PPF)-** It represents all the combinations of outputs of two products that can be produced using all available inputs (labour, capital, land, etc). Points on the frontier are efficient outcomes. Points inside the PPF are inefficient – underusing of resources; outside the PPF are inefficient – overusing of resources (we can´t produce such quantities).
- Concave shape of the PPF: illustrates the opportunity cost – increasing marginal cost (cost of one more unit).

- **Market -** any arrangement that enables buyers and sellers to get information and do business with each other. The price is the information device that adjusts in order to guarantee market equilibrium.
- **Law of Demand -** Ceteris *paribus*, the higher the price of a good, the smaller is the quantity demanded – inverse relation.
- **Law of Supply -** *Ceteris paribus*, the higher the price of a good, the greater is the quantity supplied - direct relation.
- **Shift along the curve** (demand or supply) happen due to shocks in price of good vs **Shift of the curve** to the right or to the left happen due to all the other factors.
- **Surplus** happens when quantity supplied is higher than quantity demanded **vs Shortage** happens when quantity supplied is lower than quantity demanded.
- **Circular-flow diagram -** illustrates how households (the consumers, demand) and firms (buyers, supply) interact in the market economy. Factors of production- Labour (earns wages); Capital (earns interest); Land (earns rents); Entrepreneurship (earns profit) - and goods and services flow in one direction. Money flows in the opposite direction
- **Flow variables** are measured over a certain period vs **Stock variables** are measured in one instant in time and correspond to the accumulation of flow variables. For examples, savings (flow) accumulate into wealth (stock).

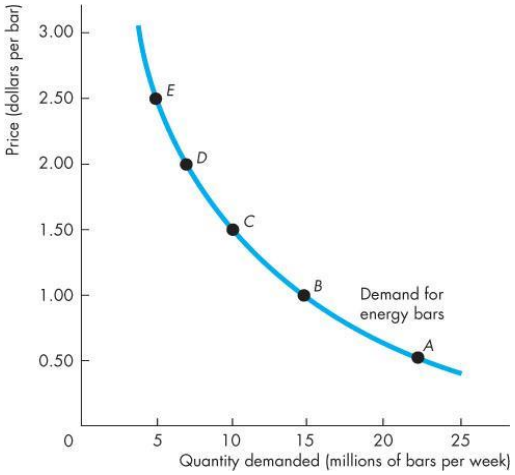


Main important graphs to keep in mind

1) **PPF**



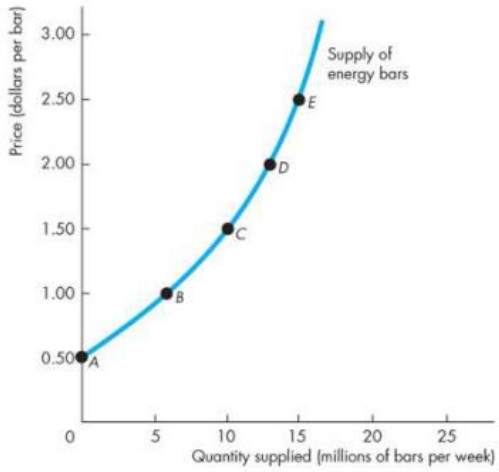
2) **Demand curve** (representing the buyers) – negative slope



Factors that can make the demand curve shift:

- Price of related goods
- Expected future prices
- Income
- Population
- Preferences
- Expected future income and credit

3) **Supply curve** (representing the sellers) – positive slope



Factors that can make the supply curve shift:

- Prices of factors of production
- Prices of related goods
- Expected future prices
- Number of suppliers
- Technology

Main important concepts

Class 02

- **Gross Domestic Product definition:** GDP is the market value of all final goods and services produced in a country in a given time period (typically one year).
- Market value: goods and services are valued at their market prices (whenever possible).
- Final goods and services: final good (or service) is an item bought by its final user. GDP excludes intermediate goods/services, which are used as a component of a final good or service.
- Produced within a country (domestic production).
- In a given time period (usually 1 year or 1 quarter). GDP includes goods and services produced in the corresponding period, even if not consumed in that period

- **Output approach:** Adds up the value added across production = Σ Gross Value Added (GVA) of all sectors
- **Income approach:** Adds up all the income paid during production = Wages + Rents + Interest + Profits
- **Expenditure approach:** Adds up all the spending = Final Consumption (C) + Investment (I)
- Final consumption (goods and services that increase current welfare)
- Investment (goods and services that increase future production and welfare)

production = income (y) = expenditure

- **Problem of double counting:** Happens when we include intermediate goods – which are sold to firms and then bundled or processed with other goods or services for sale at a later stafe.
- This issue can be avoided by using the GVA method: the value of the output generated in an economy is given by the difference between the final value of production and the intermediate goods used in production. To avoid double counting, only finished goods are included in GDP.

- **Gross vs Net:** Gross means before deducting the depreciation of capital. The opposite of gross is net, which means after deducting the depreciation of capital.
- Depreciation = decrease in the value of a firm's capital that results from wear, tear and obsolescence.

- **Basic prices (bp)** – value goods and services at the price received by the producer **vs Market prices (mp)-** valuing production at market prices (at the consumer level- what we pay in the supermarket).
- To move from basic prices to market prices, one needs to include indirect taxes (e.g. VAT) and exclude subsidies to firms.

- **Domestic product** - production within a country (independently of who is producing it - location matters) vs **National product** - value of goods and services produced anywhere in the world by the residents of a nation (independently of where they are, residency matters).
- To go from domestic to national product, you have to add the NRFI.
- Net Receipts of Factor Income (NRFI): inflows of income obtained from the rest of the world - outflows of income to the rest of the world

Note: For Formulas – check the Formula Sheet uploaded on Moodle

Main important concepts

Class 03

Nominal vs Real GDP

- Nominal GDP is the value of goods and services produced during a given year valued at the prices that prevailed in that same year. **Measures quantities at current prices.**
- Real GDP is the value of final goods and services produced in a given year, when valued at the prices of a reference base year. **Measures quantities at the prices of a base year (constant prices).**
- Better way to really understand what happened to production (change in quantities), since we take out the price-effect.

Inflation measures the evolution of prices overall: It is useful to i) compare the cost of living over time; ii) compare the cost of living across different countries; iii) inflation measures are many times used to adjust prices and wages

How to measure inflation?

- **GDP DEFLATOR:** Measures the average price level of the economy, taking **into account all the goods and services** produced within the country.

Extra (for your curiosity)

- ***Consumer Price Index (CPI):*** *Measures the average price level faced by consumers,* ***based on a (fixed) basket of consumption goods and services.*** *Prices for the goods and services included in the basket are measured on a monthly basis. The composition of the basket is updated less frequently.*

Extra (for your curiosity)
There are two types of inflation

- *Headline inflation includes prices of all goods in the basket (more volatile)*
- *Core inflation excludes goods that tend to have more volatile prices (e.g. energy, food, alcohol or tobacco)*

Limitations of GDP (per capita) as a measure of economic well-being

- It's an average: doesn't look at inequality
- Only measures income, not quality of life
- Difficult to measure certain activities, like new types of production and the "non- observed economy"
- Need to measure purchasing power parity to compare countries.
- Does not count non-priced production (e.g. doing housework, reading free blogs, volunteering)
- Adds finished goods, but does not subtract "bads" (e.g. pollution, crime)

→ Still, it is the most commonly used indicator because it summarises much information in a single number + highly correlated with other indicators of well-being.

