Abstract Principles of Macroeconomics

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1 Introduction

1.1 Principles of Economics

A household and an economy face many decisions and the management of society's resources is important because resources are scarce. Economics is the study of how society manages its scarce resources.

There are four principles on how people make decisions:

1. **People face trade-offs**: "There is no such thing as free lunch!". To get one thing, we usually have to give up another thing. For instance, efficiency (society gets the most that it can from its scarce resources) vs. equity (the benefits of those resources are distributed fairly).
2. **The cost of something is what you give up to get it**: The *opportunity cost* of an item is what you give up to obtain that item.
3. **Rational people think at the margin**: People make decisions by comparing costs and benefits at the margin. Marginal changes are small, incremental adjustments to an existing plan of action.
4. **People respond to incentives**: Marginal changes in costs or benefits motivate people to respond.

Furthermore, there are three principles on how people interact:

5. **Trade can make everyone better off**: Trade allows people to specialize in what they do best and competition results in gains from trading.
6. **Markets are usually a good way to organize economic activity**: In a market economy, firms and households interact in markets for goods and services. Adam Smith observed that households and firms interact in the market as if they are guided by an "invisible hand". Because they look at prices when deciding what to buy and sell, they unknowingly take into account the social costs of their action and as a result, prices guide decision makers to reach outcomes that tend to maximize the welfare of society as a whole.
7. **Governments can sometimes improve market outcomes**: Markets only work if property rights are enforced. *Market failure* occurs when the market fails to allocate resources efficiently. It can be caused by an externality (the impact of one person / firm's actions on the well-being of a bystander) or market power (the ability of a single person or firm to overly influence market prices).

The following three principles deal with how the economy as a whole works:

8. **A country's standard of living depends on its ability to produce goods and services**: Almost all variations in living standards are explained by differences in countries' productivities where productivity is the amount of goods and services that are produced from each hour of a worker's time.
9. **Prices rise when the government prints too much money**: One cause of inflation is the growth in the quantity of money.

10. **Society faces a short-run trade-off between inflation and unemployment**: The Phillips Curve illustrates that when inflation goes down, unemployment goes up (in the short-run!).

1.2 Thinking like an Economist

Empirical information is gathered from observation, experience and experiment. A hypothesis is an assumption and scientific methods test the hypothesis. We differentiate between:

- **Inductive reasoning**: The process of observation from which patterns might be formed that provide evidence for a hypothesis which may lead to a theory.
- **Deductive reasoning**: Begins with a theory from which a hypothesis is drawn that is then subject to observation and either confirmation or rejection.

Economists make assumptions in order to make the world easier to understand.

1.2.1 Positive vs. Normative analysis

- Positive statements are statements that attempt to describe the world as it is ("descriptive analysis"). For instance:
  - "An increase in the minimum wage will cause a decrease in employment among the least skilled."
  - "Higher federal budget deficits will cause interest rates to increase."
- Normative statements are statements about how the world should be ("prescriptive analysis") For instance:
  - "The income gains from a higher minimum wage are worth more than any slight reductions in employment."
  - "Governments should be allowed to collect from tobacco companies the costs of treating smoking-related illnesses among the poor."

Economists may disagree about the validity of alternative positive theories or they may have different values and therefore different normative views about what policy should try to accomplish.

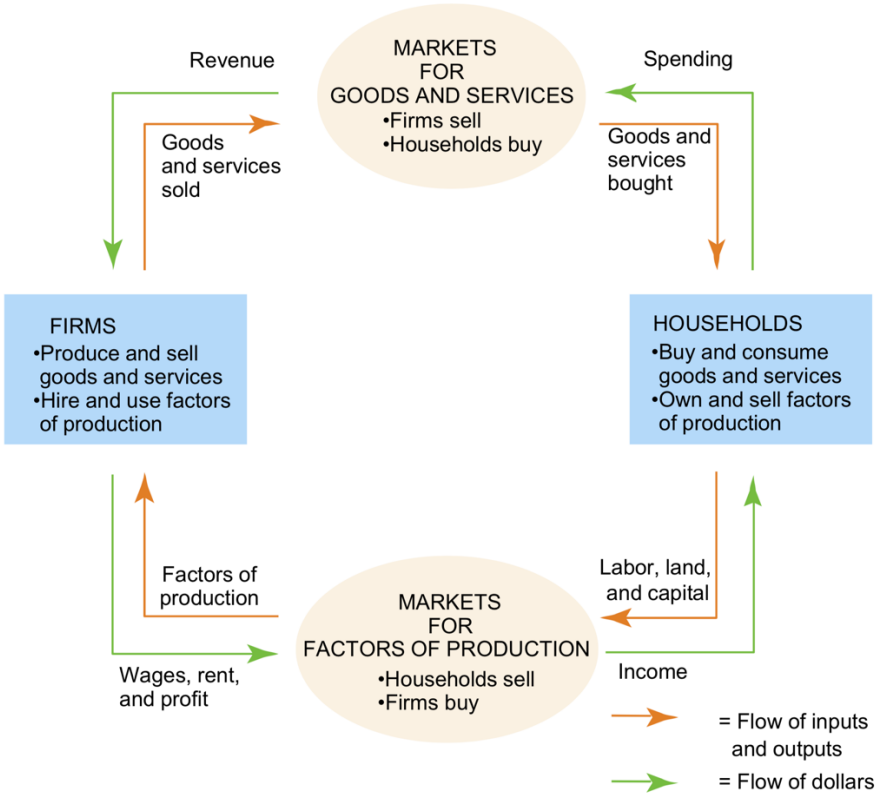
1.3 Economic Models

Models are used to simplify reality in order to improve our understanding of the world. A model contains two different types of variables:

- **Endogenous variables**: A variable whose value is determined within the model.
- **Exogenous variables**: A variable whose value is determined outside the model.

1.3.1 Circular-Flow Diagram

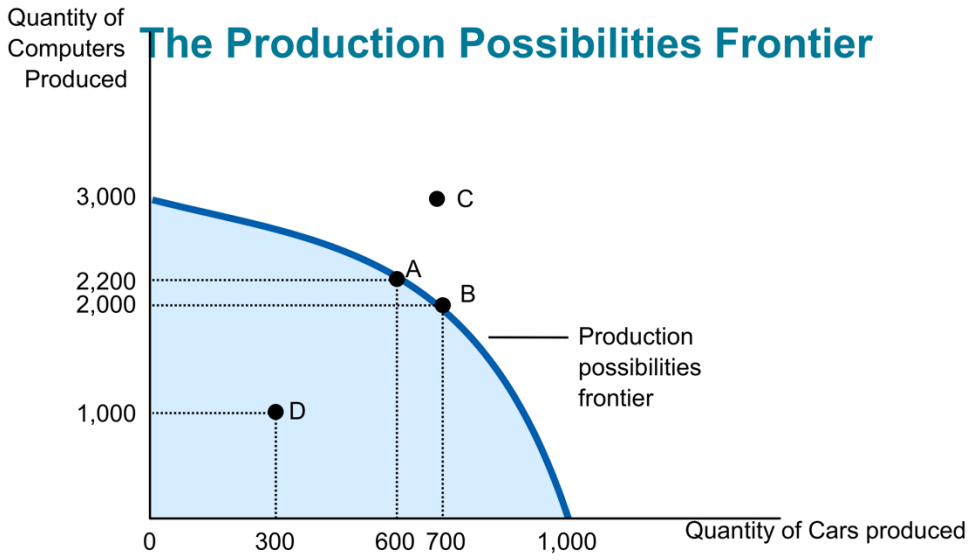
The circular flow diagram shows how money flows through markets among households and firms:



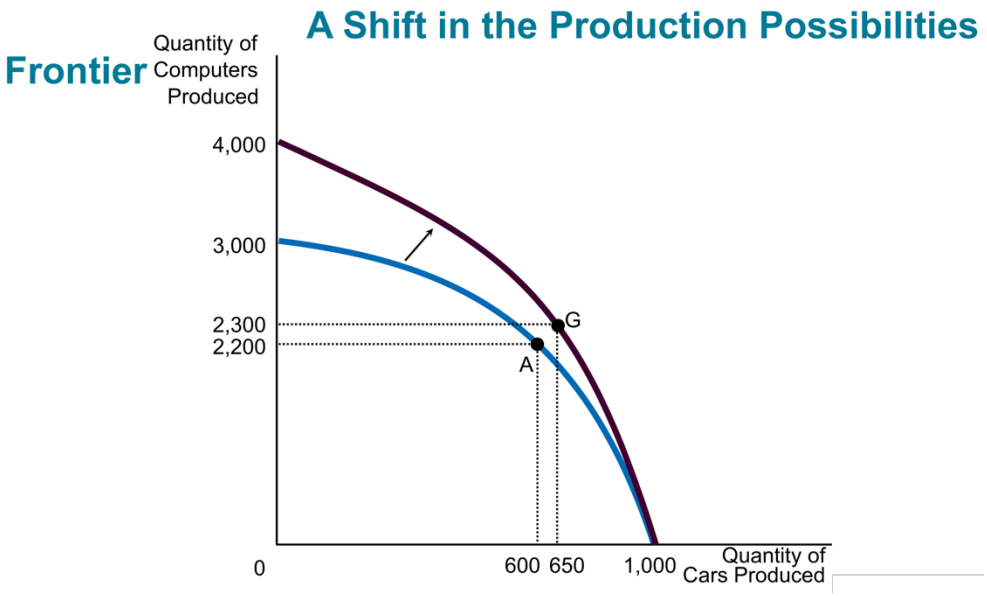
Firms produce and sell goods and services whereas households buy and consume them. In contrast, households own and sell factors of production (land, labor and capital) whereas firms hire and use them.

1.3.2 Production Possibilities Frontier

The production possibilities frontier shows the combinations of output that the economy can possibly produce given the available factors of production and the available production technology.



When efficiency rises (in the economy as a whole or in one specific market), there is a shift in the production possibilities frontier. An increase in productivity in one market also has an influence on the output of different markets, as illustrated here:



2 National Accounting

For an economy as a whole, income must equal expenditure because every transaction has a buyer and a seller so every dollar of spending by some buyer is a dollar of income for some seller.

2.1 Gross Domestic Product

Gross domestic product (GDP) is a measure of the income and expenditures of an economy. Because income equals expenditure, GDP can be calculated by adding up total expenditure in the economy or by adding up total income in the economy. GDP is the total market value of all final goods and services produced within a country in a given period of time. Excluded from the GDP are most items that are produced and consumed at home and therefore never enter the marketplace and items that are produced and sold illicitly (such as illegal drugs). Only the final value is counted, not intermediate goods. GDP can be measured in different ways:

- Demand side: Consumption, Investment, Net Exports
- Production side: Labour, Productivity
- Income side: Labour and Capital income

GDP (Y) is the sum of the following:

- **Consumption (C)**: The spending by households on goods and services (without the purchases of new housing)
- **Investment (I)**: The spending on capital equipment, inventories and structures (including new housing)

- **Government Purchases (G)**: The spending on goods and services by local, state and federal governments (without transfer payments because they are not made in exchange for goods or services)
- **Net Exports (NX = X-M)**: Exports minus imports

Therefore, we have:

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

GDP per person tells us the income and expenditure of the average person in the economy. Higher GDP per person indicates a higher standard of living. However, GDP is not a perfect measure of the happiness or quality of life.

2.1.1 Real vs. Nominal GDP

Real GDP values the production of goods and services at constant prices whereas nominal GDP values the production of goods and services at current prices. The *GDP deflator* is a measure of the price level calculated as the ratio of nominal GDP to real GDP times 100 and therefore tells us what portion of the rise in nominal GDP is due to a rise in prices rather than a rise in the quantities produced.

$$\text{GDP Deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} * 100$$

The *inflation rate* is the percentage change in the price level from the previous period. The consumer price index (CPI) is a measure of the overall cost of the goods and services bought by a typical consumer and is used to monitor changes in the cost of living over time. It is calculated with a weighted basket (containing different goods and services) as base. We have:

$$\text{Consumer price index in year } t = \frac{\text{Price of basket in year } t}{\text{Price of basket in base year}} * 100$$

$$\text{Inflation rate in year 2} = \frac{\text{CPI in year 2-CPI in year 1}}{\text{CPI in year 1}} * 100$$

CPI is not a perfect measure of the cost of living, there are three key issues that cause the CPI to overstate the true cost of living:

1. **Substitution bias**: The basket does not change to reflect consumer reaction to changes in relative prices (consumers substitute toward goods that have become relatively less expensive).
2. **Introduction of new goods**: The basket does not reflect the change in purchasing power brought on by the introduction of new products (new products result in greater variety, which in turn makes each dollar more valuable).
3. **Unmeasured quality changes**: The statistical office tries to adjust the price for constant quality, but such differences are hard to measure.

There are two important differences between the GDP deflator and the CPI:

1. The GDP deflator reflects the prices of all goods and services produced domestically, whereas the CPI reflects the prices of all goods and services bought by consumers.

2. The CPI compares the price of a fixed basket of goods and services to the price of the basket in the base year whereas the GDP deflator compares the price of currently produced goods and services to the price of the same goods and services in the base year.

3 Production and Growth

3.1 Growth Theory

The trend rate of growth is the average sustainable rate of economic growth over a period of time. It is found by taking GDP in some time period, subtracting GDP from an earlier period, dividing the result by the initial time period and expressing the figure as percentage.

The Solow theory identifies the rate of human and physical capital and population growth as being key determinants of economic growth. Other factors that may influence productivity are:

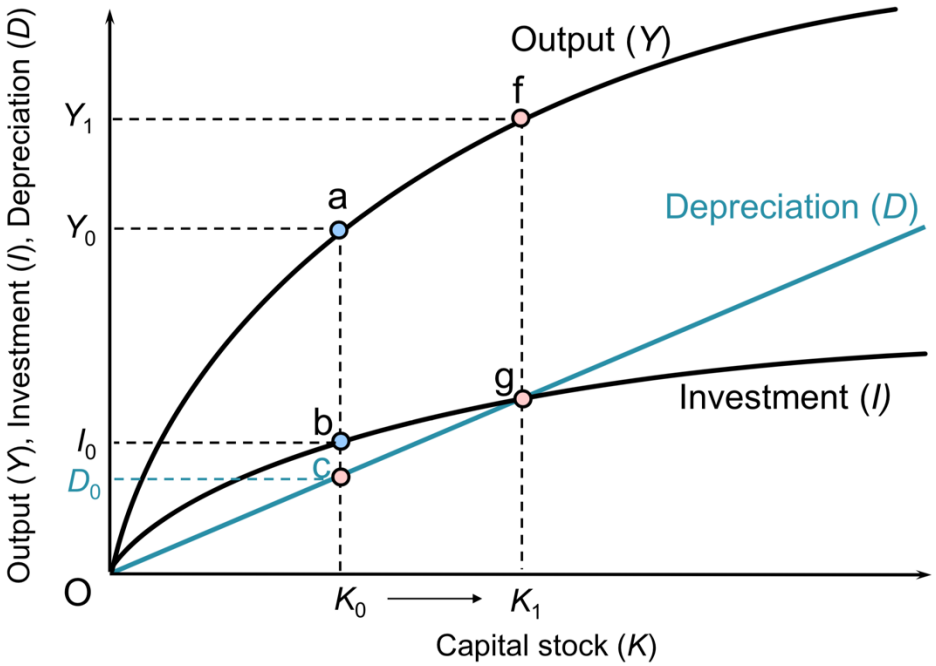
- How open to trade a country is.
- How easy it is to do business and how and the extent to which corruption is minimized.
- The extent to which violence, war and conflict exist in a country.
- Regional, institutional and cultural characteristics.
- Geographical factors such as physical resource endowments and climate.

3.1.1 Solow model of growth

GDP in any country can be assumed to be an extension of a firm's production function where the level of output is dependent on the factors of production employed. The assumptions are:

- Two production factors: Labor (L) and capital (K) (next to technology: A)
  - Output (GDP): $Y = AF(K, L)$
- Constant returns to scale: $xY = AF(xK, xL)$
  - To double the output, the labour and capital has to be doubled. This implies that capital and labour are each subject to diminishing marginal returns.
- A closed economy and no government, i.e. $Y = C + I$

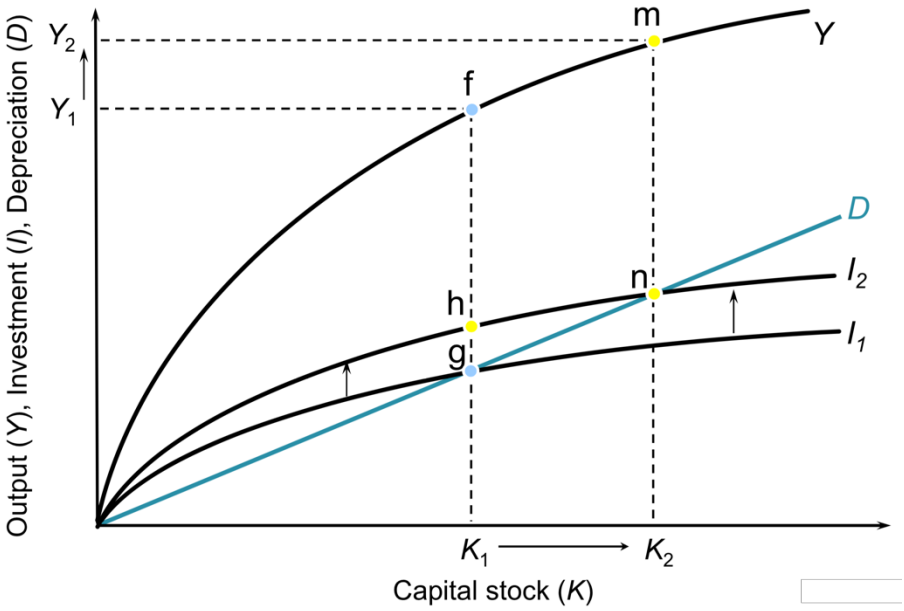
For the economy as a whole, saving must be equal to investment. We assume that a constant share of income is saved and therefore invested, $S = sY$. Firms invest in order to raise future productivity or to replace depreciated capital, we assume capital depreciates with a constant rate, $D = \delta K$. The difference between total investment and depreciation is called net investment.



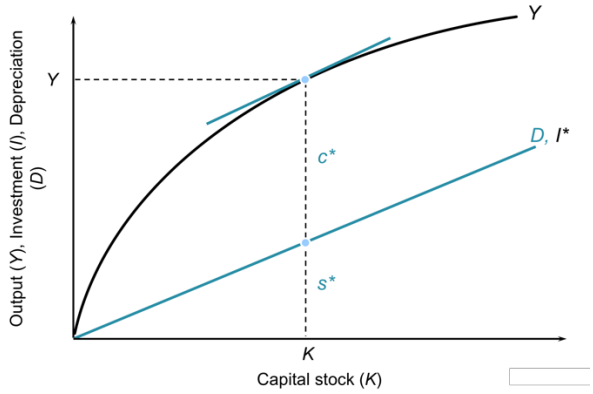
This model implies that at a given saving rate with positive net investment, the capital stock (and hence output) will grow until $D = I$. If the saving rate is increased, the capital stock and output grow further, again until $D = I$. The point at $D = I$ where the growth rate is zero is called steady-state equilibrium.

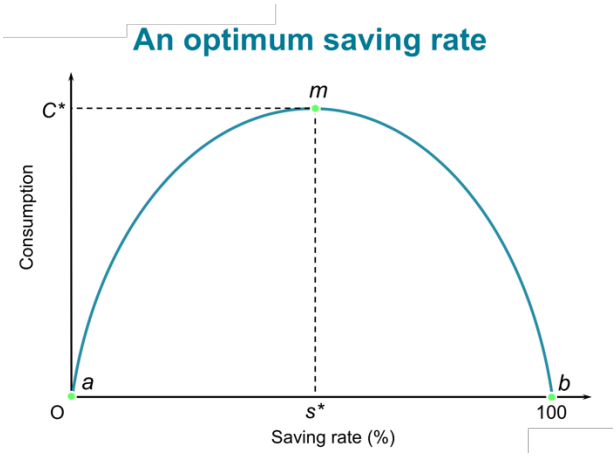
An increase in the savings rate causes the investment line to shift upwards and results therefore in a new steady-state equilibrium:

Effect of increase in the savings rate

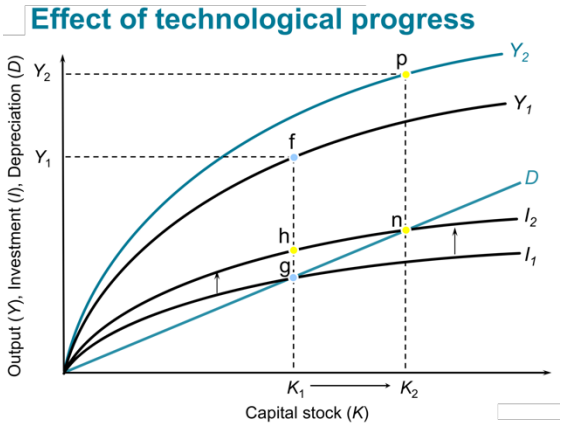


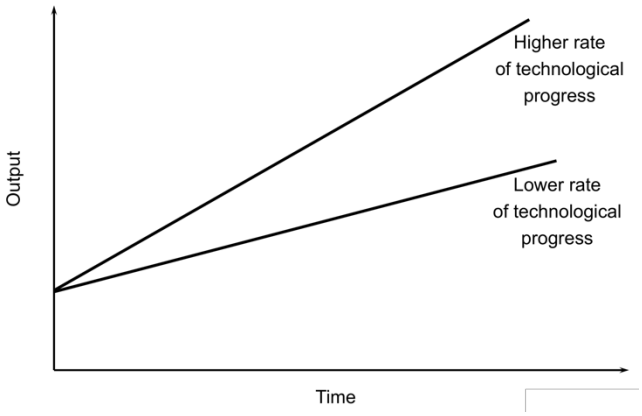
Steady state consumption is the difference between steady state output and steady state depreciation / investment. There's a unique saving rate that maximizes the difference between output and investment.





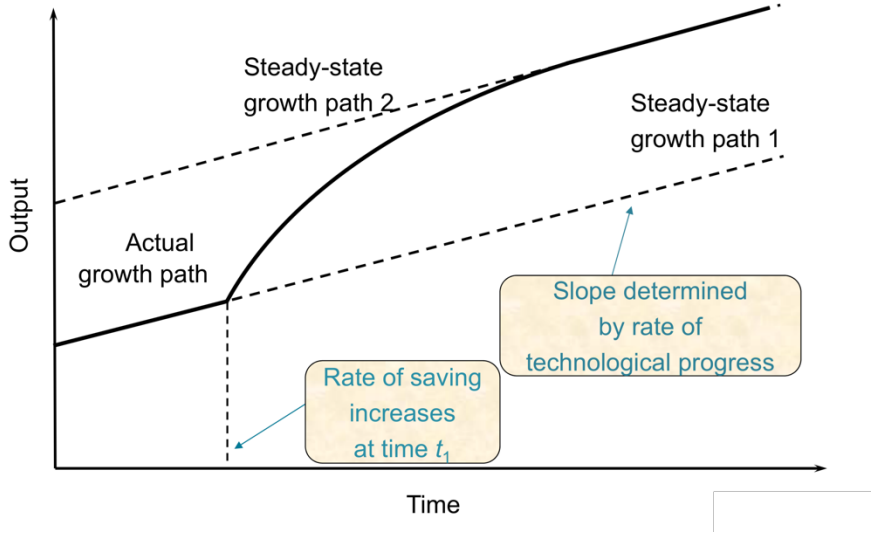
If we allow for technological progress, the growth rate in the steady state doesn't have to be zero:





If we combine technological progress and an increase in the saving rate, we get:

Effect of an increase in the saving rate with given technological progress



We can see diminishing returns in the Solow model. As the stock of capital rises, the extra output produced from an additional unit of capital falls. The catch-up effect refers to the property whereby countries that start off poor tend to grow more rapidly than countries that start off rich.

3.1.2 Endogenous growth theory

Endogenous growth theory is a theory of long-run economic growth which results from the creation of new knowledge and technology which impacts on everyone and makes them more productive as a result.

3.2 Productivity

A nation can enjoy a high standard of living if it can produce a large quantity of goods and services. The factors of production (the inputs used to produce goods and services) directly determine productivity. Labour productivity is the amount of output per worker. It will rise if the capital stock increases but because of diminishing marginal product, the rate of increase in average labour productivity will decline as the capital stock per worker increases.

The factors of production include:

- **Physical capital**: Stock of equipment and structures that are used to produce goods and services (tools, office buildings, schools, etc.). It is a produced factor of production because in the past it was an output from the production process.
- **Human capital**: The knowledge and skills that workers acquire through education, training and experience.
- **Natural resources**: Inputs used in production that are provided by nature such as land, rivers, mineral deposits, trees, petroleum or coal. They can be important but are not necessary for an economy to be highly productive in producing goods and services.
- **Technological knowledge**: Society's understanding of the best ways to produce goods and services.

3.3 Economic growth and public policy

To raise productivity and living standards, governments can:

- Encourage saving and investment.
- Encourage investment from abroad: Either foreign direct investment (capital investment owned and operated by a foreign entity) or foreign portfolio investment (investments financed with foreign money but operated by domestic residents).
- Encourage education and training: But a problem facing some poor countries is the brain drain (the emigration of many of the most highly educated workers to rich countries).
- Ensure workers are healthy: Healthier workers are more productive.
- Establish secure property rights and maintain political stability.
- Promote free trade: Trade is, in some ways, a type of technology and a country that eliminates trade restrictions will experience the same kind of economic growth that would occur after a major technological advance.
- Promote research and development: E.g. patent laws, tax incentives for R&D, grants for research at universities.

4 Unemployment

Unemployment incurs costs to the individual (loss of earnings, stress, self-esteem and health problems, family breakdown, de-skilling, etc.) as well as costs to the society and economy (opportunity costs, tax and benefits effects, etc.).

Economists have come up with the following finding: “Most spells of unemployment are short, and most unemployment observed at any given time is long term.” Therefore, most people who become unemployed will soon find jobs but most of the economy’s unemployment problem is attributable to relatively few workers. Hysteresis refers to the effect that the longer people are without work the less likely they are to be hired by firms.

4.1 Categories of Unemployment

1. Long-run problem: **Natural rate of unemployment** – Is unemployment that does not go away on its own even in the long run and therefore the amount of unemployment that the economy normally experiences.
2. Short-run problem: **Cyclical unemployment** – Cyclical Unemployment refers to the year-to-year fluctuations in unemployment around its natural rate. It is associated with short-term ups and downs of the business cycle.

4.2 Definition of Unemployment

A person with a job is considered as employed. A person is considered as unemployed, if that person does not have a job and is able and available (willing) to work at current wage rates. The labour force is the total number of workers and is equal to the number of employed and unemployed. People which are not in the labour force have no job and are neither able nor available to work.

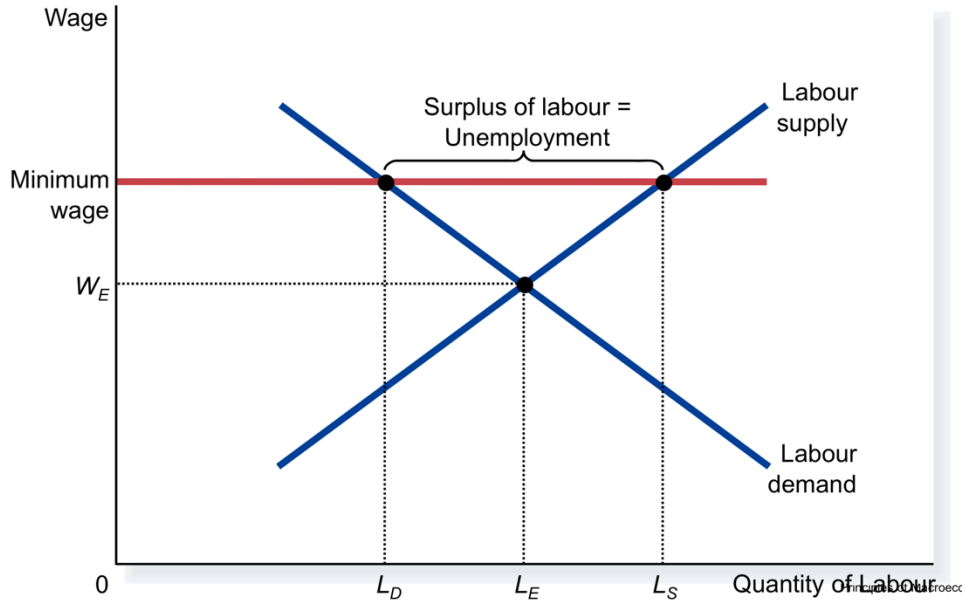
The unemployment rate is calculated as the percentage of the labour force that is unemployed. The labour-force participation rate is the percentage of the adult population that is in the labour force.

4.3 Reasons for Unemployment

In an ideal labour market, wages would adjust to balance the supply and demand for labour, ensuring that all workers would be fully employed. In equilibrium there is no unemployment, because everybody who is willing to work at the given market wage is able to do so (the market clears). Two different types of unemployment are responsible for long-term unemployment:

- **Frictional Unemployment**: Refers to the unemployment that results from the time it takes to match workers with jobs that are best suit their tastes and skills. This type is often thought to explain relatively short spells of unemployment and is mainly due to:
    - **Job search**: It takes time for qualified individuals to be matched with appropriate jobs.

  Frictional unemployment is inevitable because the economy always experiences changes, e.g. due to matching (workers leaving their job for a “better” one), due to shifts in customer preferences or due to sectoral shifts (changes in demand among industries or regions).
  Government programs can affect the time it takes unemployed workers to find new jobs and firms to find the right people by Government-run employment agencies, public training programs or unemployment insurance.
- **Structural Unemployment**: The unemployment that results because the number of jobs available in some labour markets is insufficient to provide a job for everyone who wants one (labour supply exceeds labour demand). It is often thought to explain longer spells of unemployment and can have one of the following reasons:
    - **Minimum wage laws**: When the minimum wage is set above the level that balances supply and demand (equilibrium level), it creates unemployment.



- **Unions**: A union is a type of cartel attempting to exert its market power. The process by which unions and firms agree on the terms of employment is called collective bargaining. The union can pressure employers to provide a higher wage level by threatening with strikes. A firm facing a strike is likely to agree to pay higher wages than it otherwise would. Workers in unions (insiders) reap the benefits of collective bargaining while workers not in the union (outsiders) bear some of the costs, e.g. unemployment.
- **Efficiency wages**: Efficiency wages are above-equilibrium wages paid by firms in order to increase worker productivity. The theory of efficiency wages states that firms operate more efficiently if wages are above the equilibrium because of worker health, worker turnover, worker quality and worker effort.

5 Saving, investment and the financial system

5.1 Financial institutions

Financial institutions can be grouped into two different categories:

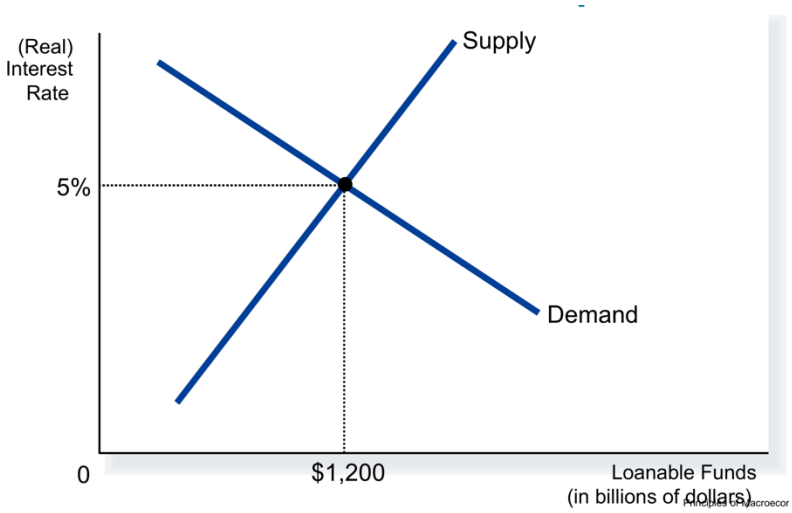
- **Financial markets** are the institutions through which savers can directly provide funds to borrowers:
  - Stock markets: Stock represents a claim to partial ownership in a firm and is therefore, a claim to the profits that the firm makes. The sale of stock to raise money is called equity financing.
  - Bond markets: A bond is a certificate of indebtedness that specifies obligations of the borrower to the holder of the bond.
- **Financial intermediaries** are financial institutions through which savers can indirectly provide funds to borrowers:
  - Banks: They take deposits from people who want to save and use the deposits to make loans to people who want to borrow. They pay depositors interest on their deposits and charge borrowers slightly higher interest on their loans. Furthermore, they help create a medium of exchange by providing non-cash payment methods.
  - Mutual funds: An institution that sells shares to the public and uses the proceeds to buy a portfolio of various types of stocks and / or bonds, therefore allowing people with small amounts of money to easily diversify.

We assume that the economy has only one financial market, the market for loanable fund which is the market in which those who want to save supply funds and those who want to borrow to invest demand funds. Loanable funds refers to all income that people have chosen to save and lend out, rather than use for their own consumption.