→ Other indicators include additional dimensions (health, education, …): Human Development Index (UN); Better Life Index (OECD)

Main important concepts

Class 04

- **Business cycle expansion** - occurs when the economy is recovering from a recession – vs. **Economic growth -** refers to the economic performance over long periods of time, the sustained expansion of production possibilities measured as the increase in real GDP over a given period
- Computing **average growth rates over long periods** is easier using logs: $g \approx (\ln(Yt) - \ln(Y0))/t$
- **Catching-up growth** – occurs through capital accumulation and may imply strong growth rates, but only during transitory periods- vs **Cutting-edge growth** – can be sustained in the very long run.
- Catching-up growth **cannot be sustained forever**. Long-run economic growth cannot be due to capital accumulation alone. Cutting-edge growth **can be sustained by technological progress**. Technological progress (represented by increases in A) increase output even while holding K constant. An increase in A represents an increase in total factor productivity.
- **Production Function:** expresses a relationship between output and the factors of production: K and L.
- **Diminishing Marginal Productivity (applies to labour and capital):** for example, for capital - more capital (K) should produce more output (Y) but at a diminishing rate. MPK diminishes because the first unit of capital is applied where it is most productive, the second unit where it is slightly less productive, and so on.
- **Solow Model**
- Consumption and **investment:** Output can be either consumed or saved/invested in capital goods. Assume the investment rate (ɣ), the fraction of output invested, is constant.
- **Capital depreciation:** Capital also depreciates (wears out). Assume the depreciation rate ($\delta\delta$), the fraction of capital that wears out, is also constant
- Steady state level of capita: forces that **destroy capital** equal the forces that **create it.** When capital is in the steady state, output is also in the steady state.

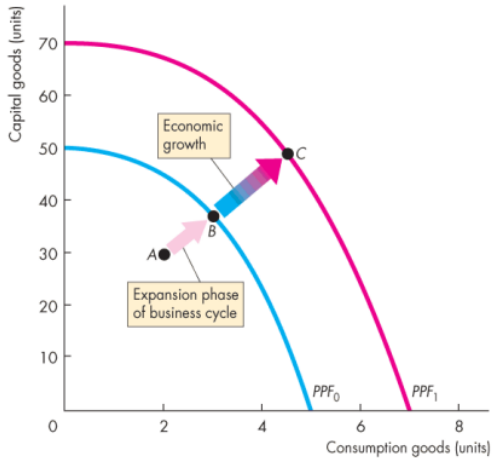
Playing around with the model

- What happens **if the investment rate increases**? What happens if the **depreciation rate decreases**? **Steady state levels increase.** Economy grows in the transition to new steady state, but not in the long run => catching-up growth
- What happens if **technology increases**? **Steady state levels increase**. Economy grows in the transition to new steady state. But now the movement can be repeated, and we can have growth in the very long run => cutting-edge growth.

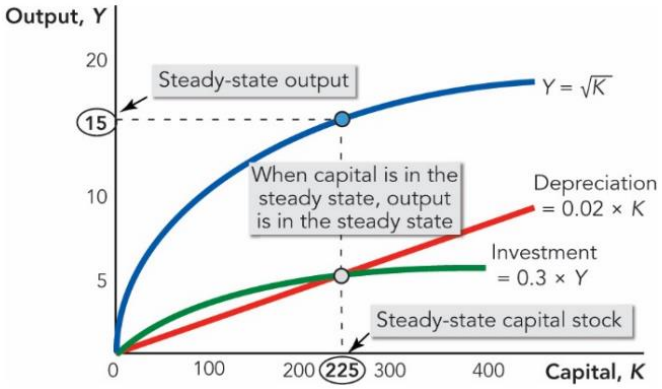
- **Limitations of the Solow growth model:**
- **Growth is exogenous:** the model does not provide an explanation for why technological changes occur (Exogenous: a variable that is determined externally). There are new growth theories (making growth an endogenous phenomenon).
- **If economies have access to the same technologies and capital is free to roam the globe**, then GDP per capita **should converge across all countries, regardless of initial positions** (absolute convergence). However, this is not observed in real data. Unfortunately, there are many countries that started poor and still observed modest growth rates (with none or very little convergence to the top). In general, countries with lower initial income have not grown at a faster pace than countries with higher initial income, so the income gap were broadly unchanged. What **we observe in reality is conditional convergence**: **countries with the same characteristics** (production function, investment rate, depreciation rate) **should converge** to the same real GDP per capita.

Main important graphs

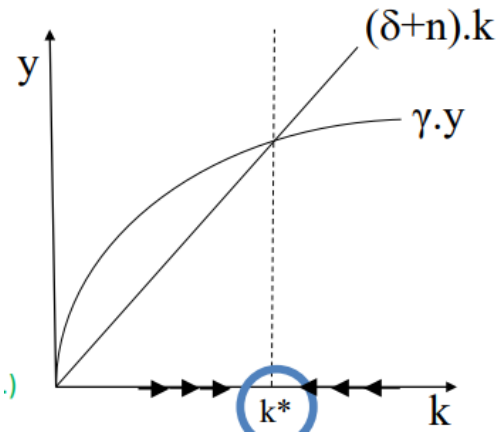
1) **Differences in the PPF: expansion vs economic growth**



2) **Solow Model representation with output and capital**



3) **Solow Model representation with output and capital per capita:** Everything works in the same way, except that now variables are "per capita"! (And the equation has a new term, because depreciation per capita also depends on n.)



Main important concepts

Class 05

- **Savings:** income that is not spent on consumption goods **vs investment:** spending by businesses on capital goods.

- **Macro Fundamental Identity (Closed Economy)**

- **Assumption: closed economy** (NX=0)
- Domestic Saving (S) = Y-C-G but Y-C-G = I , **so S=I**
- Often, we assume that we work in a closed economy. For example, in Solow Model, we assume savings and investment are exactly equal.

Other formulas:

- Spriv + BB = I priv

- **Macro Fundamental Identity (Open Economy)**

- **Assumption: open economy** → have to take into account the all the flows to/from the rest of the world**: i) flows of goods and services** (NX = Exports – Imports); **ii) flows of income** (NRFI = Net Receipts of Factor Income); **iii) flows of transfers** (Trfx = net current transfers). Indeed, the current account **the result of all these international transactions** in goods, services, income and gifts, so **CA = NX + NRFI + Trfx.**
- Now, we will talk **about Gross National Disposable Income**: Yd= C+G+I+ **NX + NRFI + Trfx** ⇔ Yd= C+G+I**+ CA**
- Conclusion: S = Yd – C -G ⇔ **S = I + CA**

Other formulas:

- Spriv + BB = I priv + CA

- **Twin deficits hypothesis:** If private saving (Spriv) and private investment (I priv) are strongly correlated, then the budget balance (BB) and the current account (CA) will also strongly comove.

- Besides the current account, **there is also the Capital Account (KTrfx**), which includes net capital transfers from abroad **and the Financial Account (FA),** which includes flows of financial assets (direct investment, financial derivatives, etc).

- CA + KTrfx = CKA (current and capital account). Here, we can **observe if agents are net lending (CKA > 0) or net borrowing (CKA < 0).**
- BP = CKA – FA
- Balance of Payments (BP) = 0 ⇔ CKA – FA = 0 ⇔ CKA = FA (flows), which accumulate into a stock = Δ Net IIP (net international investment position).

Main important concepts

Class 06

- **Loanable funds market** summarizes how funds made available (supplied) by savers meet the demand of funds by borrowers (who invest in physical capital).
- **Three types of financial markets**: Loan markets; Bond markets (bond is like a loan, the holder receives interest but can sell it in the secondary market); Stock markets (owning a stock = owning a share of the company, so the individual is entitled to receive dividends, which are part of the profits).

- **Financial institutions:** firms that operates on both sides of the financial markets; it is a borrower in one market and a lender in another. Ex: Commercial banks; Government-sponsored mortgage lenders; Mutual funds; Pension funds; Insurance companies; Central bank

- **Interest rate – the price of money over time.** Interest rates depend on: credit quality of the borrower (rating); time maturity of the loan/bond; size of the loan/bond.
- There is the *active interest rate* - charged on banks loans to costumers (banks assets) vs *passive interest rate*- paid on banks deposits (banks liabilities).
- Interest and price have an inverse relation. If the asset price increases, the interest rate decreases.