5.1.1 The market for loanable funds

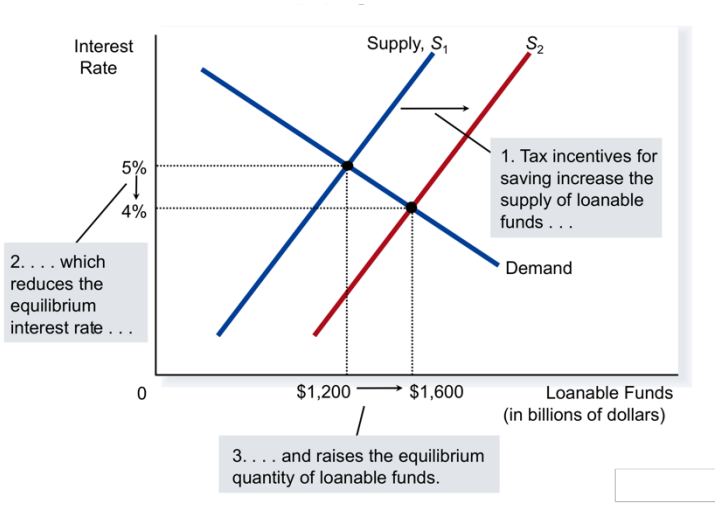
The supply of loanable funds comes from people who have extra income they want to save and lend out whereas the demand comes from households and firms that wish to borrow to make investments. The interest rate is the price of the loan and therefore the amount that borrowers

pay for loans and the amount that lenders receive on their saving. The equilibrium of the supply and demand for loanable funds determines the real interest rate:

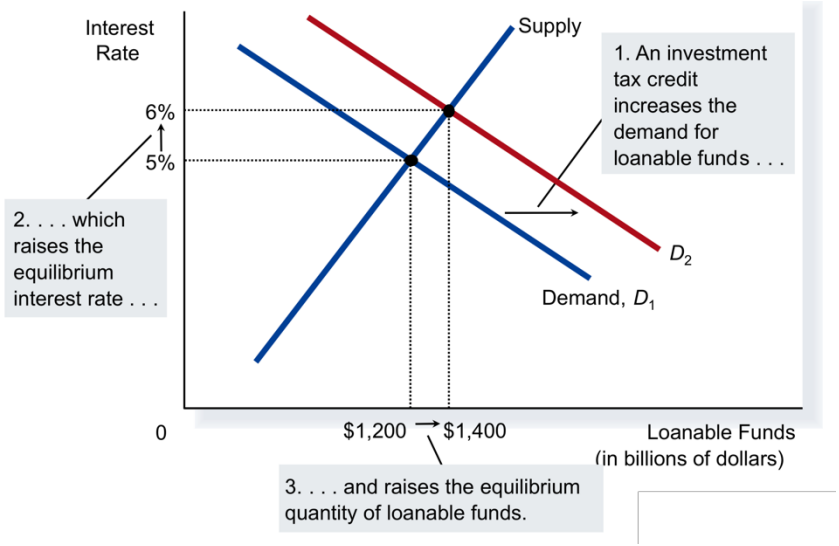


The following government policies affect saving and investment:

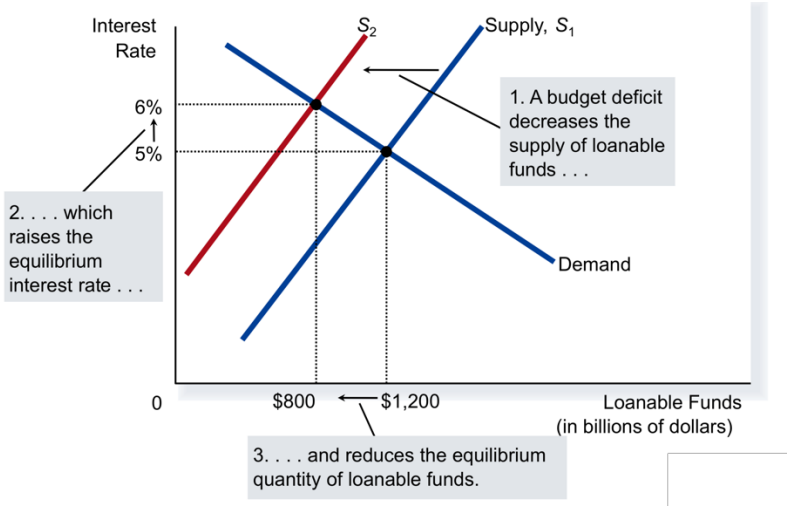
- **Taxes and saving**: Taxes on interest income substantially reduce the future payoff from current saving and, as a result, reduce the incentive to save whereas a tax decrease increases the incentive for households to save at any given interest rate. These policies therefore shift the supply line:



- **Taxes and investment**: An investment tax credit increases the incentive to borrow, therefore increasing the incentive to borrow and therefore shifting the demand curve to the right (and vice-versa).



- **Government budget deficits and surpluses**: Government borrowing to finance its budget deficit reduces the supply of loanable funds available to finance investment by households and firms (this fall in investment is called crowding out). Therefore, the supply curve is shifted to the left:



5.2 Saving and Investment

National saving is the total income in the economy that remains after paying for consumption and government purchases. Private saving ($Y - T - C$) is the amount of income that households have left after paying their taxes and paying for their consumption. Public saving ($T - G$) is the amount of tax revenue that the government has left after paying for its spending.

If $T > G$, the government runs a budget surplus. If $G > T$, the government runs a budget deficit because it spends more money than it receives.

5.3 Money

Bartering (“Tauschhandel”) is the exchange of one good for another. Money is the set of assets in an economy that people regularly use to buy goods and services from other people. Money has three functions:

1. **Medium of exchange**: A medium of exchange is an item that buyers give to sellers when they want to purchase goods and services, therefore anything that is readily acceptable as payment.
2. **Unit of account**: The measure people use to post prices and record debts.
3. **Store of value**: An item that people can use to transfer purchasing power from the present to the future.

Liquidity is the ease with which an asset can be converted into the economy’s medium of exchange.

Commodity money takes the form of a commodity with intrinsic value (e.g. gold, silver or cigarettes). Fiat money is used as money because of government decree and does not have intrinsic value (e.g. coins, currency or check deposits).

Currency is the paper bills and coins in the hands of the public and demand deposits are balances in bank accounts that depositors can access on demand by writing a check.

There are many assets that have some money-characteristics (currency, checking accounts, saving accounts, money market funds, etc.) and there is no single precise measure of money. We will often assume as if there is just one which is assumed to be controlled by the Central Bank: M

5.3.1 Central Bank

A central bank is an institution designed to oversee the banking system and regulate the quantity of money in the economy. Central Banks act as a banker’s bank, making loans to banks and use as a lender of last resort. And it conducts monetary policy by:

- Controlling the money supply
- Controlling the internal value of the currency (price stability)
- Controlling the external value of the currency (exchange rate)

It uses the following (conventional) tools of monetary control:

- **Open-Market Operations**: The Central Bank conducts open-market operations when it buys government bonds from or sells government bonds to the public.
    - When the CB buys government bonds, the money supply increases.
    - When the CB sells government bonds, the money supply decreases.
- **Reserve Requirements**: Regulations on the minimum amount of reserves that banks must hold against deposits.
    - Increasing the reserve requirement decreases the money supply.
    - Decreasing the reserve requirement increases the money supply.
- **Discount Rate**: The discount rate is the interest rate the CB charges banks for loans.
    - Increasing the discount rate decreases the money supply.
    - Decreasing the discount rate increases the money supply.

5.3.2 Banks and the Money Supply

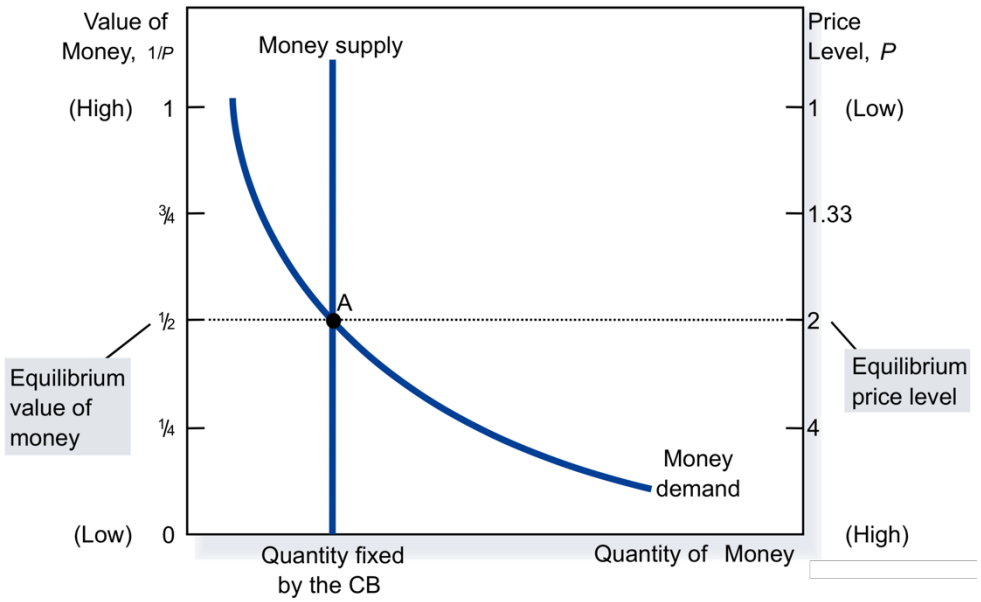
Banks can influence the quantity of demand deposits in the economy and the money supply. Reserves are deposits that banks have received but have not loaned out. In a fractional-reserve banking system, banks hold a fraction of the money deposited as reserves and lend out the rest. The reserve ratio is the fraction of deposits that banks hold as reserves. When a bank makes a loan from its reserves, the money supply increases. The money multiplier is the amount of money the banking system generates with each dollar of reserves and is $1/R$.

6 Money, Growth and Inflation

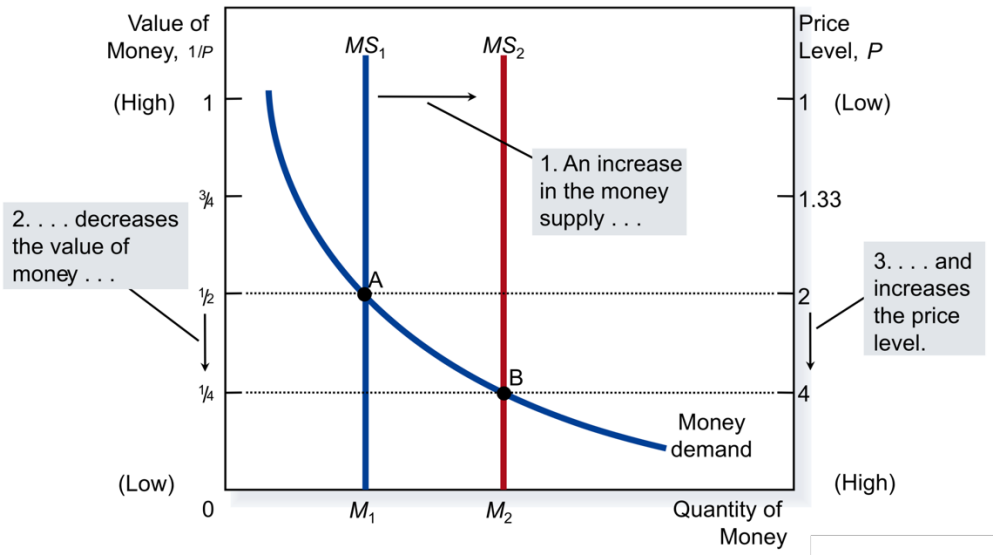
6.1 Inflation

Inflation is an increase in the overall level of prices whereas deflation is a decrease in the overall level of prices. When the overall price level rises, the value of money falls.

The value of money is determined by the supply and demand for money. The money supply is a policy variable that is controlled by the central bank. Therefore, the supply of money is vertical (perfectly inelastic). Money demand has several determinants, including interest rates and the average level of prices in the economy. In the long run, the overall level of prices adjusts to the level at which the demand for money equals the supply.



An increase in the money supply decreases the value of money and therefore increases the price level:



The Quantity Theory of Money states that the quantity of money available in the economy determines the value of money and the primary cause of inflation is the growth in the quantity of money.

When the government raises revenue by printing money, it is said to levy an inflation tax. It is like a tax on everyone who holds money.

The Fisher effect refers to a one-to-one adjustment of the nominal interest rate to the inflation rate. According to the Fisher effect, when the rate of inflation rises, the nominal interest rate rises by the same amount, the real interest rate therefore stays the same.

6.1.1 Costs of inflation

Inflation does not in itself reduce people's real purchasing power because as prices rise, so do incomes. However, some people's incomes may not rise exactly with inflation. The real costs of inflation are:

1. **Shoeleather costs**: The resources wasted when inflation encourages people to reduce their money holdings (inflation reduces the real value of money, so people have an incentive to minimize their cash holdings). The actual cost of reducing your money holdings is the time and convenience you must sacrifice to keep less money on hand ("extra trips to the bank").
2. **Menu costs**: The costs of adjusting prices.
3. **Relative price variability**: Inflation distorts relative prices, resulting in distorted consumer decisions and markets are less able to allocate resources to their best use.
4. **Tax distortions**: Inflation exaggerates the size of capital gains and increases the tax burden on this type of income because with progressive taxation, capital gains are taxed more heavily.
5. **Confusion and inconvenience**: It is more difficult to compare real revenues, costs and profits over time.
6. **Arbitrary redistribution of wealth**: These redistributions occur because many loans in the economy are specified in terms of the unit of account – money.

6.1.2 Deflation

Deflation can be as damaging as inflation because there is little incentive to spend today if the expectation is for cheaper prices tomorrow. Therefore, it might result in consumers not spending at levels that provide incentives for firms to invest in new capacity which results in little or no growth.

6.2 Money

Nominal variables are variables measured in monetary units whereas real variables are variables measured in physical units. According to Hume and others, real economic variables do not change with changes in the money supply (classical dichotomy → different forces influence real and nominal variables). The irrelevance of monetary changes for real variables is called monetary neutrality.

The velocity of money refers to the speed at which the typical dollar bill travels around the economy from wallet to wallet. We have:

$$V = \frac{P * Y}{M} \qquad\qquad M * V = P * Y$$

Where V is the velocity, P the price level, Y the quantity of output and M the quantity of money. This equation shows that an increase in the quantity of money in an economy must be reflected in a rise of the price level, a rise of the quantity of output or a fall of the velocity.

Because the velocity of money is relatively stable over time, a change in the quantity of money causes proportionate changes in the nominal value of output. But because money is neutral, money does not affect output, therefore the price level must rise.

6.2.1 Changes in Banking and the Financial Crises

Under traditional lending regimes banks would have had to have set aside reserves to cover the loans that they had made. Securitization takes loans off the balance sheet so the bank does not have to set aside reserves to cover those loans, and so the bank has more scope for increasing lending. It involves packaging up loans and selling them. To sell them, banks get credit rating agencies to analyze the packages of debt and give them a credit rating. They then set up a subsidiary company, known as a special purpose vehicle (SPV). The SPV issues shares that may be bought by other investors and then buys the packages of debt. The SPV also issues bonds to raise money to buy packages of debt from the bank.

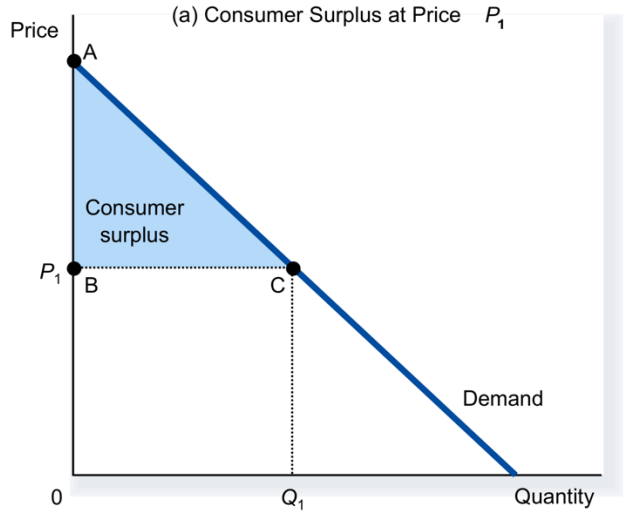
What was created was a complex web of financial transactions that built high levels of interdependence amongst those involved. The whole structure depended on the ability of mortgage borrowers to service their mortgages. When the number of borrowers defaulting on their repayments started to rise in the middle of the 2000s, the structure began to become unstable. But it was hard to work out who would bear the losses as a result of these defaults. As a result, banks became more cautios about lending to each other, leading to the “credit crunch” in 2008.

7 International Trade

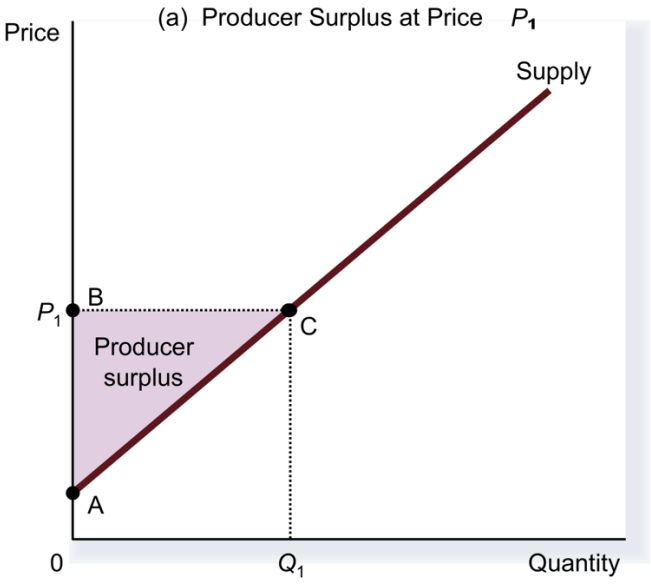
7.1 Welfare Economics

Welfare economics is the study of how the allocation of resources affects economic well-being. Buyers and sellers receive benefits from taking part in the market, equilibrium in the market results in maximum benefits and therefore maximum total welfare for both the consumers and the producers of the product. Consumer surplus measures economic welfare from the buyer's side whereas producer surplus does so from the seller's side.

The willingness to pay is the maximum amount that a buyer will pay for a good and it therefore measures how much the buyer values the good or service. Consumer surplus is the buyer's willingness to pay for a good minus the amount the buyer actually pays for it.

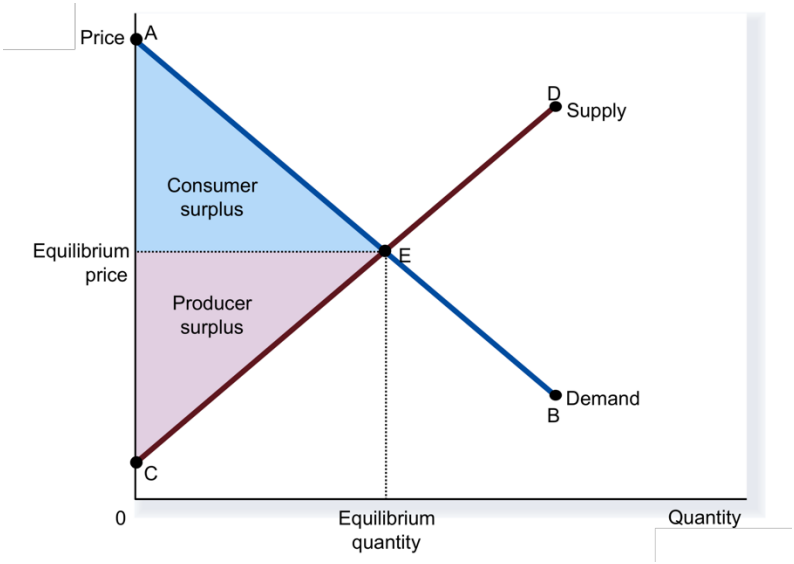


Producer surplus is the amount a seller is paid for a good minus the seller's cost and it measures the benefit to sellers participating in a market.



The total surplus is the consumer surplus + the producer surplus which can also be stated as: Value to buyers – cost to sellers.

Efficiency is the property of a resource allocation of maximizing the total surplus received by all members of society. An allocation is Pareto efficient if no individual can be made better off without another being made worse off. In the equilibrium of a competitive market, the sum of consumer surplus and producer surplus is maximized, meaning consumer surplus cannot be raised without lowering producer surplus and vice-versa.



The three insights concerning market outcomes are:

- Free markets allocate the supply of goods to the buyers who value them most highly, as measured by their willingness to pay.
- Free markets allocate the demand for goods to the sellers who can produce them at least cost.
- Free markets produce the quantity of goods that maximizes the sum of consumer and producer surplus.

7.2 International trade

Specialization and Trade can make everyone better off. Differences in the costs of production determine who should produce what and how much should be traded for each product. There are two ways to measure differences in costs of production:

- The number of hours required to produce a unit of output
- The opportunity cost of sacrificing one good for another

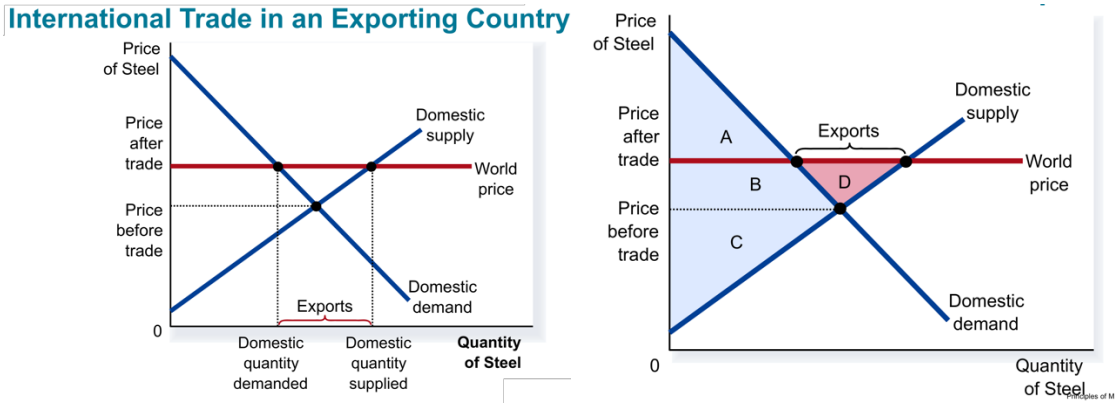
When we compare producers of a good according to their productivity, we speak of absolute advantages. A producer that requires a smaller quantity of inputs to produce a good is said to have an absolute advantage in producing that good.

When we compare producers of a good according to their opportunity cost, we speak of comparative advantages. A producer that has the smaller opportunity cost of producing a good is said to have a comparative advantage in producing that good.

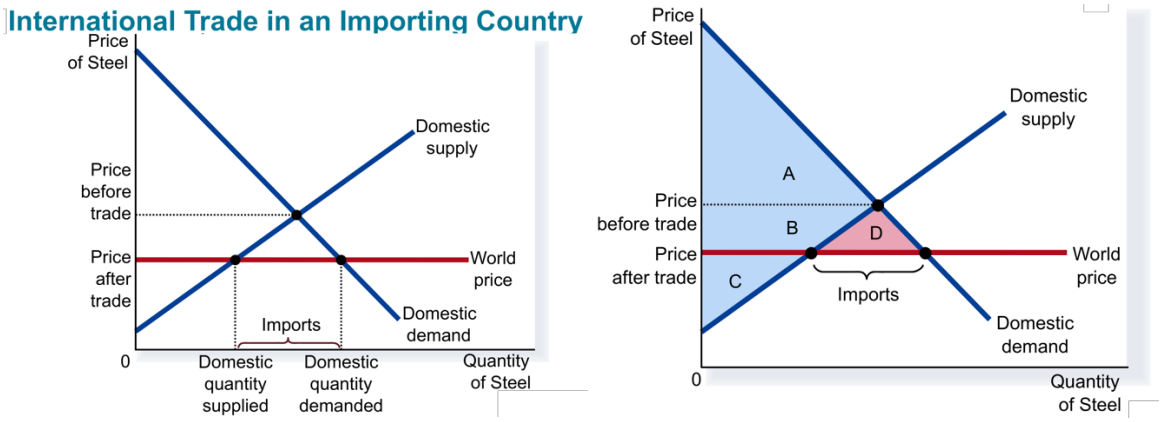
Whenever potential trading parties have differences in opportunity costs, they can each benefit from trade. Trade can benefit everyone in a society because it allows people to specialize in activities in which they have a comparative advantage.

7.2.1 Benefits of Trade

The world price refers to the price that prevails in the world market for that good. If a country has a comparative advantage, then the domestic price will be below the world price and the country will be an exporter of the good. If the country does not have a comparative advantage, then the domestic price will be higher than the world price and the country will be an importer of the good.



As we can see, for an exporting country, consumer surplus is decreased ($-B$), but producer surplus is increased ($+(B+D)$), resulting in an increase of the total surplus by D.



For an importing country, total surplus is again increased by D, but producer surplus is decreased ($-B$), whereas consumer surplus is increased ($+(B+D)$).

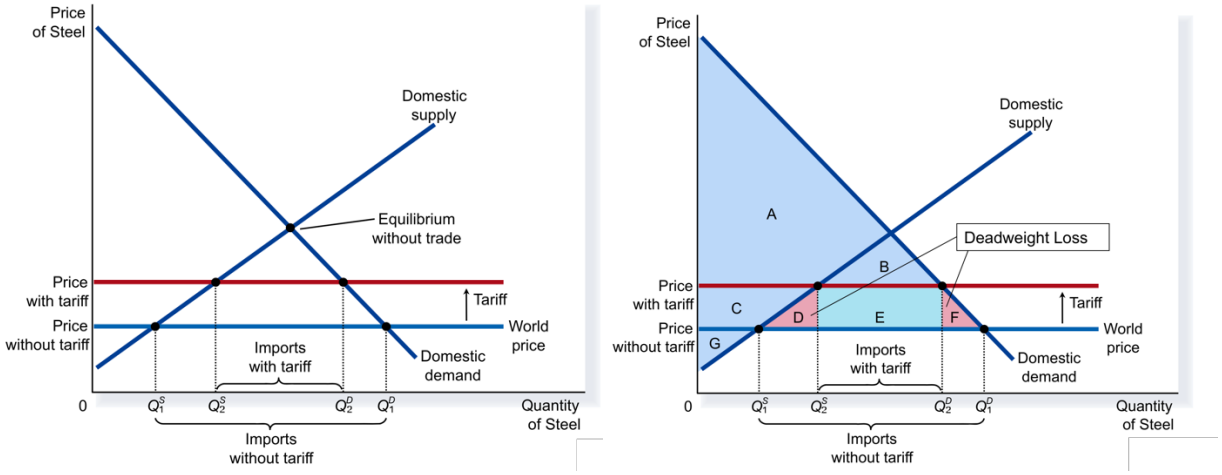
Other benefits of International Trade are:

- Increased variety of goods.
- Lower costs through economies of scale.
- Increased competition.
- Enhanced flow of ideas.

7.2.2 Restrictions on Trade

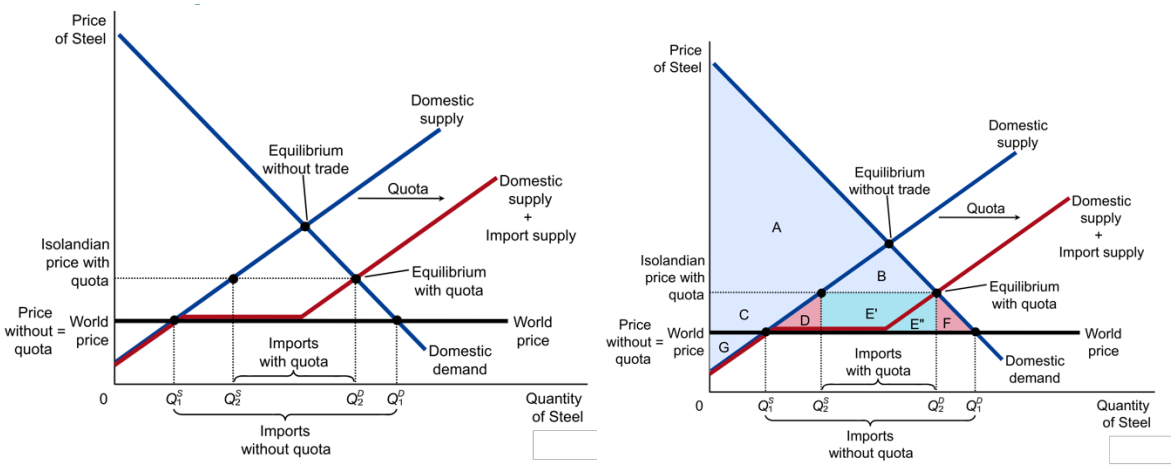
Restrictions on trade come in the form of:

- **Tariffs**: A tariff is a tax on goods produced abroad and sold domestically. They raise the price of imported goods above the world price by the amount of the tariff.



As we can see, total surplus decreases because of deadweight loss. Producer surplus increases by C, whereas consumer surplus is decreased. E is tariff revenue (i.e. government revenue).

- **Quotas**: An import quota is a limit on the quantity of a good that can be produced abroad and sold domestically.



Once again, total surplus is decreased because of deadweight loss, producer surplus is increased and consumer surplus is decreased. E' + E'' is license holder surplus and therefore goes to the license holder (that can buy at world price and sell at the higher domestic price). The quota can potentially cause an even larger deadweight loss, if mechanisms like lobbying are employed to allocate the import licenses.

- **Non-tariff barriers**

8 Open-Economy Macroeconomics

A closed economy is one that does not interact with other economies in the world whereas an open economy interacts freely with other economies in the world. It does so in two ways:

- It buys and sells goods and services in world product markets.
- It buys and sells capital assets in world financial markets.

8.1 Net Exports and Net Capital Outflow

Exports are goods and services that are produced domestically and sold abroad, Imports are goods and serviced that are produced abroad and sold domestically.

Net exports (NX) are the value of a nation's exports minus the value of its imports and are also called the trade balance. A trade deficit is a situation in which net exports are negative, therefore Imports > Exports. A trade surplus is a situation in which net exports are positive, therefore Exports > Imports. Balanced trade refers to when net exports are zero.

There are many factors that affect net exports:

- The tastes of consumers for domestic and foreign goods.
- The prices of goods at home and abroad.
- The exchange rates at which people can use domestic currency to buy foreign currencies.
- The incomes of consumers at home and abroad.
- The costs of transporting goods from country to country.
- The policies of the government toward international trade.

Net capital outflow (NCO) refers to the purchase of foreign assets by domestic residents minus the purchase of domestic assets by foreigners. The following variables influence net capital outflow:

- The real interest rates being paid on foreign assets.
- The real interest rates being paid on domestic assets.
- The exchange rate at which people can use domestic currency to buy foreign currencies.
- The perceived economic and political risks of holding assets abroad.
- The government policies that affect foreign ownership of domestic assets.

For an economy as a whole, NX and NCO must balance. Because each exchange that affects the net capital outflow, also affects net exports in the same amount. For instance, if an economy is running a trade deficit, it must be financing the net purchase of goods and services by selling assets abroad. If it's running a trade surplus, the excess in foreign currency it receives is being used to buy assets from abroad.:

$$NCO = NX$$

Furthermore, we have:

$$S - I = NCO = NX$$

Therefore:

This table shows the three possible outcomes for an open economy.

Trade Deficit	Balanced Trade	Trade Surplus
Exports < Imports	Exports = Imports	Exports > Imports
Net Exports < 0	Net Exports = 0	Net Exports > 0
$Y < C + I + G$	$Y = C + I + G$	$Y > C + I + G$
Saving < Investment	Saving = Investment	Saving > Investment
Net Capital Outflow < 0	Net Capital Outflow = 0	Net Capital Outflow > 0

8.2 The Prices for International Transactions

International transactions are influenced by international prices. The two most important international prices are the nominal exchange rate and the real exchange rate.

The nominal exchange rate is the rate at which a person can trade the currency of one country for the currency of another. Appreciation refers to an increase in the value of a currency as measured by the amount of foreign currency it can buy. Depreciation refers to a decrease in the value of a currency as measured by the amount of foreign currency it can buy.

The real exchange rate is the rate at which a person can trade the goods and services of one country for the goods and services of another. It is calculated as follows:

$$\text{Real exchange rate} = \frac{\text{Nominal exchange rate } \left(\frac{fc}{lc}\right) * \text{Domestic price}}{\text{Foreign price}}$$

The Big Mac Index is a tool to measure how much under- / overvalued a country against the US dollar is.

A depreciation in the Swiss real exchange rate means that Swiss goods have become cheaper relative to foreign goods which encourages consumers both at home and abroad to buy more Swiss goods and fewer goods from other countries. As a result, Swiss exports rise and Swiss imports fall, causing a raise in Swiss net exports. An appreciation in the Swiss real exchange causes Swiss net exports to fall.

8.2.1 Purchasing-Power Parity

Purchasing-power parity states that a unit of any given currency should be able to buy the same quantity of goods in all countries. The theory is based on the law of one price which states that a good must sell for the same price in all locations, otherwise there would be unexploited profit opportunities (“arbitrage”). But limitiations of PPP are that many goods are not easily traded or shipped from one country to another and tradable goods are not always perfect substitutes when they are produced in different countries.

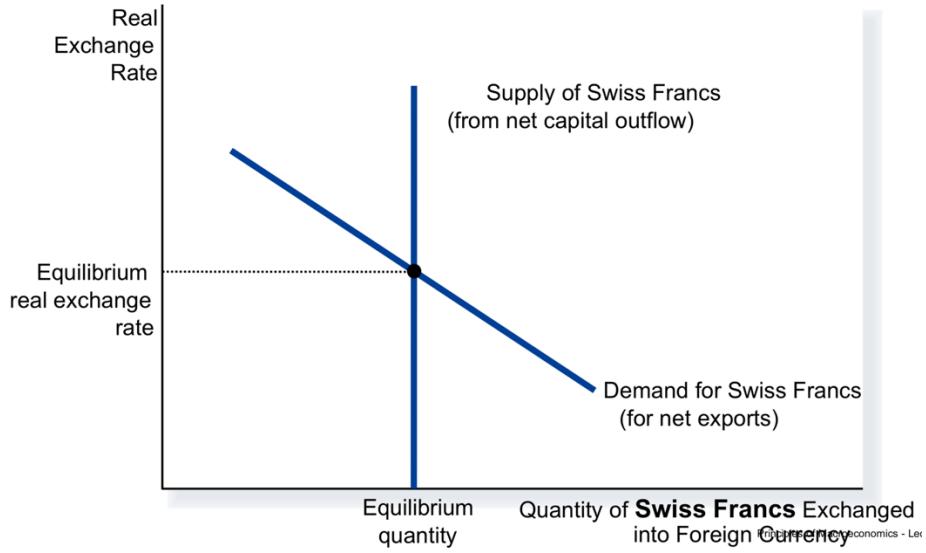
9 A Macroeconomics Theory of the Open Economy

The basic assumptions of a macroeconomic model of an open economy are that the economy’s GDP and price level is given.