Before we talked about supply and demand. In this chapter, we go more specific, and we focus on the supply and demand of funds (money).

- **Demand for Loanable Funds: Business investment** is the main item that makes up the DLF. **The higher** the real interest rate (price of money), **the lower** is the quantity of loanable funds demanded.
- What can shift the DLF? Expected profits: an increase in expected profits increases the demand for funds today (planned investment increases).

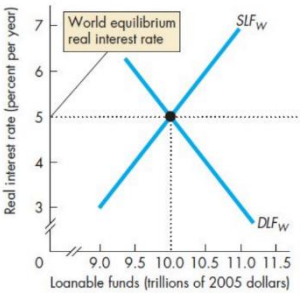
- **Supply of Loanable Funds (SLF): Saving** is the main item that makes up SLF. funds. **The higher** the real interest rate, **the higher** is the quantity of loanable funds supplied.
- What can shift the SLF? If one of the influences on saving plans changes and saving increases, the supply of funds increases (more savers willing to lend).
- I) Disposable income: if it increases, there is more money available to consume and save.
  II) Expected future income/ wealth: if it decreases, individuals may become more cautions with their spending and prioritize saving more in the present – savings increase (on the contrary, when the future is brighter, no need to save so much – savings would decrease); III) Default risk: when the risk of borrowers defaulting on loans is lower, lenders are more willing to extend credit (increase savings).

Before, in equilibrium, we talked about equilibrium quantities and equilibrium price.

- Now, in equilibrium, we talk about **equilibrium quantity of loanable funds and equilibrium real interest** (price of money).
- In equilibrium, supply = demand ⇔ savings = investment. Real interest rate at which the quantity of loanable funds demanded equals the quantity of loanable funds supplied.

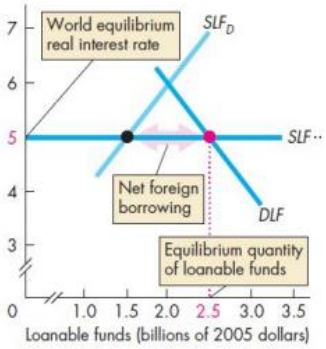
- **The loanable funds market is global, not national.**

- Without capital controls, the loanable funds market would be a single, integrated, global market. Funds would **flow into** the country in which the **interest rate is highest** and **out** of the country in which the **interest rate is lowest**.



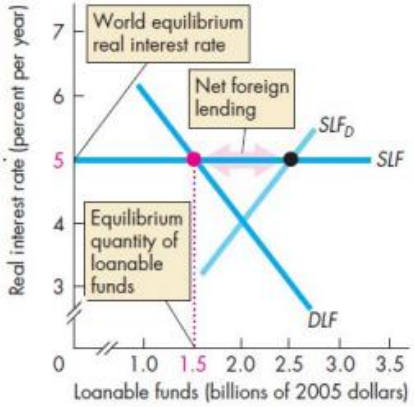
Here, we see that world equilibrium real interest rate = 5%.

- **International borrower:** borrowers are free to seek the lowest real interest rate. So, economies are international borrowers when the world interest rate is lower than what it would have been in the domestic market.



Here, in this case, we are focusing on a specific economy. SLF and DLF cross where real interest rate is 6%, so higher than the equilibrium world interest rate seen above (5%). At 5%, in this economy, demand > supply ⇔ investment > savings ⇔ CA < 0 – net borrowing.

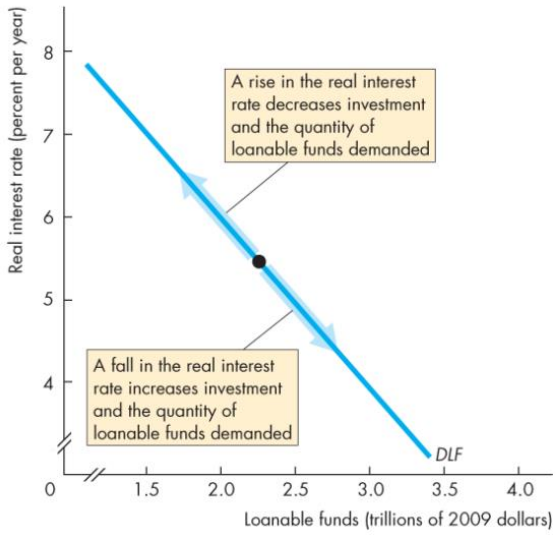
- **International lender:** lenders are free to seek the highest real interest rate. So, economies are international lenders when the world interest rate is higher than what it would have been in the domestic market.

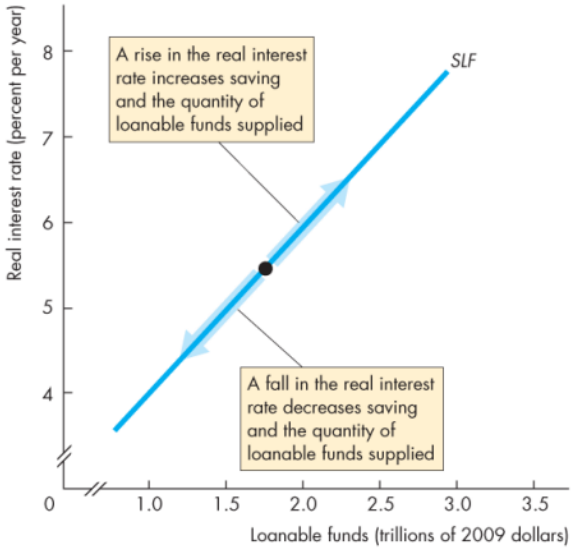


Here, in this case, we are focusing on a specific economy. SLF and DLF cross where real interest rate is 4%, so lower than the equilibrium world interest rate seen above (5%). At 5%, in this economy, supply > demand⇔ savings > investment⇔ CA > 0 – net lending.

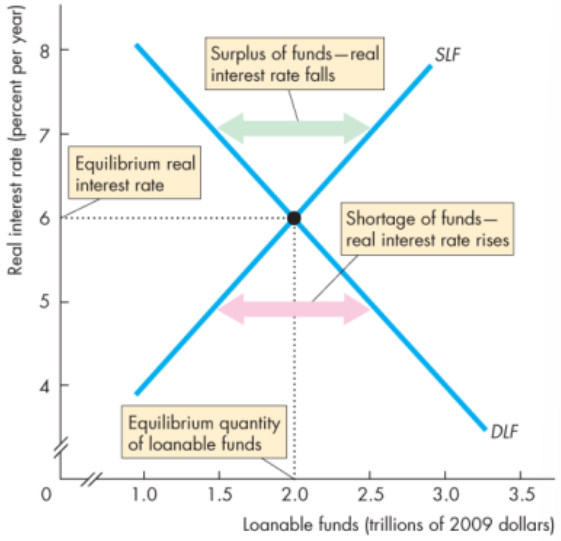
Main important graphs

1) Demand for Loanable Funds (DLF) and Supply of Loanable Funds (SLF)





2) Equilibrium



Main important concepts

Class 07

- **Inflation:** increase in the average level of prices.
  - **The inflation rate is measured by changes in a price index** from one year to the next.
- **Examples of price index:**
  - Consumer Price Index (CPI): Measures the **average price level of a (fixed) basket** of consumption goods and services.
  - GDP Deflator: Measures the **average price level of the economy**, considering all the goods and services produced within the country.