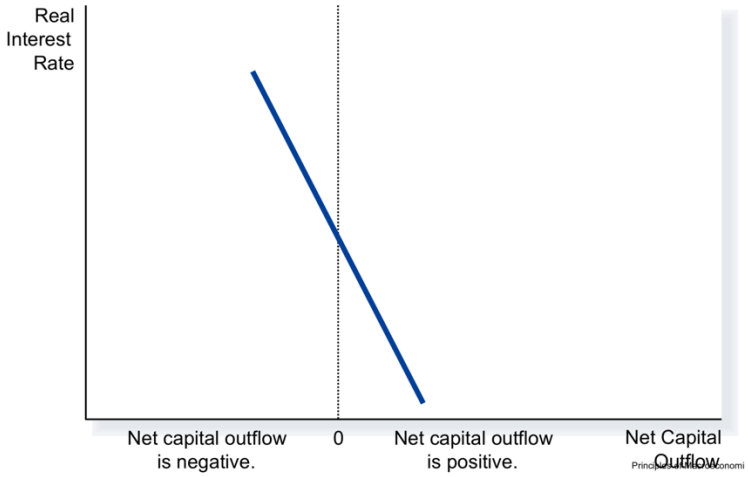
9.1 Supply and Demand for Loanable Funds & Foreign-Currency Exchange

The market for loanable funds coordinates savings, investment and net capital outflow. We have $S = I + NCO$. The supply of loanable funds comes from national saving (S) where a higher real interest rate encourages people to save. The demand for loanable funds comes from domestic investment (I) and net capital outflow (NCO) where a higher real interest rate discourages firms to invest in new buildings, machines and equipment and discourages people tu buy assets abroad

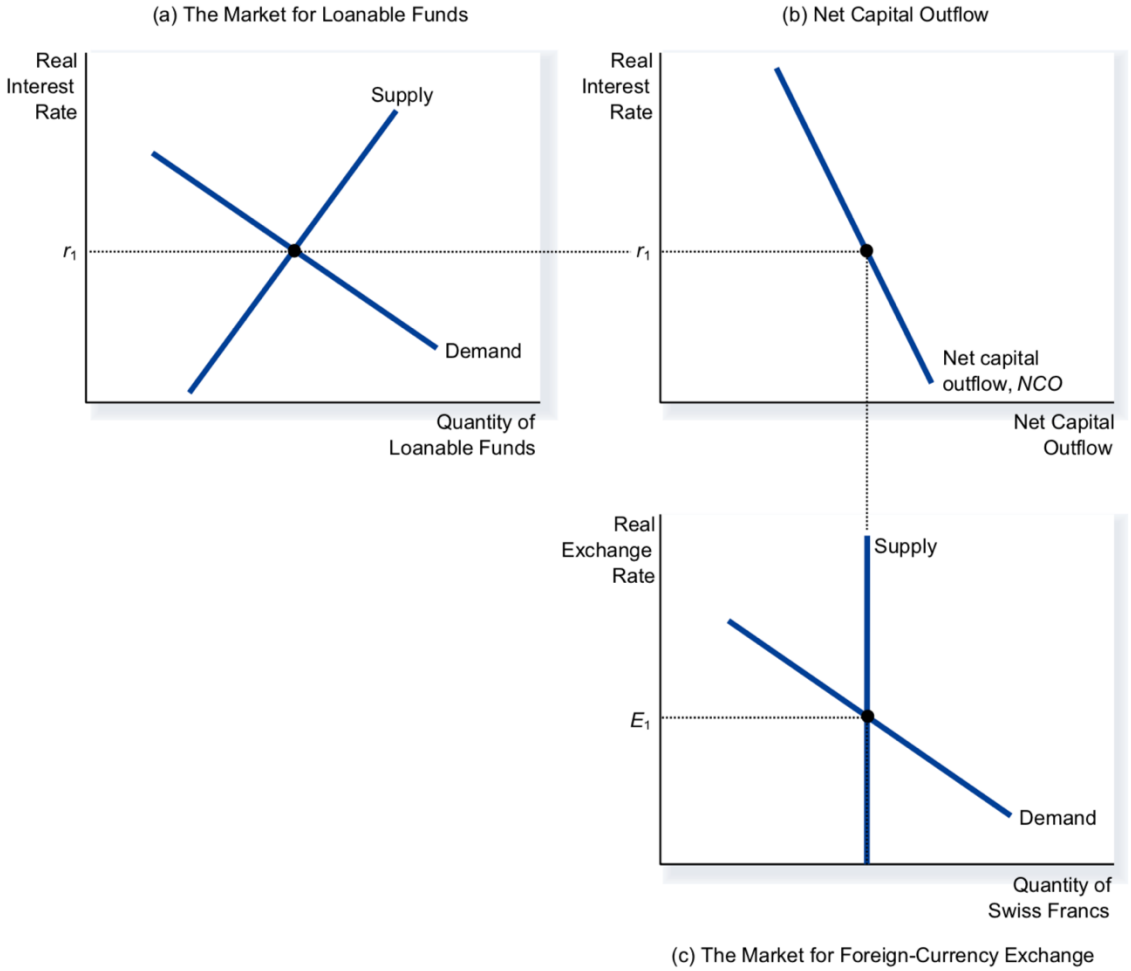
The market for foreign currency coordinates people who wish to exchange domestic to foreign currency. If the real exchange rate of the Swiss Franc is low, Switzerland's exports are strong, leading to a high demand for its currency. Therefore, the demand curve for domestic currency is downward sloping because a lower exchange rate makes domestic goods less expensive and foreign goods more expensive:



Net capital outflow links the two markets because in the market for loanable funds, supply comes from national saving and demand comes from domestic investment and NCO whereas in the market for foreign currency exchange, supply comes from NCO and demand comes from net exports. The key determinant of net capital outflow is the real interest rate:



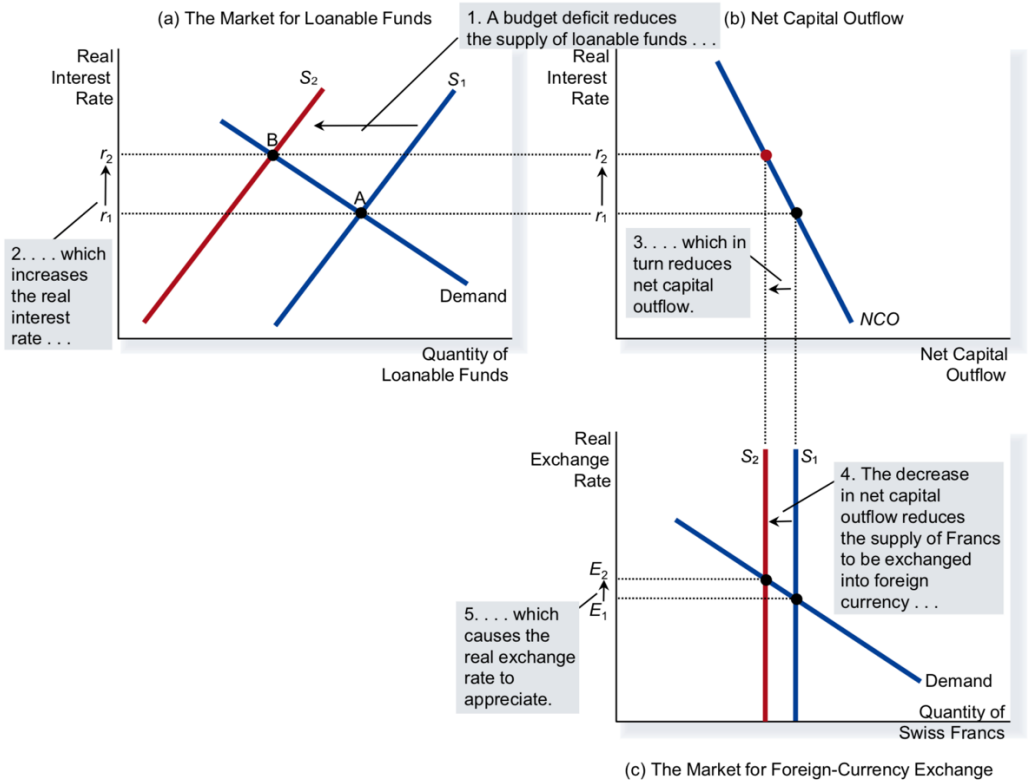
All linked together, we get the following relationship:



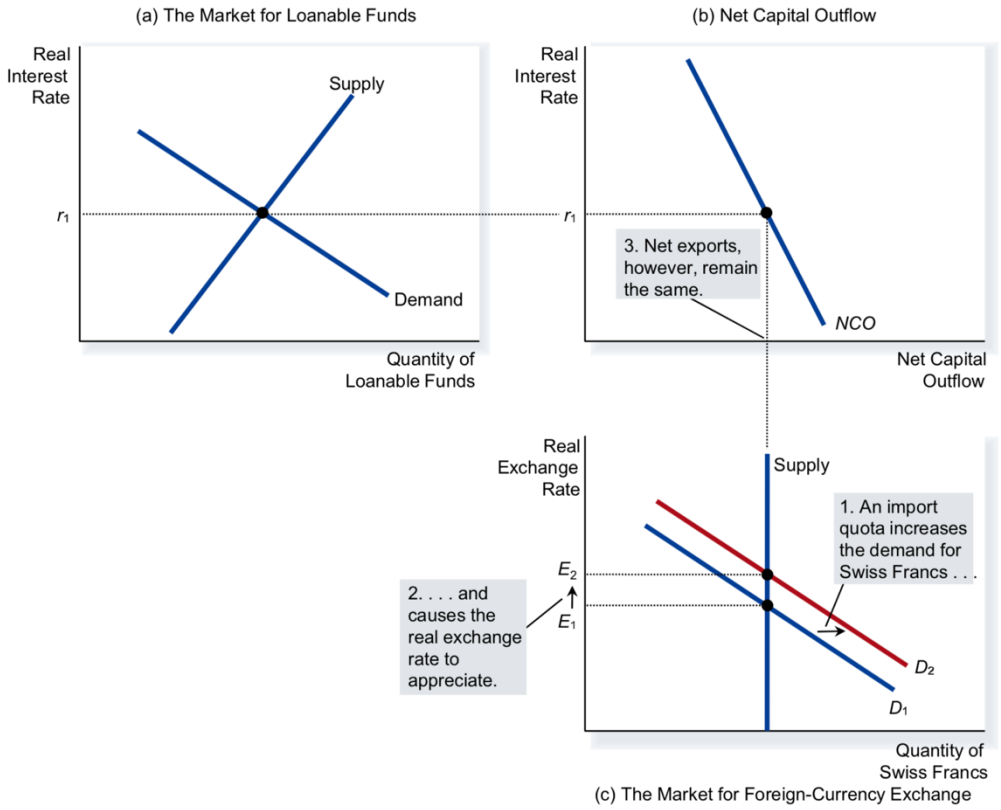
9.1.1 How Policies and Events Affect an Open Economy

The magnitude and variation in important macroeconomic variables depend on:

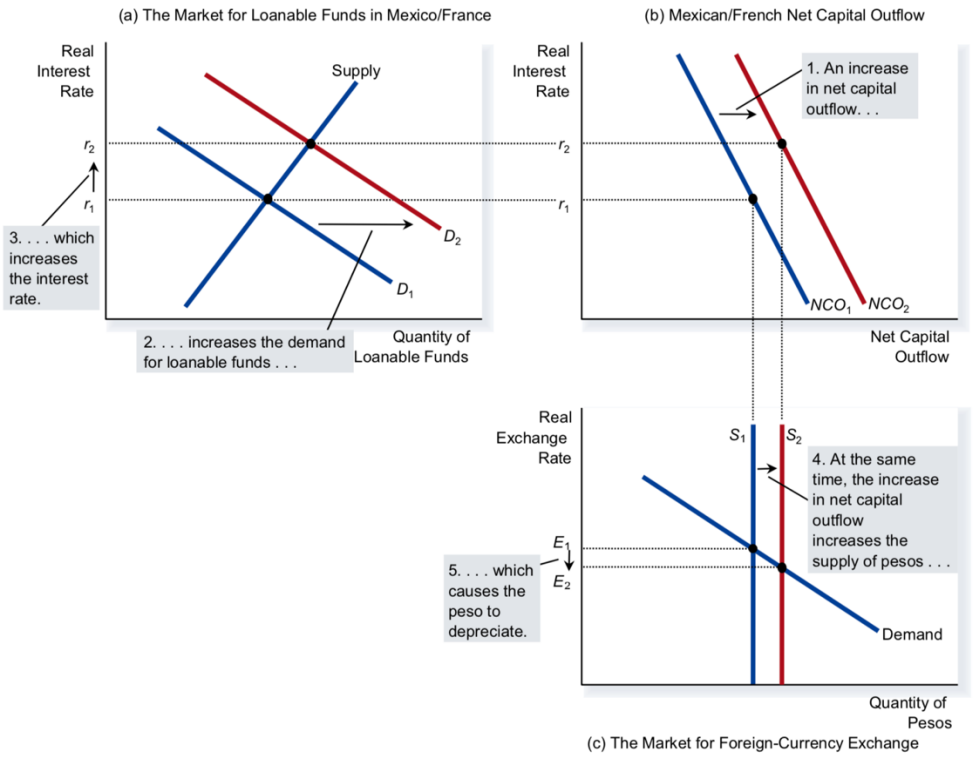
- **Government budget deficits**: A government budget deficit reduces the supply of loanable funds, drives up the interest rate, crowds out domestic investment and causes net foreign investment (NCO) to fall, resulting in an appreciation of the real exchange rate:



- **Trade policies**: Trade policies are tariffs and import quotas. They do not change national saving and domestic investment, the real exchange rate adjusts to keep the trade balance the same. Since an import quota reduces imports at any real exchange rate, net exports rise. Therefore, foreigners will need to buy more francs to buy Swiss net exports, which will shift the demand for francs to the right. This will appreciate the real exchange rate, but will have no effect on the market for loanable funds, and therefore the real interest rate will remain the same. Since the real interest rate does not change, neither do net capital outflows. However, the appreciation of the franc will increase imports and decrease exports (domestic goods are more expensive relative to foreign goods). This will gradually return the demand for francs to its initial state. Therefore, we can conclude that trade policies do not affect the trade balance.



- **Political and economic stability**: Capital flight is a large and sudden reduction in the demand for assets located in a country. First, it will increase the demand for loanable funds (in order to increase the purchase of assets overseas), shifting the demand curve to the right, increasing the real interest rate. Secondly, since people wants to convert their euros / pesos into a more “secure” currency, supply of euros / pesos rapidly increases, shifting the supply curve to the right, resulting in a depreciation of the currency.



10 Business Cycles

Economic fluctuations are irregular and difficult to predict. These fluctuations are often called the business cycle. Most macroeconomic variables fluctuate together, but by different amounts. As output (real GDP) falls, unemployment rises. Because there is a time-lag between any downturn in economic activity and a rise in unemployment and vice versa, unemployment is a lagged indicator.

Okun's law states that in order to keep the unemployment rate steady, real GDP needs to grow at or close to its potential.

Recession is a period of declining real incomes and rising unemployment. The technical definition is that recession occurs after two successive quarters of negative growth. Depression is a severe recession. Business cycle is the study of the fluctuations in economic growth around the trend growth.

A trend is the underlying long-term movement in a data series. Stationary data (e.g. unemployment) is time series data that has a constant mean value over time whereas nonstationary data (e.g. GDP) is time series data where the mean value can either rise or fall over time. Deterministic trends are constant whereas stochastic trend variables change by some random amount in each time period.

Comovement refers to the movement of pairs of variables. Procyclical variables are above trend when GDP is above trend, e.g. real wages. Countercyclical variables are below trend when GDP is above trend, e.g. unemployment.

Leading indicators can be used to foretell future changes in economic activity, whereas lagging indicators occur after changes in economic activity have occurred. Coincident indicators occur at the same time as changes in economic activity.

10.1 Causes of Changes in the Business Cycle

1. **Household spending decisions**: Households decide on how much labour to supply and the rate of growth of wages in relation to prices affects consumers' purchasing power. Households will also make decisions based on changes in interest rates, house prices and taxation.
2. **Firms' decision making**: When firms face strong demand, they are likely to increase output, take on more workers and buy more raw materials and semi-finished goods. If the real wage rate falls then firms can afford to hire more workers and if productivity levels rise, then firms can afford to hire more workers.
3. **External sources**: Movements in exchange rates, economic activity abroad and unpredictable events such as war and natural hazards can have an impact on the domestic economy.
4. **Government policy**: Changes in taxation and government spending affect the economy.
5. **Confidence and expectations**: Expectations and confidence on the future shape decisions by firms and households and can play a significant part in swings in economic activity.