- **Money:** generally accepted as a means of payment.
  - Nature of money has changed over time: commodity money > representative money > fiat money.
  - **Functions of money:** i) medium of exchange; ii) unit of account; iii) store of value

- **Money today consists of: Currency (C) –** notes and coins**; Deposits (D) at banks and other depository institutions** (owners can use the deposits to make payments)

M= C + D

  - **Banks** provide four benefits: create liquidity, pool risk, lower the cost of borrowing, lower the cost of monitoring borrower. **To maximize wealth of owners: the interest rate at which it lends exceeds the interest rate it pays on deposits.**
  - Depositors must **be able to obtain their funds when they want them.** To make the risk of failure small, **banks are required to hold minimum ratios of reserves.**

- **How is money created? Only the Central Bank is entitled to issue currency,** but the quantity of money (M) in an economy is determined also by other banks: M = C + D.

1. **The Central Bank determines the monetary base (H),** including notes and coins (C) and deposits of other banks at the CB (R – reserves): **H = C + R.**
2. **Commercial Banks determine the deposits that households and firms have (D).**
   - The quantity of deposits that banks can create is limited by three factors:
     i) Monetary Base (H).
     ii) Desired reserve ratio (r = R/D = ratio of reserves to deposits that a bank plans to hold).

<u>Determinants of the desired reserve ratio:</u>

- <u>Required reserve rates</u> (mandatory and defined by the CB): the higher the required reserve rate, the higher the desired reserve ratio (commercial banks have to follow CB).
- <u>CB interest rates:</u> if CB increases interest rates, commercial banks are more compensated by depositing reserves in the CB (increase desired reserve ratio).
- <u>Confidence/uncertainty:</u> if banks are more confident, the desired reserve ratio decreases.
- <u>Spread</u> (difference between the lending rate charged by banks in loans and the deposit rate paid by banks for deposits): if banks earn higher profit on loans compared to what they pay for deposits, they will be more motivated to lend than to keep the money as reserves (desired reserve ratio decreases). As the spread narrows, less motivated to lend, so r increases.

iii) Currency drain ratio (c= C/D = ratio of currency to deposits – desired currency holding).

<u>Determinants of the currency drain ratio:</u>

- <u>Trust in the financial system:</u> the higher the trust, the less individuals will want to hold currency, and they would rather make deposits (c decreases).

- Interest rate and liquidity of deposits: as the interest rate on deposits increase and as deposits are more easily converted into cash without significant loss of value, the willingness to hold currency decreases (c decreases).

- **Money multiplier:** reflects how largely the monetary base translates into money supply.

$M = C + D = c.D + D = (1+c).D$

$H = C + R = c.D + r.D = (c+r).D$

$$\Rightarrow m = \frac{M}{H} = \frac{(1+c)}{(c+r)}$$

- The quantity of money created depends on the desired reserve ratio (r) and the currency drain ratio (c).
- The smaller these ratios, the larger is the money multiplier.

Main important concepts

Class 08

- **Quantity theory of money:** In the long run, **an increase in the quantity of money brings an equal percentage increase in the price level.**
  - "Inflation is always and everywhere a monetary phenomenon."
  - Based on the equation of exchange, **MV = PY**, where M is money supply, P is price level, V is velocity of money, Y is real GDP.
  - Both sides of this equation are also equal to nominal GDP.

Note 1: MV = PY is just a definition. Only when we add 2 assumptions: i) factors of production and the production function determine the level of output in the long-run (Y*, the potential output); ii) velocity of money is constant – the equation becomes QTM. The only thing that can cause an increase in P is an increase in M (since Y* and V are assumed independent of M).

Note 2: Velocity of circulation of money (V = PY/M) - the average number of times in a year that a euro is used to purchase the goods and services in GDP, how fast money passes from one holder to the next.

  - For example, when people want to hold only a little money, money changes hands frequently (V is large).

- **Expressing the equation in growth rates:** Money growth rate + Rate of velocity change = Inflation rate + Real GDP growth. Rearranging and assuming that velocity does not change in the long run:
  Inflation rate = Money growth rate - Real GDP growth

- **Money Demand Function: equation that shows the determinants of the quantity of real money balances people wish to hold.**
  - **Depends on: i) Real GDP** (increases the volume of expenditure, and thus the quantity of real money); **ii) Nominal interest rate** (opportunity cost of holding wealth in the form of money; as it increases, the quantity of real money decreases); **iii) Financial innovation** (lowers the cost of switching between money and interest-bearing assets, so it decreases the quantity of real money)
  - A **rise in the price level increases the quantity of nominal money** but **doesn't change the quantity of real money** that people plan to hold.

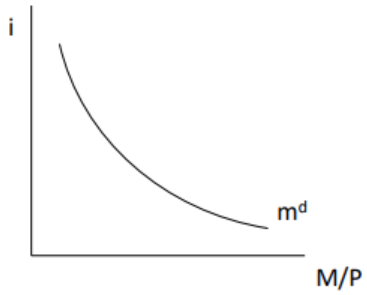
- **Money supply is independent of the interest rate** (vertical curve).
- **Money market equilibrium occurs when the quantity of money demanded equals the quantity of money supplied.** Adjustments that occur to bring about money market equilibrium are fundamentally different in the short run and the long run:
  - SR: interest rate adjusts (we will study this later)
  - **LR: price level adjusts**

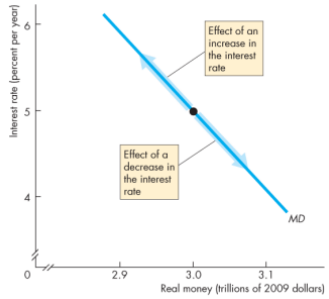
- **Long-run Equilibrium**
  - In the long run, **the loanable funds market determines the real interest rate.** The nominal interest rate equals the equilibrium real interest rate plus the expected inflation rate.
  - In the long run, real GDP is identical to potential GDP. **Potential GDP is determined by the production function, labour market equilibrium and savings rate**, as we have seen before
  - So, the **only variable left to adjust in the long-run is the price level.**

- **Money neutrality**: In the long run, nothing real has changed. Money has no impact on the real economy: real GDP, employment, quantity of real money, and the real interest rate are unchanged. However, nominal variables like price are affected.

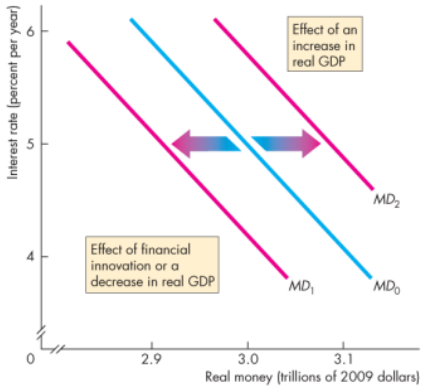
Main important graphs

1. Money demand function



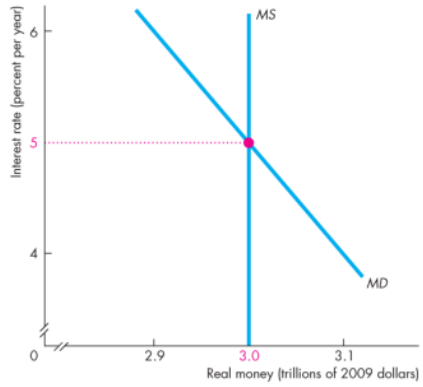


Endogenous changes – changes in interest rate lead to changes along the curve.



Exogeneous changes – changes in all of the other external factors (real GDP/financial innovation)

2. Money market equilibrium

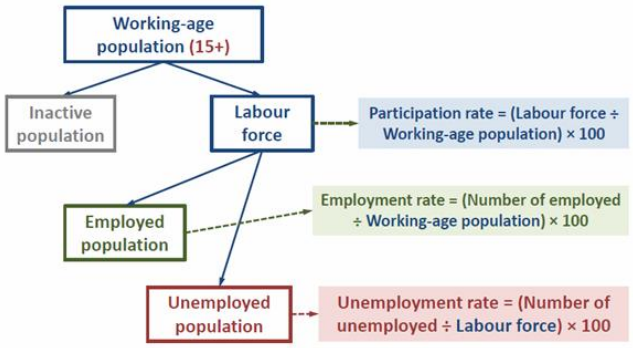


Main important concepts

Class 09

- **Potential GDP** (= real GDP at full employment)**:** measures the production that the economy is able to **generate on a sustained basis.**
- **Output Gap:** difference between the observed GDP and potential GDP. For example, if the output gap is positive, it means the economy is producing more than what would be expected given its underlying structural features.
- Over the business cycle, **the output gap and the employment gap fluctuate in tandem.** For example, when the output gap is positive the economy is working above full employment, so the employment gap tends to be positive (unemployment is low).

Employment and Unemployment



- **Unemployed person:** has to meet the following three criteria – 1) without work; 2) seeking work; 3) currently available to work. If one of the criteria fails, not unemployed.
- **Unemployment can be classified into 3 types: i) Frictional unemployment** (result from the normal functioning of the labour market, the matching of workers and jobs); **ii) Structural unemployment** (lasts longer than frictional unemployment – number of jobs available is insufficient to provide a job for everyone who wants one; for example, due to technology changes); **iii) Cyclical unemployment** (correlated with the business cycle – for example, a worker who is laid off because of a recession and is then rehired when the expansion begins).
- **Natural Unemployment:** result from when there is no cyclical unemployment = Frictional + Structural
- **Full employment:** unemployment rate equals the natural unemployment rate.

Aggregate Supply and Aggregate Demand

- **Prices in the LR** are flexible (respond to changes in supply or demand) **vs Prices in the SR** (sticky, fixed at some predetermined level) – changing prices is costly. In this sense, in the SR, wages are also sticky.
- **Aggregate Supply (AS): relationship between the quantity of real GDP supplied and the price level.** The quantity of real GDP supplied is **the total quantity that firms plan** to **produce** during a given period. Depends on labour, capital and technology.
- **LRAS:** In the long-run Real GDP equals potential GDP. Potential GDP is independent of the price level. As the price level rises, wages change by the same percentage, real wages remain constant, the quantity of real GDP supplied remains at potential GDP and unemployment at the natural rate. So, the long-run aggregate supply curve **is vertical at potential GDP.**

Explaining a little bit more: In the long run, real variables like output, employment, and unemployment are determined by factors such as technology, resources, and labour productivity rather than the price level. As a result, the economy self-adjusts to maintain output at potential GDP, with

unemployment returning to its "natural rate" (the long-run equilibrium rate of unemployment), where the economy is fully utilizing its resources. In essence, in the long run, the price level doesn't affect real GDP because nominal changes (in prices and wages) balance out, leaving real output unchanged at its potential level.

- **SRAS:** To capture price-stickiness, we assume that the short-run aggregate supply curve is **flat.** Firms typically mark up their prices above average costs to earn a profit margin. However, in the short run, the markup remains relatively stable because firms aren't immediately able to adjust prices due to the "stickiness.

Explaining a little bit more: So, rather than prices increasing, firms can temporarily absorb demand increases by producing more, which explains why the SRAS curve remains relatively flat output adjusts, not prices.

- **Shifts of AS**

- **SRAS:** due to changes in production costs, for example, oil price shock. If production costs increase, SRAS curve shifts up. *For the same output produced before, it is + expensive to produce, so have to charge a higher price.*
- **LRAS:** due to changes in potential GDP (increase in the full-employment quantity of labour, an increase in the quantity of capital and an advance in technology).

- **Aggregate Demand (AD): defines the relationship between the quantity of real GDP demanded and the price level.** The quantity of real GDP demanded is the total amount of final goods and services produced in a country that people, businesses, governments, and foreigners plan to buy → AD = C + G + I + NX. *The negative slope may be understood from the equation of exchange:* $M.V = P.Y \Leftrightarrow (M/P).V = Y = AD$.

- **Wealth effect:** rise in the price level, other things constant, decreases the quantity of real wealth. Demand decreases (as people try to restore their real wealth)
- **Substitution effect: i) Intertemporal substitution effect (liquidity effect)** - A rise in the price level, other things constant, decreases the real value of money and raises the interest rate. When the interest rate rises, people save more (consume less), so the quantity of real GDP demanded decreases; **ii) International substitution effect.** A rise in the price level, other things constant, increases domestic prices relative to foreign prices. Hence, imports increase and exports decrease, which decreases the quantity of real GDP demanded.

- **Shifts of AD due to: A change in any influence on buying plans other than the price level changes aggregate demand:** 1) Expectations; 2) World Economy; 3) Fiscal Policy; 4) Monetary Policy. When aggregate demand increases, the AD curve shifts to the right.

1) *Higher expected income increases C today, AD ↑; A rise in the expected inflation rate makes buying goods cheaper today, AD ↑; An increase in expected profits boosts firms' investment, AD ↑.*
2) *An increase in foreign income increases the demand for Portuguese (EU) exports => AD ↑. A depreciation lowers the price of domestic goods and services relative to foreign goods and services, which increases exports and decreases imports, AD ↑.*
3) *Increase in government expenditure => AD↑ ; A tax cut or an increase in transfers => increases households' disposable income => increases consumption expenditure => AD ↑.*
4) *Monetary policy: changes in the quantity of money or the interest rate; An increase in the quantity of money increases liquidity => AD ↑; A cut in interest rates => higher C and I => AD ↑.*

You can see the previous in the AD equation:

AD = C (Y-T, M/P, r) **+ G + I** (r) **+ NX** (Y, Y*, eP*/P)

- **Private consumption depends positively on:** 1) Disposable Income (Y-T); 2) Real Quantity of Money (M/P) and negatively on 3) Real Interest Rate (r).
- **Private Investment depends negatively on the Real Interest Rate (r):** *higher real interest rates increase the cost of borrowing and reduce the attractiveness of investment projects.*
- **Net Exports depend positively on 1) Trading Partners Output (Y*) -** *if our trading partners are producing more, they're likely consuming more, which boosts demand for our exports*; and **negatively on 2) Domestic output (Y)** - *With more income, consumers and businesses in the domestic economy tend to buy more goods and services, including imports from other countries*; **3) Relative price level (in the same currency)** (eP*/P): *if it rises, meaning that foreign goods become relatively cheaper or domestic goods relatively more expensive), domestic consumers and businesses are more likely to purchase foreign goods over domestic goods, increasing imports.*
- **Government expenditure is exogenous.**

- **AD-AS Equilibrium**

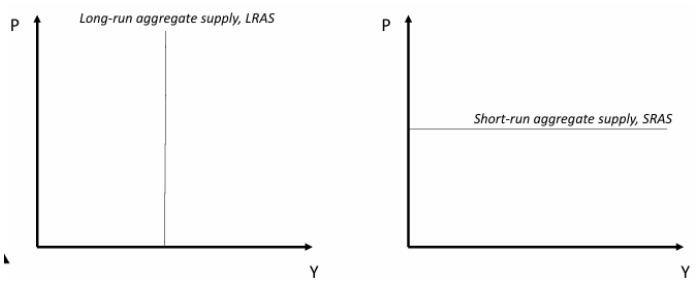
- **In the SR**: Equilibrium occurs at the intersection of the AD curve and the SRAS curve - Fixed price equilibrium. In the short run real GDP is "demand determined". The price level is determined by the supply side. The model captures the stylized fact that the changes in AD impact output faster than they impact prices.
- **In the LR**: Equilibrium occurs when the real GDP equals potential GDP, i.e. when the economy is on the LRAS curve: fully flexible prices – *prices adjust to reach Potential Output*. Long-run equilibrium occurs at the intersection of the AD, SRAS and LRAS curves