10.2 Business cycle models

The classical model assumes that markets clear whereas the Keynesian model does not. Supply side means that production factors determine supply on goods and service markets.

10.2.1 Supply-side – The New Classical Model

The model assumes that labour markets clear but workers have imperfect information and it is based around the concept of anticipated and unanticipated price changes. If price rises are anticipated, workers will recognize that real wages will fall and will supply less labour, the demand for labour will be greater than the supply of labour so the nominal wage will rise and the real wage at the new equilibrium will be constant.

If workers don't anticipate the change in prices, real wages fall, firms demand more labour but workers continue to offer the same amount of labour. The demand for labour will be in excess of supply and nominal wages will rise but less than prices and as a result, output will rise but the real wage will fall.

10.2.2 Supply-side – The Keynesian Model

Keynes believed markets do not clear quickly due to sticky prices and sticky wages (nominal wages are often slow to adjust in the economy due to long-term employment contracts). Because not all prices adjust instantly to changing conditions, an unexpected fall in the price level leaves some firms with higher-than-desired prices, which depresses sales and cause firms to lower the quantity of goods and services supplied.

10.2.3 Demand-side – The New Classical Model

Aggregate demand is composed of consumption spending, investment spending, government spending and net exports. Changes to any or all of the components of aggregate demand could cause a deviation of output from trend. A rise in aggregate demand leads to a rise in the price level, so real wages fall and firms hire more workers resulting in nominal wage rising, resulting in output and price levels increase and lower unemployment.

The new Classical interpretation rests on an inflation fallacy (asymmetric information). Workers misinterpret a rise in nominal wages as a rise in real wages, causing the economy to move to a temporary equilibrium with incorrect expectations. Over time, workers realize that real wages have changed and negotiate for wage rises, causing firms' costs to rise and some firms' to cut back supply. The economy then returns to trend output but with a higher price level once expectations have fully adjusted.

This implies that unemployment is countercyclical, inflation is procyclical and real wages are countercyclical.

10.2.4 Demand-side – The Keynesian Model

If there is an increase in aggregate demand, wages and prices will take time to adjust. Stocks decline and firms take steps to increase output and in doing so increase employment. This causes in the short run output to increase above trend but the price level does not change because of sticky prices. Over time the economy returns to trend because firms will be able to raise prices and nominal wages will also increase.

This implies that unemployment is countercyclical, inflation is procyclical and real wages are procyclical.

10.2.5 Real Business Cycles

This model assumes that there are no market imperfections, firms and households are profit and utility maximizing and markets clear. In this model both positive and negative technology shocks affect productivity regardless of the real wage rate. A negative technology shock reduces labour productivity and the demand for labour falls. Output also drops and unemployment increases.

This implies that employment, labour productivity and real wages are procyclical.

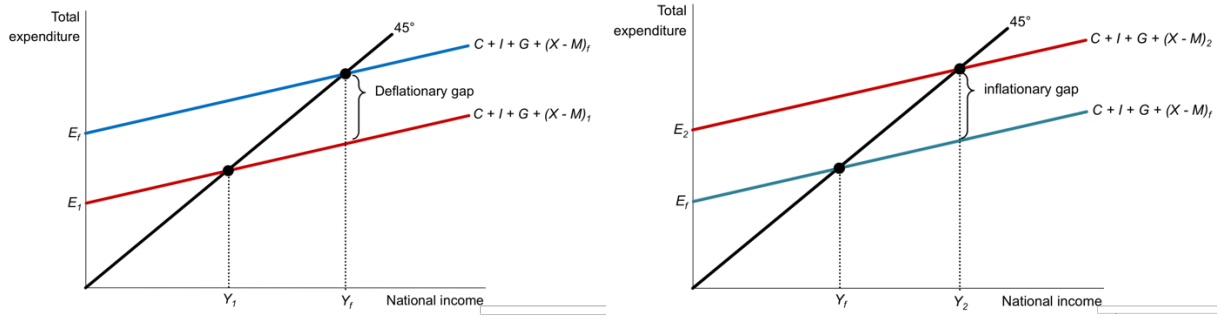
11 Keynesian Economics and IS-LM Analysis

Keynes' primary message was that recessions and depressions can occur because of inadequate aggregate demand.

Keynesian analysis distinct between planned and actual behavior. Planned spending, saving or investment is the intended actions of households and firms whereas actual spending is the realized outcome. Full employment is when those people who want to work at the going rate are able to find a job. If planned and actual outcomes are very different, it is possible for the equilibrium level of national income to be below the full employment level.

In the Keynesian cross diagram, the 45° line connects all points where total spending would be equal to national income, therefore the capacity of the economy. Short-run equilibrium is where the expenditure function ($E = C + I + G + NX$) crosses the 45° line. Autonomous expenditure is spending that is not dependent on income / output.

The deflationary or output gap is the difference between full employment output and expenditure when expenditure is less than full employment output whereas the inflationary gap is the difference between full employment output and actual expenditure when actual expenditure is greater than full employment output.



To eradicate an inflationary or deflationary gap a government can influence the components of aggregate demand through fiscal and monetary policy bringing about an equilibrium that is closer to the full employment level of national income.

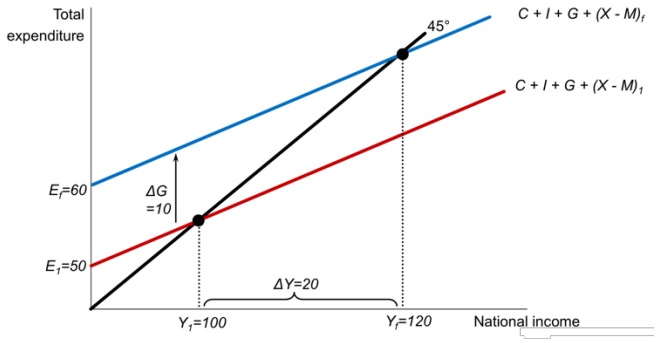
11.1 Multiplier effect

The multiplier effect refers to the additional shifts in aggregate demand that result when expansionary fiscal policy increases income and thereby consumer spending. The slope of the expenditure function is dependent on the multiplier effect. Government purchases are said to have a multiplier effect on aggregate demand.

The accelerator principle relates the rate of aggregate demand to the rate of change in investment. E.g. when a company is producing at its limit, additional aggregate demand may result in a lot of investment because the company wants to have more capacity for the future.

The marginal propensity to consume (MPC) is the fraction of extra income that a household consumes rather than saves. The multiplier is $\frac{1}{1-\text{MPC}} = \frac{1}{\text{MPS}}$, i.e. the higher the MPC is, the higher is the multiplier. In an open economy, with the marginal propensity to taxation (MPT) and the marginal propensity to import (MPM), this becomes $\frac{1}{\text{MPS}+\text{MPT}+\text{MPM}} = \frac{1}{\text{MPW}}$

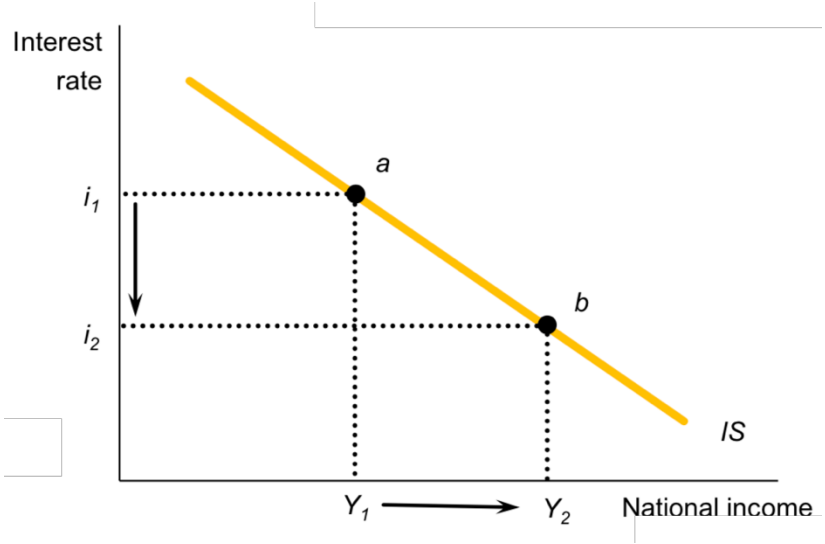
In equilibrium planned expenditure equal actual income. However, if there is a deflationary gap, a government may decide to increase its spending and income will rise by even more because of the multiplier:



11.2 IS-LM Curves

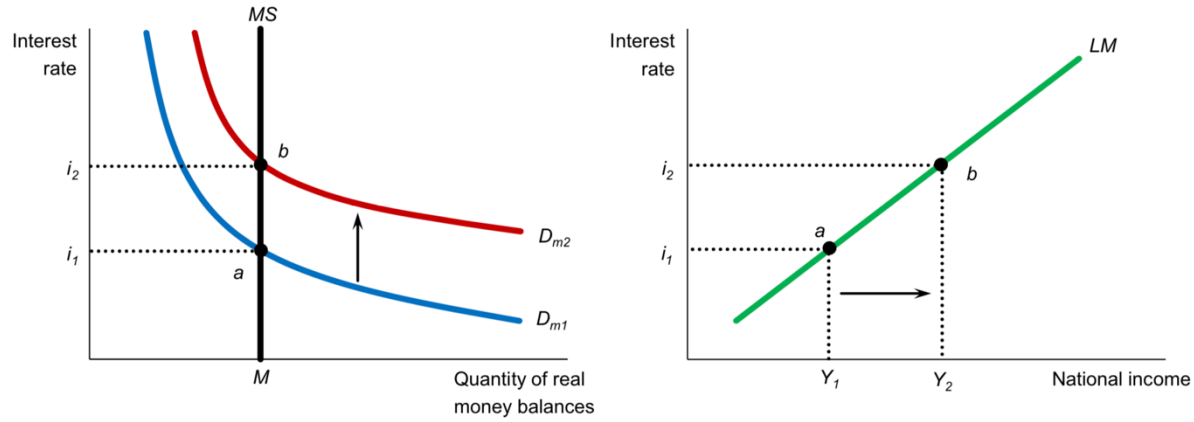
IS-LM describes equilibrium in goods market and the money market and together determines the general equilibrium (where IS = Investment and Saving / LM = Liquidity and Money). The goods and money markets are linked by the rate of interest i.

The IS curve is derived from the Keynesian cross diagram because a fall in the interest rate raises the expenditure line and a new equilibrium occurs. It can also be derived from the loanable funds market perspective:



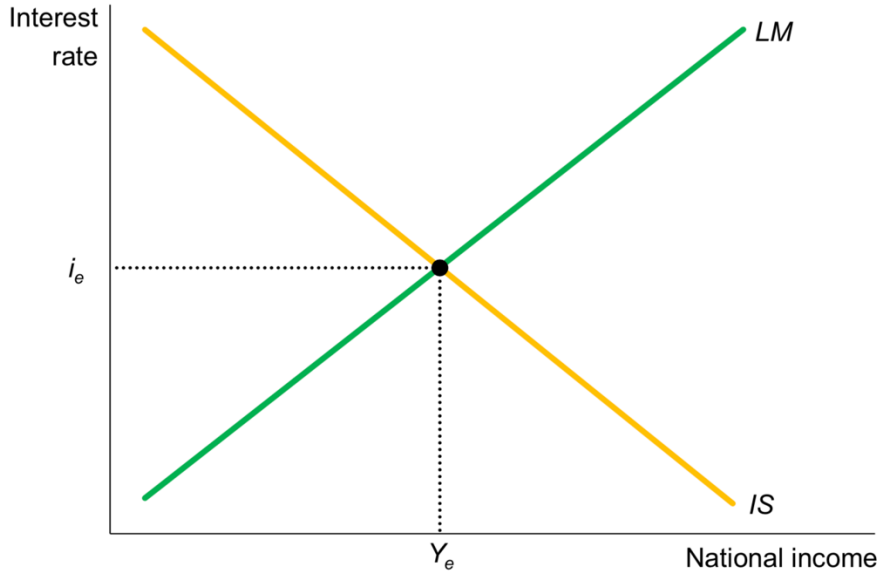
The slope of the IS curve depends on how responsive consumption and investment expenditures are to changes in interest rates and the size of the multiplier. Shifts in the IS curve come about as a result of changes in autonomous expenditure. A rise in government spending would shift the IS curve to the right whereas a fall in exports would lead to a shift of the IS curve to the left.

The LM curve is derived from the money market diagram. A rise in national income increases the demand for money and a new equilibrium occurs:



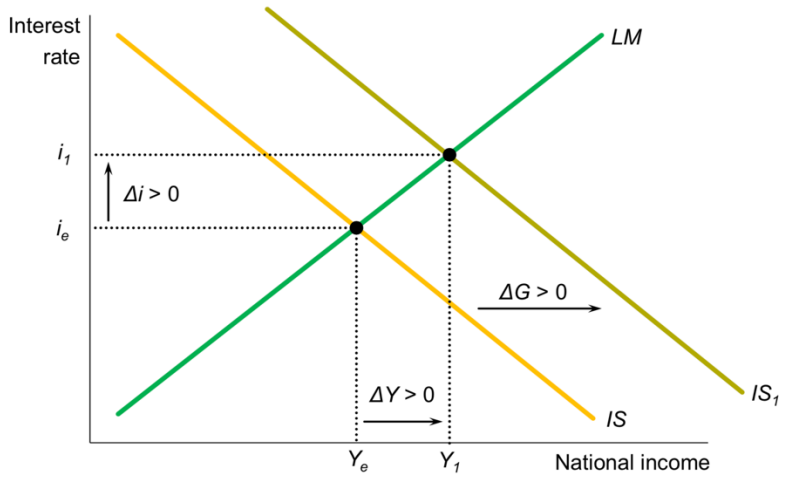
The slope of the LM curve depends on how responsive the demand for money to changes in interest rates is. The LM curve can shift if the central bank expands / contracts the money supply (a rise in money supply will shift the LM curve to the right).

General equilibrium occurs where the IS curve intersects the LM curve:

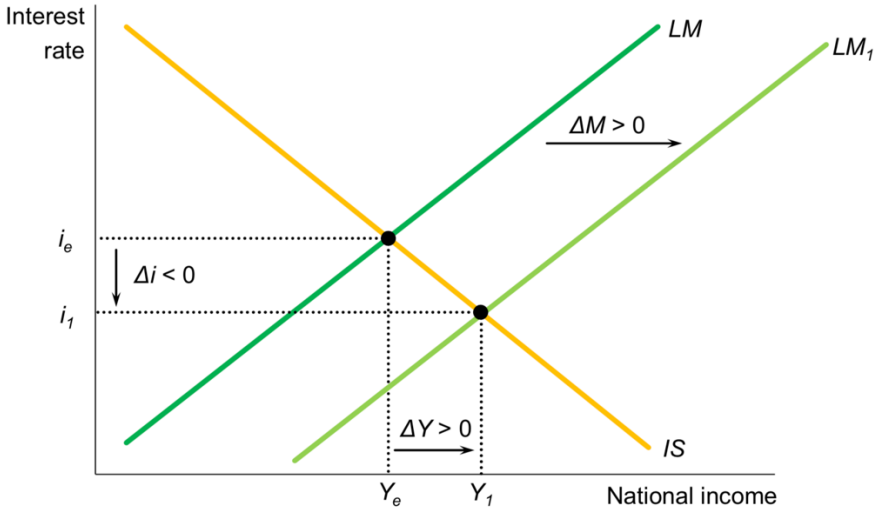


11.2.1 The Effect of Changes

- **Fiscal policy**: If the government increases its spending, the IS curve shifts to the right, resulting in higher national income and a higher interest rate:

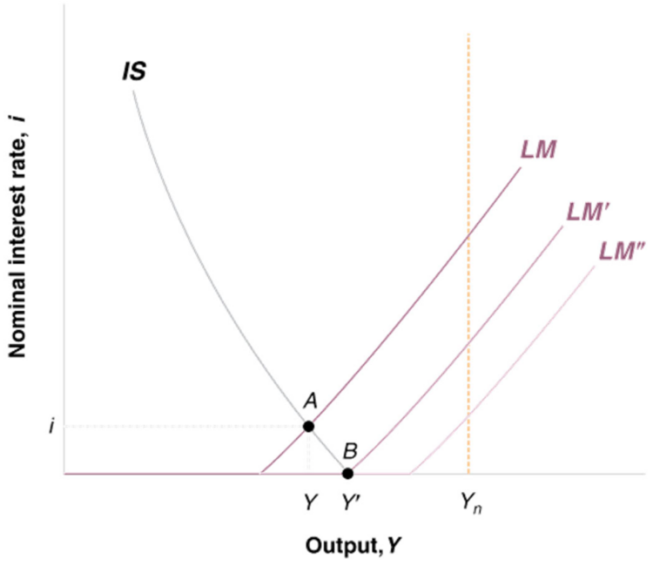


- **Monetary policy**: If the central bank expands the money supply, the LM curve shifts to the right, resulting in an increase in national income and a fall in interest rates:



11.2.2 The Liquidity Trap

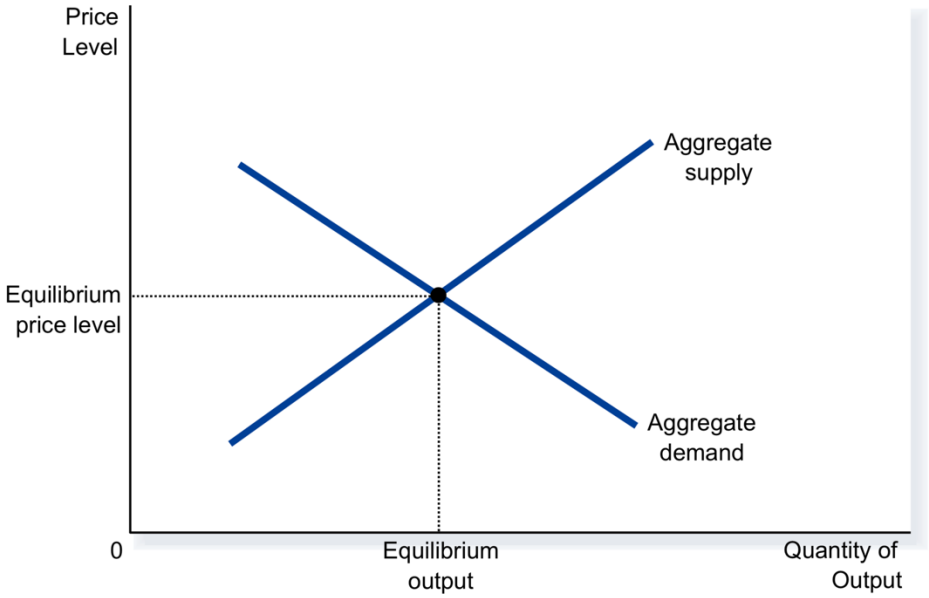
When the nominal interest rate is equal to zero and once people have enough money for transaction purposes, they become indifferent between holding money and holding bonds. The demand for money becomes horizontal and further increases in the money supply have no effect on the nominal interest rate. In the presence of a liquidity trap, monetary policy may not be able to increase output back to its natural level:



12 Monetary and Fiscal Policy

Most economists believe that classical theory describes the world in the long run and that in the long run, changes in the money supply affect nominal variables but not real variables. When studying year-to-year changes, the assumption of monetary neutrality is not appropriate.