Conclusions

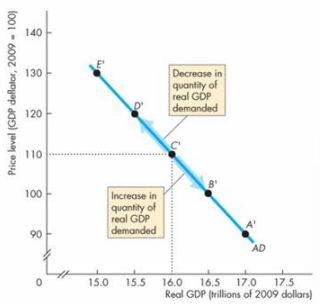
- **Business cycle in the AS-AD model** occurs because AD and SRAS fluctuate, but the nominal wage and price level don't change rapidly enough to keep real GDP at potential GDP. Note that business cycle are fluctuations around the GDP growth trend (Potential GDP).
- **Inflationary Gap:** real GDP exceeds potential GDP + above full employment
- **Recessionary Gap:** real GDP falls short of potential GDP + below full employment

Main important graphs

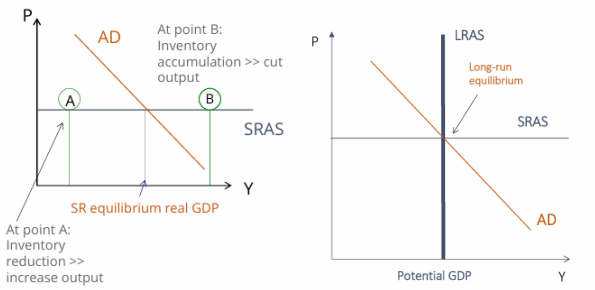
Aggregate Supply



Aggregate Demand



AD-AS Equilibrium: SR vs LR



Main important concepts

Class 10

- **Keynesian Model:** describes the **economy in the very short run** when prices are sticky, and demand determines real GDP.

Question for this class: *If there is an exogenous* ***shock to aggregate expenditure by how much does real GDP change?***

- **Keynesian Multiplier:** given by the **change in equilibrium expenditure divided by the change in autonomous expenditure.**
  - The multiplier is **greater than 1** because an **increase in autonomous expenditure induces further increases in aggregate expenditure** (through induced expenditure).
  - The slope of the aggregate planned expenditure curve (AE) determines the magnitude of the multiplier.

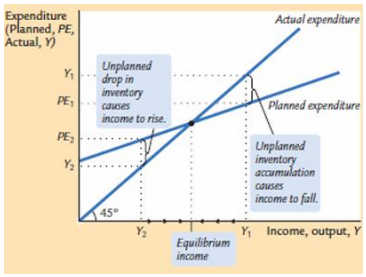
Situation in Closed Economy: no rest of the world (so, no NX).

- **Assumptions:** No government + I is exogenous (r is given). Therefore, in this case, the crucial **understanding of the multiplier is related with the change in consumption induced by changes in disposable income** (which depend on GDP).

$$Y = C(Y-T, M/P, r) + I$$

  - **Consumption function:** relationship between consumption expenditure and disposable income, other things remaining the same. There are two types of consumption: **i) Autonomous consumption -** amount of consumption expenditure that would take place in the short run even if people had no current income; basic consumption that households need to survive, regardless of their income; **ii) Induced consumption -** expenditure in excess of autonomous consumption, what is induced by disposable income.
  - **Marginal propensity to consume (MPC)**: the fraction of a change in disposable income (Y-T) spent on consumption instead of saved (how much consumption changes with changes in income) ⇔ $MPC = \partial C/\partial Y$ ⇔ **the slope of the consumption function.**

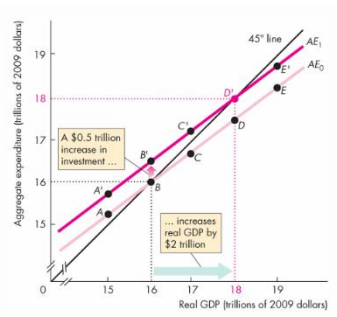
- **Keynesian Cross:** simple closed economy model in which income is determined by expenditure. **Actual aggregate expenditure is always equal to real GDP** (45º line).
  - The **slope of planned expenditure** is the **same as of the consumption function: MPC.** With I exogenous, the only component of (C+I) that changes when income changes is C. A one unit increase in income causes C, and therefore, planned expenditure to increase by the MPC.
  - **Equilibrium expenditure:** when aggregate planned expenditure equals real GDP (=actual aggregate expenditure).



Planned expenditure might differ from real GDP → firms can end up with inventories that are greater or smaller than planned.

- If aggregate planned expenditure exceeds real GDP (PE>Y), there is an unplanned decrease in inventories. To restore inventories, firms hire workers and increase production. Real GDP increases.
- Similarly, if real GDP exceeds aggregate planned expenditure (PE < Y), there is an unplanned increase in inventories. To reduce inventories, firms lay off workers and decrease production. Real GDP decreases.

Planned autonomous expenditure changes



Situation: increase in autonomous expenditure

For the previous equilibrium: planned > actual - brings an unplanned decrease in inventories: from B to B'.

Adjustment: So, firms increase production and real GDP increases. With a higher level of real GDP, induced expenditure also increases: from B' to D'.

Multiplier effect: change in equilibrium expenditure is larger than the initial change in autonomous expenditure → autonomous spending increased by 0.5 (from B to B') but actual expenditure increased by 2 (from B to D'), because induced expenditure also increased.

- **Keynesian Multiplier for closed economy**

$$multiplier = \frac{1}{(1 - slope\ AE)} = \frac{1}{(1 - MPC)}$$ → The larger the MPC (and the steeper the AE curve) the larger the multiplier.

(Remember that the slope of the AE is the MPC)

Situation in Open Economy

- Considering now **the full model**,

$$Y = C(Y - T, M/P, r) + G + I(r) + X(Y^*, eP/P^*) - M(Y, eP/P^*)$$

- **Now, the slope of AE depends:** on the marginal propensity to consume **(MPC)**, but also on the marginal propensity to import **(MPI)** → Slope AE = MPC – MPI

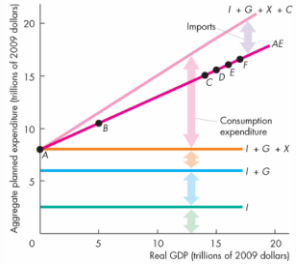
Note: *MPC →**fraction of additional income that is spent on consumption**. If the MPC is 0.8, then for every extra dollar of income, 80 cents are spent on domestic goods and services + MPI →**fraction of additional income that is spent on imports.** If the MPI is 0.2, then for every extra dollar of income, 20 cents are spent on imports.*

- **Keynesian Multiplier for Open Economy**

$$\frac{\Delta Y}{\Delta A} = \frac{1}{\left(1 - \frac{\partial C}{\partial Y} + \frac{\partial M}{\partial Y}\right)} = \boxed{\frac{1}{(1 - MPC + MPI)}}$$

MPC increase → increases multiplier.

MPI increase → decreases multiplier.