Aggregate demand and aggregate supply are used to explain short-run fluctuations in economic activity around its long-run trend. The aggregate demand curve shows the quantity of goods and services that households, firms and the government wants to buy at each price level whereas the aggregate supply curve shows the quantity of goods and services that firms choose to produce and sell at each price level.



12.1 Aggregate demand

The four components of GDP ($Y = C + I + G + NX$) contribute to the aggregate demand for goods and services.

The aggregate demand curve is downward sloping for the following reasons:

- **The Price Level and Consumption**:
  - **The Wealth Effect**: A decrease in the price level makes consumers feel wealthier which encourages them to spend more.
- **The Price Level and Investment**:
  - **The Interest Rate Effect**: With a higher price level, the demand for money increases, which causes the interest rate to go up. This makes borrowing more expensive and discourages spending on investment goods.
- **The Price Level and Net Exports**:
  - **The Exchange-Rate Effect**: A lower price level in Switzerland causes Swiss Interest rates to fall and the real exchange rate to depreciate, which stimulates Swiss net exports and results in a larger demand for goods and services.

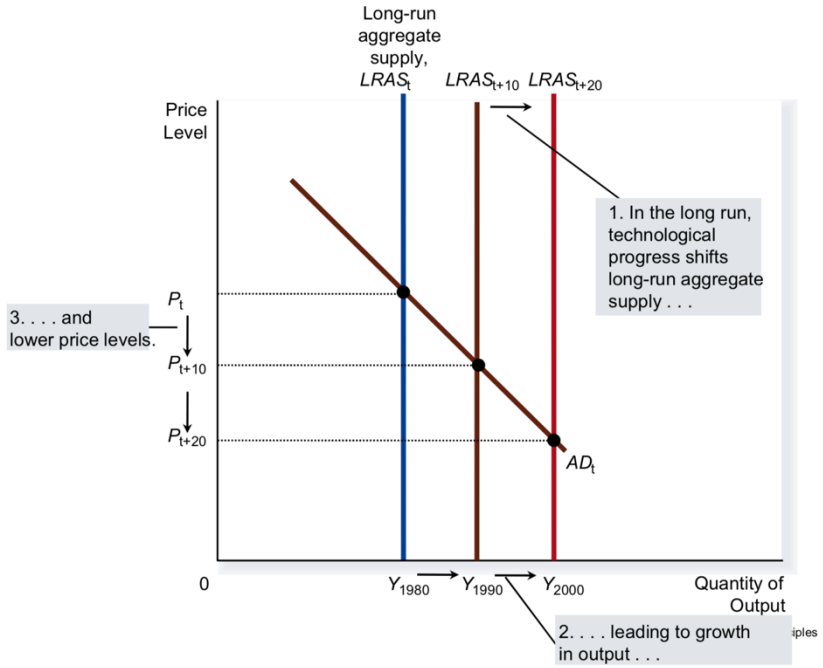
Shifts in the aggregate demand curve might arise from changes in:

- (autonomous) Consumption
- (autonomous) Investment
- Government Purchases
- (autonomous) Net Exports
- Money Supply

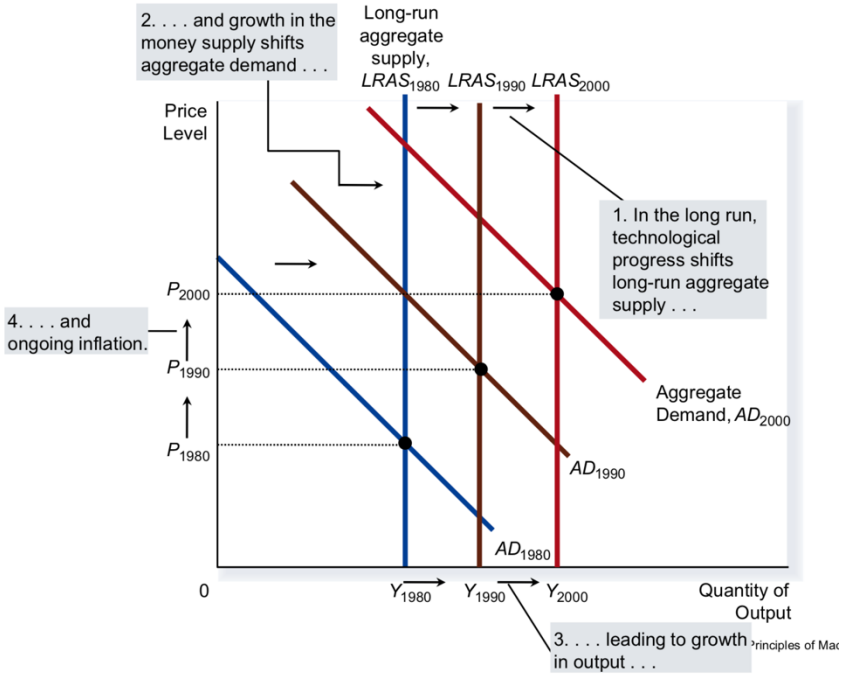
12.2 Aggregate supply

In the long run, the aggregate supply is vertical because the price level does not affect long run determinants of real GDP (an economy's production of goods and services depends on its supplies of labour, capital and natural resources and on the available technology). In the short run, the aggregate supply curve is upward sloping (in the extreme short run as in the IS / LM model, it is even horizontal because P is given / constant).

Any change in the economy that alters the natural rate of output shifts the long run aggregate supply curve (e.g. labour, capital, natural resources, technological knowledge). Therefore, we have in the long run:



But because of growing money supply, the long run looks like this:



There are three theories on why the aggregate supply curve slopes upward in the short run:

- **The Sticky-Wage Theory**: Nominal wages are slow to adjust to changing economic conditions, a lower price level therefore makes employment and production less profitable and induces firms to reduce the quantity of goods and services supplied.
- **The Sticky-Price Theory**: An unexpected fall in the price level leaves some firms with higher-than-desired prices, which depresses sales and induces firms to reduce the quantity of goods and services they produce.

- **The Misperceptions Theory**: Changes in the overall price level temporarily mislead suppliers about what is happening in the markets, a lower price level causes misperception about relative prices which induce suppliers to decrease the quantity of goods and services supplied.

All three theories suggest that output deviates in the short run from the natural rate when the actual price level deviates from the expected price level.

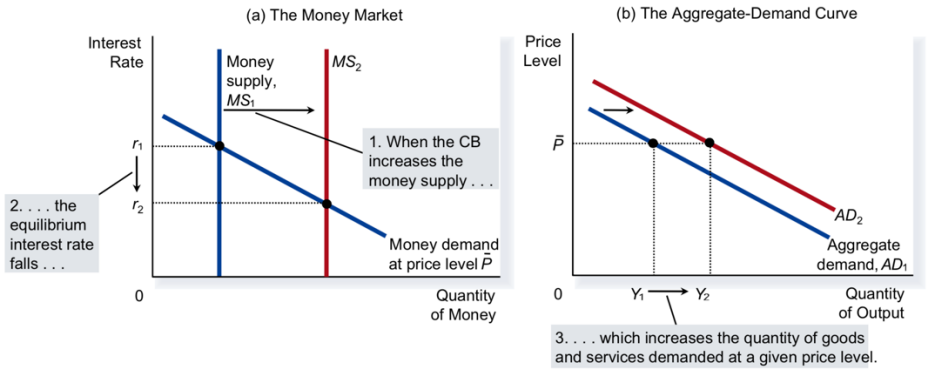
Events that shift the long-run aggregate supply curve will shift the short-run aggregate supply curve as well. The short run aggregate supply curve is also affected by expectations of the price level. An increase in the expected price level reduces the quantity of goods and services supplied (shifts the AS curve to the left) whereas a decrease in the expected price level raises the quantity of goods and services supplied (shifts the AS curve to the right).

12.3 AD/AS model

In the AD / AS model, there are four steps in the process of analyzing economic fluctuations:

1. Determine whether the event affects aggregate supply or aggregate demand.
2. Decide which direction the curve shifts.
3. Use a diagram to compare the initial and the new equilibrium.
4. Keep track of the short and long run equilibrium, and the transition between them.

In the short run, shifts in aggregate demand cause fluctuations in the economy's output whereas in the long run, they affect only the overall price level. Monetary and fiscal policy can be used to offset the shifts in aggregate demand. An increase in the money supply shifts the aggregate demand curve to the right because falling interest rates increase the demand for goods and services.



Fiscal policy can be used to change aggregate demand. There are three effects when there are changes in government purchases:

- **The multiplier effect**: The multiplier effect can amplify the shift in aggregate demand.
- **The crowding-out effect**: An increase in government purchases causes interest rates to rise, resulting in less investment spending. The crowding-out effect refers to this dampening of the effects of fiscal policy on aggregate demand.

- **Ricardian equivalence**: People anticipate future tax changes and change own savings accordingly

12.3.1 Active Stabilization Policy

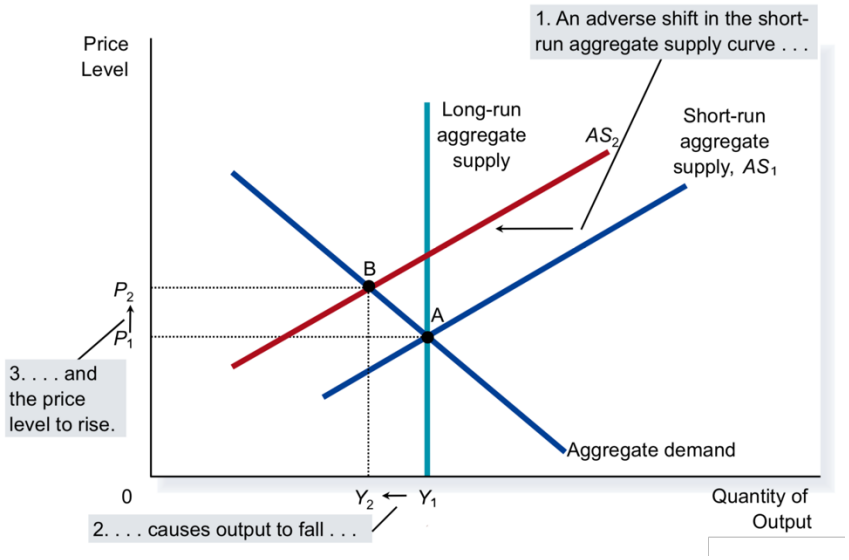
Active stabilization means that the government should avoid being the cause of economic fluctuations and should respond to changes in the private economy in order to stabilize aggregate demand. There are economists that argue that monetary and fiscal policy destabilize the economy because they affect the economy with a substantial lag.

Automatic stabilizers are changes in fiscal policy that stimulate aggregate demand when the economy goes into a recession without deliberate action by policymakers. They include the tax system and some forms of government spending like unemployment benefits.

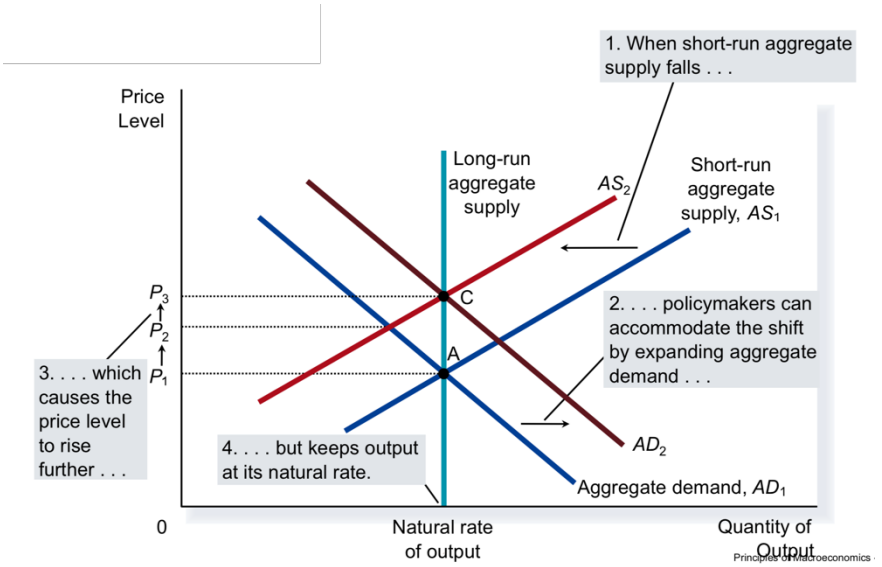
12.3.2 Stagflation

Shifts in aggregate supply can also be the cause of economic fluctuations. When the aggregate supply curve shifts to the left, output falls below the natural rate, unemployment rises and the price level rises.

Stagflation refers to a decrease in output and an increase in prices. Policymakers can't address both problems at the same time.



If they decide to expand aggregate demand, output is kept at its natural rate, but the price level is even higher:

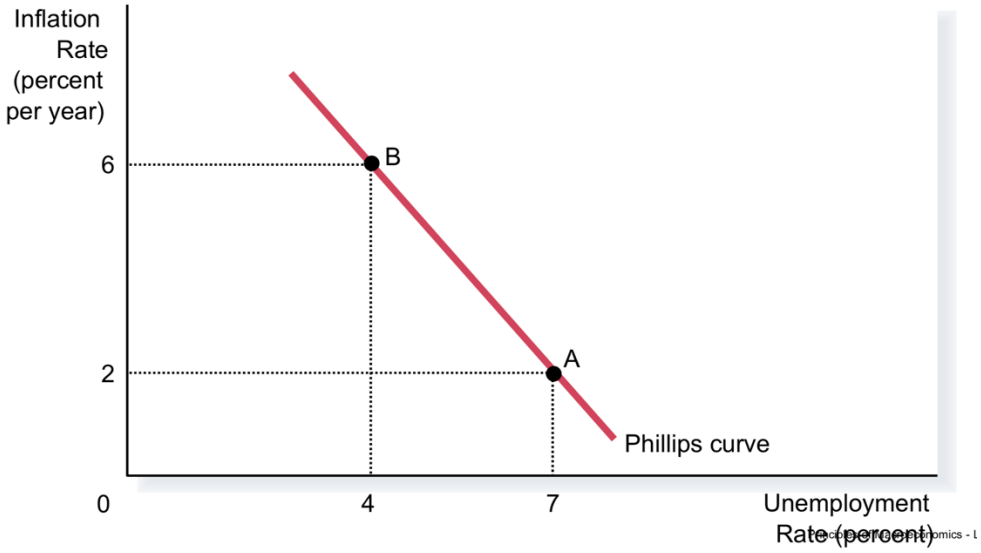


12.3.3 New Keynesian Economics

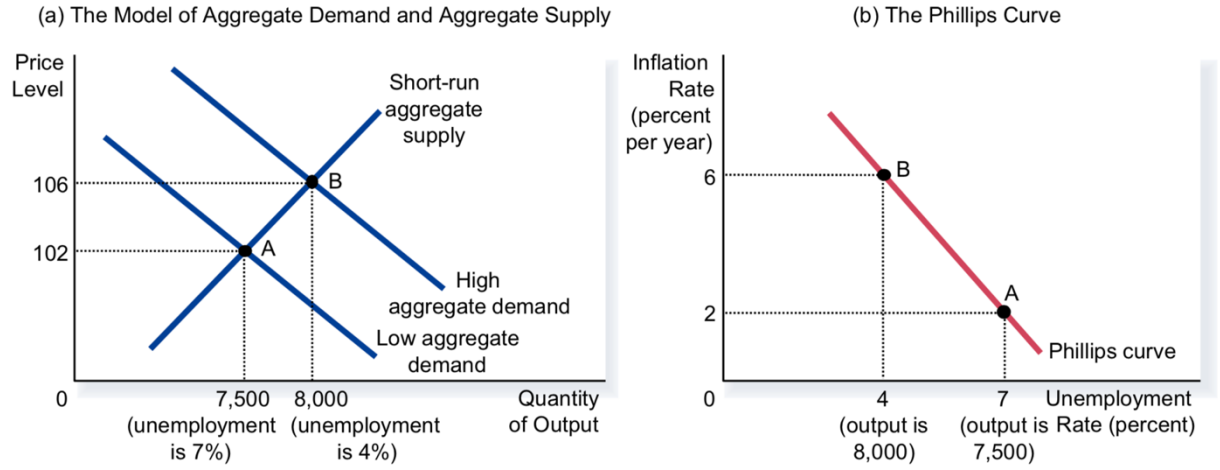
New Keynesian Economics seeks to explain how price and wage stickiness has its foundation in the microeconomic analysis of labour markets and price setting by firms. Changes in nominal variables have an influence on output and employment and imperfections exist in the microeconomy (firms operate under imperfect competition and consumers have imperfect knowledge).