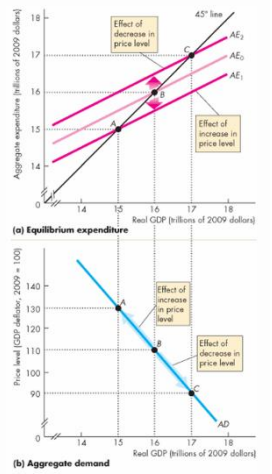
- **Introducing proportional taxes:** the higher the tax rate (τ) the smaller the multiplier.

$$Y = C(Y(1 - \tau), M/P, r) + G + I(r) + X(Y^*, eP/P^*) - M(Y, eP/P^*)$$

$$\frac{\Delta Y}{\Delta A} = \frac{1}{\left(1 - \frac{\partial C}{\partial Y}(1 - \tau) + \frac{\partial M}{\partial Y}\right)} = \boxed{\frac{1}{(1 - MPC(1 - \tau) + MPI)}}$$

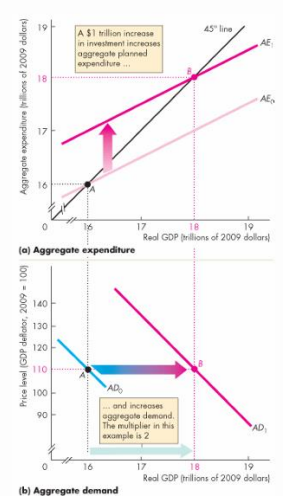
Relationship between AE and AD

- **AE CURVE →** shows **how aggregate planned expenditure depends on real GDP** (through the effects of disposable income), other things remaining the same.
- **AD CURVE →** shows **how equilibrium aggregate expenditure depends on the price level**, other things remaining the same.



a) Shifts along the AD curve: For example, **change in the price level** changes autonomous expenditure, which shifts the AE curve, generates a new level of equilibrium expenditure, and generates **a new point on the AD curve.**

→ The same rise in the price level that lowers equilibrium expenditure brings a movement along the AD curve from point B to point A. The same fall in the price level that increases equilibrium expenditure brings a movement along the AD curve from point B to point C.

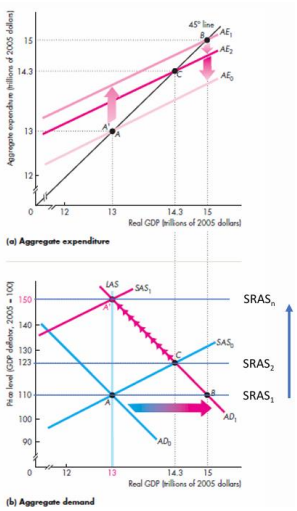


b) Shifts of the AD curve to the right/left: For example, **a change in autonomous expenditure at a given price level** shifts the AE curve, generates a new level of equilibrium expenditure, and **shifts the AD curve by an amount equal to the change in autonomous expenditure multiplied by the multiplier.**

Here, price level is the same. We have a shock of an external factor → shift of the AD curve.

Example: If investment increases: the AE curve shifts upward and the AD curve shifts rightward by an amount equal to the change in investment multiplied by the multiplier.

- **The multiplier in the LR** → In the long run, the multiplier is zero.



- **Conclusion**
  - The **Keynesian Multiplier gives us the impact on equilibrium real GDP of an autonomous (exogenous) change of expenditure in the very short run** when prices are fixed (and also assuming the interest rate is given). In practice, the multiplier may be lower if the shock also induces an increase in the interest rates, then investment will be lower.
  - **As prices start increasing in the medium-run, aggregate expenditure will be lower → LR multiplier is 0.**

Main important concepts

Class 11

Fiscal Policy

- **Expansionary Policy-** G↑ or T↓, such that Y ↑ **vs Contractionary Policy** - G↓ or T↑, such that Y ↓
- **Counter-cyclical policy:** refers to the steps taken by the government that go against the direction of the economic or business cycle and accelerate the adjustment to the LR equilibrium (for e.g.: stabilization policy: in a recession or slowdown, government goes with an expansionary policy to stimulate the economy and in an expansion, government goes with a contractionary policy to slow-down the economy) vs **Pro-cyclical policy:** government reinforces the business cycle by being expansionary during good times and contractionary during recessions.
- **Relation with AS-AD Model: How can fiscal policy accelerate the adjustment to LR equilibrium?**

- If real GDP is below potential (negative output gap)→ need to increase output to its potential level→ Fiscal policy has to be counter cyclical: expansionary, for AD to shift to the right.
- If real GDP is above potential (positive output gap) → need to decrease output until it is back at its potential level → Fiscal policy has to be counter-cyclical: contractionary, for AD to shift to the left.

- **Stabilization Policy** is operated in 2 ways: i) Discretionary policy (depends on political decisions) vs ii) Automatic stabilizers (automatic changes which are triggered by the state of the economy without government actions). For example, each person's tax bill depends on their income. In a recession, average income falls, so the average person pays less taxes. It's as if the government would automatically give people a tax cut in recessions.

Short-Run Fiscal Policy Effects

- The **impact on the short-run output level depends on the size of the actual fiscal multiplier** which depends on:

- Crowding-out effect[1].
- **Households' perceptions:** If households perceive a tax cut to be only temporary, they will not respond the same way as if they perceive it as permanent. If it is temporary, they may be cautious about increasing their consumption (fiscal multiplier will be smaller) vs if it is permanent, they are more likely to adjust their long-term expectations about disposable income - believing they have more income over the long term, they may increase spending more significantly, making the fiscal multiplier larger.
- **Government Credibility**: If the government's actions bolster confidence the multiplier could rise. But if interest rates climb in response to government borrowing then the crowding out effect could be amplified. And if consumers find the pursued policies irresponsible/unsustainable, raising concerns about future economic developments (uncertainty), they could spend less today (reinforcing the Ricardo-Barro effect).
- **Type of fiscal action:** When the government alters its own expenditure, it shifts the AD curve directly. When the government alters taxes, they shift the AD curve indirectly by influencing disposable income and therefore household consumption: the demand-side effects of a tax cut are likely to be smaller than an equivalent increase in G.
- **Targeting of measures also matters**: a tax cut targeted at poorer people may have a bigger impact, since they tend to have a higher MPC.
- **Economic conditions**: An economy operating at full capacity, there are no spare resources and any increase in G would just replace spending elsewhere, the fiscal multiplier could be around zero. In a recession, when unemployment is high, a fiscal boost can increase overall demand, the multiplier can be well above one.

Back to the Loanable Funds Market[1]: Government enters the loanable funds market when it has a budget surplus or deficit.

- **Budget Surplus** → increases the supply of funds and contributes to financing investment.
- **Budget Deficit** → increases the demand for funds and competes with businesses for scarce funds → Crowding out effect.
- **Ricardo-Barro Effect or Ricardian Equivalence** → if BB < 0, government needs to finance it, by issuing public debt, which needs to be paid back (with interest) in the future. How? It will charge higher taxes to the economic agents in the future, which will reduce their disposable income. If taxpayers are rational, they will increase savings (expansion of SLF) and anticipate the fact that they will become poorer in the

future. Additionally, crowding-out is avoided: interest rate does not increase, investment does not decrease.

Other definitions

- **Budget Balance (BB):** Total Revenues – Total Expenditure. It is a flow variable.
- BB>0 (surplus) means TR > TE
- BB < 0 (deficit) means TR < TE
- **Primary Budget Balance:** does not consider the interest paid on public debt, which is the result of past decisions. The Primary BB depends on the cycle (automatic stabilizers) and not only on discretionary policy (government action).
- **Cyclically Adjusted Primary Balance** = Observed Primary BB (% GDP) – Cyclical Component. Cyclical component refers to the impact of the automatic stabilizers on the BB. **The cyclical component is zero when output is at it's potential.**
- **Structural Primary Balance** = Cyclically Adjusted Primary Balance – Temporary Measures. It essentially shows how the government's fiscal position would look if the economy were operating at its full potential, free from temporary or exceptional factors.