13 Phillips Curve

Society faces a short-run tradeoff between unemployment and inflation. If policymakers expand aggregate demand, they can lower unemployment, but only at the cost of higher inflation. If they contract aggregate demand, they can lower inflation, but only at the cost of temporary higher inflation.



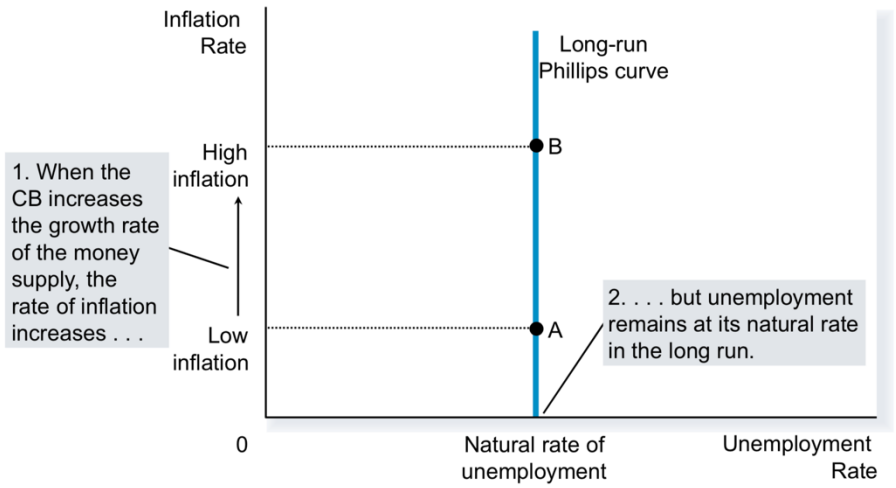
This is explained by the (short run) model of aggregate demand and aggregate supply:



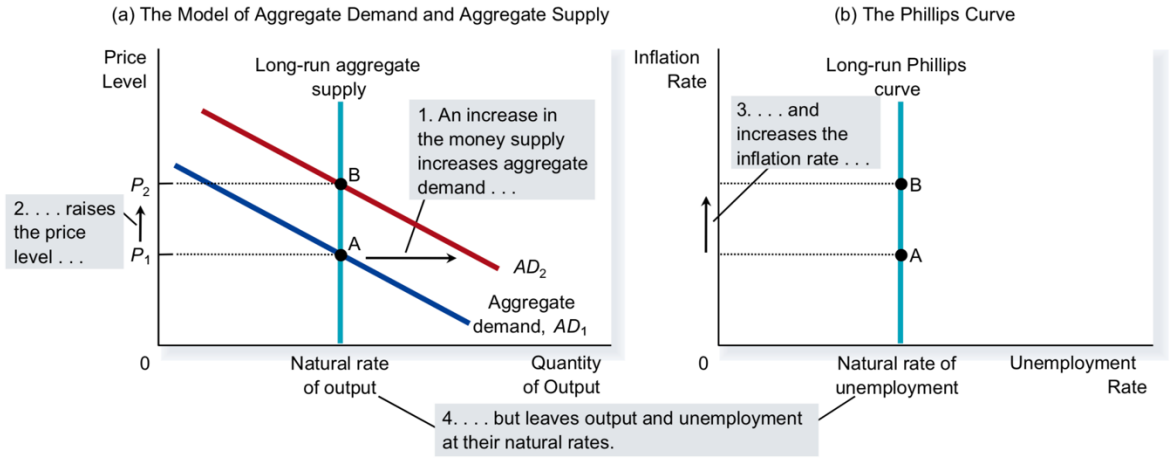
Okun's Law states that a one percent decrease in unemployment is associated with two percentage points of additional growth in real GDP.

The unemployment rate in the short run is $\text{Natural rate of unemployment} - a(\text{Actual inflation} - \text{Expected inflation})$.

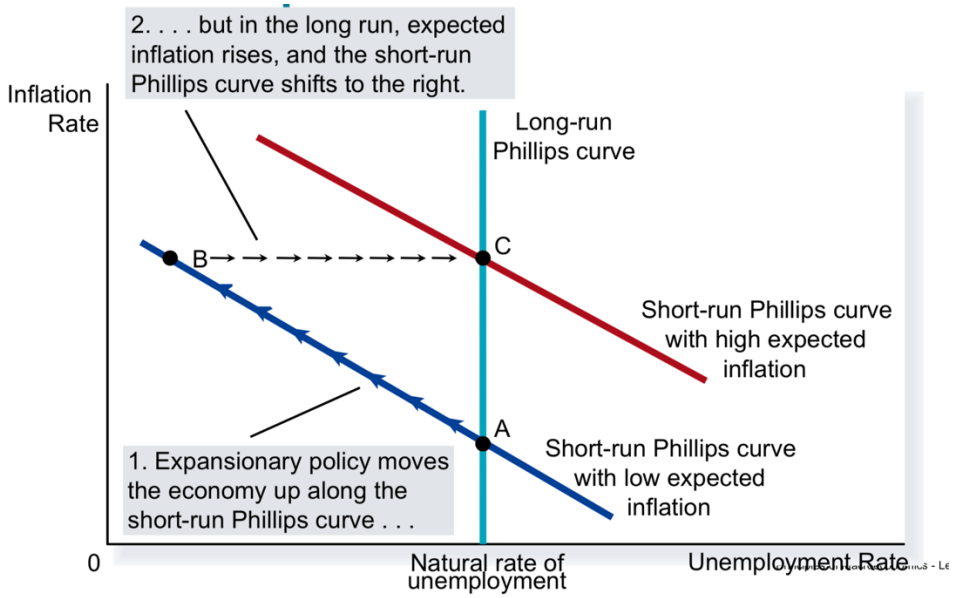
The long-run Phillips curve is vertical i.e. inflation and unemployment are unrelated in the long run:



Which is also explainable by the long-run aggregate supply:

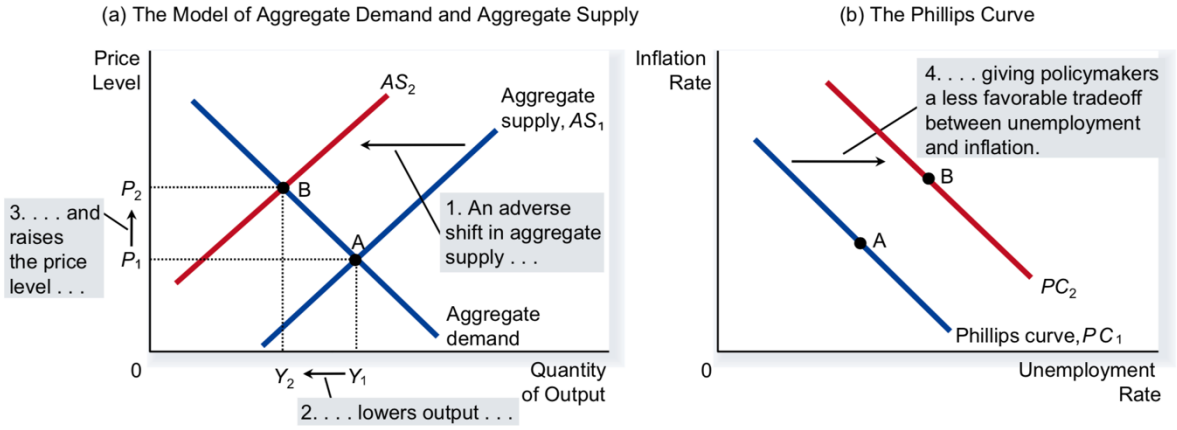


Expected inflation shifts the short run Phillips curve:

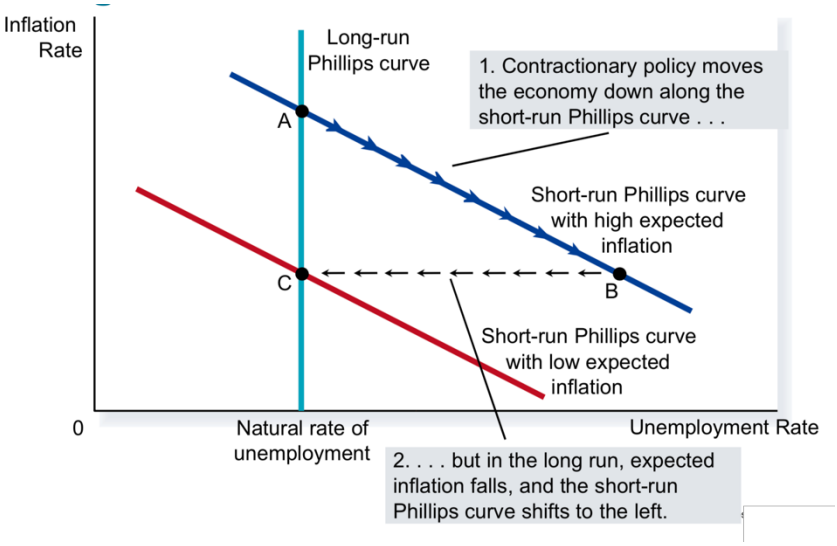


Because point A is desirable, central banks generally target an inflation rate and are interested in keeping expectations at target.

Supply shocks can cause a right ward shift of the Phillips curve:



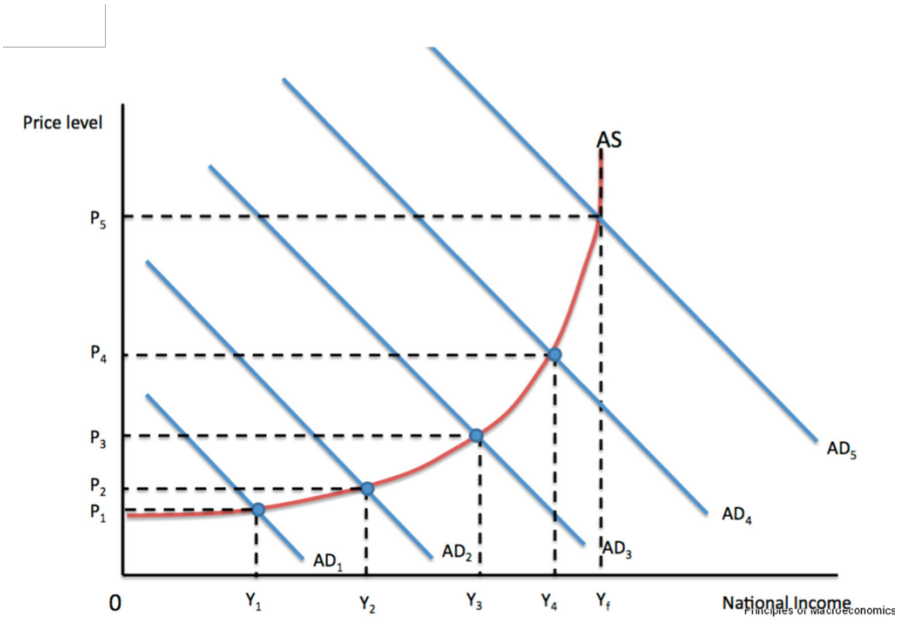
In the short run, disinflationary policy causes higher unemployment, but in the long run, the unemployment is at its natural rate and the inflation rate is lower:



The sacrifice ratio is the number of percentage points of annual output that is lost in the process of reducing inflation by one percentage point, an estimate is 5.

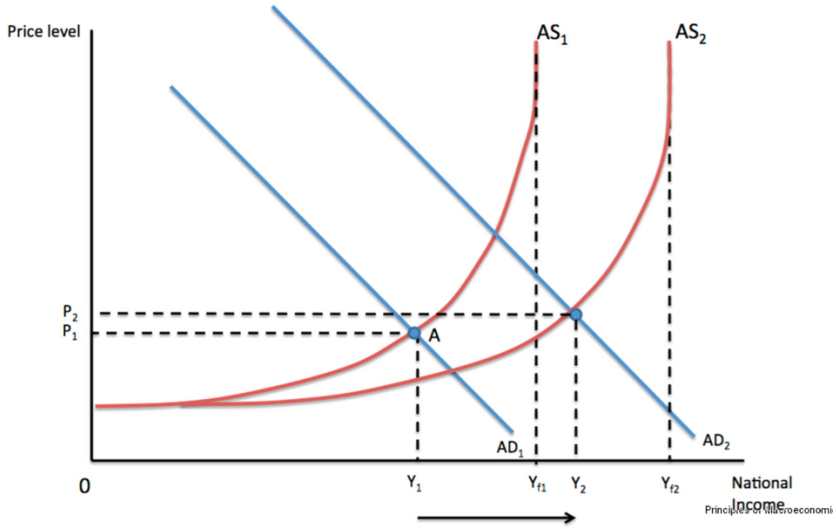
We talk about adaptive expectations when people base their inflation expectations on recently observed inflation. With rational expectations, they base their inflation expectations on all available information, including information about current and prospective future policies. The theory of rational expectations suggests that the sacrifice ratio could be much smaller than estimated.

The new Keynesian short run aggregate supply curve is shaped like a parabola, resulting in different tradeoffs between national income and price level:



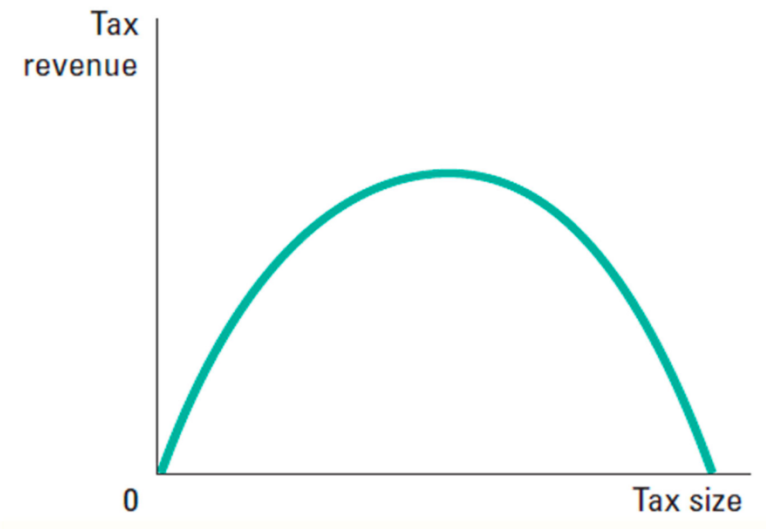
13.1 Sustained Economic Growth

Shifting the aggregate supply to the right can lead to sustained growth.



Supply-side economists look to improve the workings of free markets using one of two groups of policies:

1. **Market-orientated supply-side policies**: Policies designed to free up markets to improve resource allocation through more effective price signals.
    a. **Reform tax and welfare policy**: Taxes are a disincentive to work and distort market outcomes, higher tax rates reduce the opportunity cost of leisure and encourage tax avoidance and evasion. The Laffer curve suggests that lowering taxes may result in higher revenues:



   b. **Flexible labour markets**: Reduce trade union power and encourage local level wage agreements, reduce rigidities in the labour market by increasing the ease of hiring and firing and / or improve market information for employers, workers and the unemployed.
   c. **Reducing government spending**: Because of crowding out effect and because government spending is not as efficient as private sector investment.
   d. **Privatization and deregulation**: Privatization leads to higher productivity and lower costs but the privatization of monopolies with ineffective regulation can reduce consumer surplus. Deregulation should remove some market imperfections.
2. **Interventionist supply-side policies**:
   a. **Infrastructure Investment**
   b. **Investment in Education and Training**
   c. **Research and Development**
   d. **Regional or Industrial Policies**