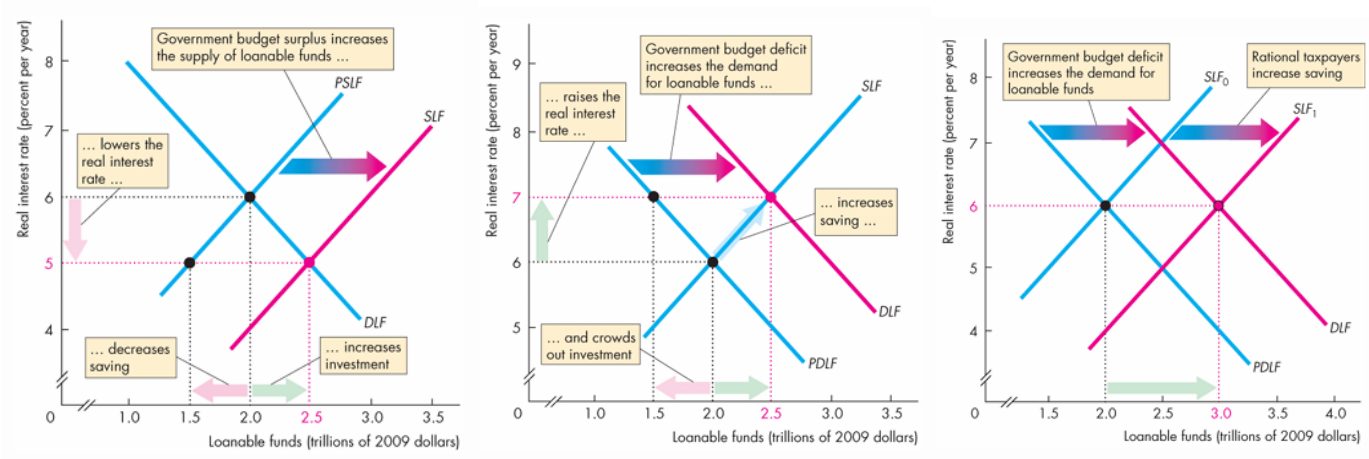
$\Delta\ Primary\ Structural\ Balance < 0 \rightarrow$ Expansionary Fiscal Policy

$\Delta\ Primary\ Structural\ Balance = 0 \rightarrow$ Neutral Fiscal Policy

$\Delta Primary\ Structural\ Balance > 0 \rightarrow$ Contractionary Fiscal Policy

- **Fiscal stance:** reflects the direction and size of the stimulus provided by fiscal policies to the economy, in addition to the automatic reaction of public finances to the economic cycle. So, a better measure for fiscal stance is the structural or cyclically adjusted balance, that exclude the impact of the cycle (automatic stabilizers).
- **Public Debt:** It represents the total amount that a government still owes (stock variable) – it is a sum of all past deficits and surpluses (flow variables). Whenever the government spends more than it collects in tax revenue, it finances this budget deficit by issuing government debt.
  - **Risk:** By issuing public debt, putting a burden on future generations of taxpayers (debt needs to be paid back). Plus, as debt increases and the risk of default increases, there is more pressure on public finances and increasing concerns about debt sustainability.
- **Budget Deficit** (flow) = ΔDt (variation of stock) = interest paid on debt (iDt−1) + primary deficit
- **Positive snow-ball effect:** i>g, debt to GDP tends to increase vs **Negative snow-ball effect**: i < g, debt to GDP tends to decrease.

Main important graphs



1. **Government with a Budget Surplus (BB>0)**
2. **Government with a Budget Deficit (BB<0)**
3. **Ricardo-Barro effect**

Main important concepts

Class 12

Monetary Policy

Short-run effects of Monetary Policy → will work through Aggregate Demand.

- **CB affecting the Money Market**

I) **Increase the quantity of money → M/P shifts to the right →** people find themselves holding more money than the quantity demanded → people who are holding the surplus of money will try to get rid of it → How? Buying interest-bearing bonds or by depositing it in interest-bearing bank accounts → price of bonds goes up as the demand for bonds increases → **Lower interest rate.**

II) **Decrease the quantity of money → M/P shifts to the left** → people find themselves holding less money than the quantity demanded → try to increase their holdings of money by reducing their holdings of bonds and other interest-bearing assets → price of bonds go down → **Higher interest rate** (bond issuers find that they have to offer higher interest rates to attract buyers).

- **Impact of the previous on the AS-AD Model**

I) Lower interest rate → Cost of Borrowing goes down → People borrow more → Consumption and Investment increases → **AD shifts to the right.**

II) Higher interest rate → Cost of Borrowing goes up → People borrow less → Consumption and Investment decrease → **AD shifts to the left.**

- **So, concluding, Monetary Policy can be used as a Stabilization Policy →** Intended to reduce the magnitude of economic cycles and accelerate the adjustment to the LR equilibrium. In the SR, when prices are fixed.

A) **If Y < Y pot (recessionary gap) →** expansionary monetary policy (M up, i down, C and I up, Y up until it is back at its potential level.

B) **If Y > Y pot (inflationary gap) →** contractionary monetary policy (M down, i up, C and I down, Y down until it is back at its potential level).

Note: In the LR, when prices adjust, there is **monetary neutrality →** no LR effect on output or employment.

Other Related Concepts

- **Central Bank:** public authority that regulates a nation's banks and controls the quantity of money in circulation. Two main objectives: i) keep inflation stable (primary objective); ii) maintain full employment and moderate the business cycle. For example, the European Central Bank considers that price stability is best maintained by aiming for 2% inflation over the medium-term.

- **CB´s Policy Tools** (How can the CB implement the Monetary Policy described above?)

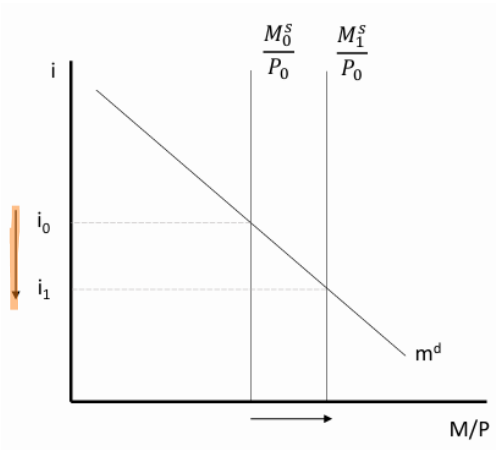
- **#1: Open Market Operations →** purchase or sale of securities from or to a commercial bank. For example, when CB purchases securities (it increases its monetary base), and at the same time has to pay for the newly created reserves, so increases the amount of money in the economy (increase in M).
- #2: Key Policy Rates: Deposit facility in order to make overnight deposits with the central bank; Marginal lending facility in order to obtain overnight liquidity from the central bank
- #3: Required reserve ratios: minimum percentage of deposits that a depository institution must hold as reserves (1% in euro area).
- #4: Forward Guidance: providing information about its future monetary policy intentions.

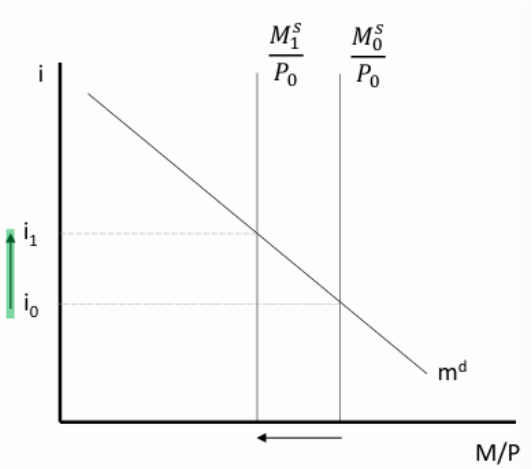
- **Transmission Mechanism of Monetary Policy**: process through which monetary policy decisions affect the economy and the price level – it is difficult to predict the precise effect of this.
  But basically: Change in official interest rates → Affect bank interest rates + Affect expectations + Affect asset prices + Affect exchange rates *(check theoretical slides for more detailed explanation)*

- **Liquidity Trap: The Zero Lower Bound**
- We saw: Monetary Policy works through interest rates. But **what happens if it is already at 0**? We call this a liquidity trap: expansionary monetary policy raises the supply of money, **but because interest rates can't fall any further, the extra liquidity might not have any effect.**

Main important graphs

Impact of CB on the Money Market: when it increases the money supply vs decreases the money supply





Impact of the previous on the AD: AD shifts to the right vs AD shifts to the left