Micro- & Macro- Economics

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Those notes are largely inspired by the following:

- Principles of Microeconomics - Prof. Filippini - ETH Zürich Fall 2010
- Principles of Macroeconomics - Prof. Sturm - ETH Zürich Fall 2010
- Economics - International edition - N.Gregory Mankiw and Mark P. Taylor

1 Introduction to Economics

1.0.1 Economy

"the one who manages a household", in greek. Economics is the study of how sociey manages its scarce resources.

1.0.2 Scarcity

means that society has limited resources and therefore cannot produce all the goods and service people wish to have.

1.1 Ten principles of Economics

1. People Face Trade-Offs: there is no such things as a free lunch
2. The cost of Something is what you give up to get it: decisions require comparing costs and beefits of alternatives
3. Rational People Think at the Margin: marginal changes are small, incrmental adjustements to an existing plan of action: People make decisions by comparing costs and benefits at the margin.
4. People respond to Incentives
5. Trade can make everyone better off
6. Markets are usually a good way to organize Economic Activity
7. Governments can sometimes improve Market Outcome
8. An Economy's Standard of Living depends on its ability to produce Goods and Services
9. Prices rise when the governments prints too much Money
10. Society faces a short-run Trade-off between Inflation and Unemployment

1.2 Economic Models

1.2.1 The Circular flow diagram

The circular flow model is a visual model that shows ahow dollars and goods flow through markets among households and firms.

1.2.2 The production possibility frontier

This model is a graph that shows the combination of output that the economy can produce given the available factors of production and the available production technology.

1.3 Opportunity Cost

In a two-goods economy: the amount of good A you have to forego in order to get a certain amount of a special good B represents the **opportunity cost** of product B.

1.4 Real vs nominal price

1.4.1 Nominal Price

Absolute pric of a good; unadjusted for inflation

1.4.2 Real Price

Price of a good relative to an aggregate measure of prices; price adjusted for inflation

1.5 Macro- vs Microeconomics

1.5.1 Micro

Focuses on the individual parts of the economy

1.5.2 Macro

looks at the economy as a whole

1.6 Normative and Positive Economics

1.6.1 Normative

deals with ethical questions ? (bullshit)

1.6.2 Positive

describe the facts of an economy and its behavior

2 Supply and Demand: How Markets work

2.1 Market

The market is a collection of buyers and sellers, that through their actual or potential interactions determine the price of a product or set of products.

2.1.1 Competitive Market

market in which there are many buyers and sellers so that each ha s a negligible impact on the price.

Buyers and sellers are **price takers**.

2.1.2 Other market forms

1. Monopoly: one seller that control the price
2. Oligopoly: few sellers
3. Monopolistic Competition: many sellers, slightly differentiated products (e.g. magazines), each seller may set price for its own product

2.2 Supply and Demand

are the force that make the market economy work. They determine the quantity the quantity of each good to be produced and the price at which it is sold. Economists use the model of supply and demand to analyze competitive markets.

2.2.1 Demand

Law of demand states that quantity of good demanded falls when its price rises

$$\frac{dQ_d}{dP} \leq 0$$

2.2.2 Supply

law of supply states that the quantity of goods supplied rises when price rises.

$$\frac{dQ_s}{dP} \geq 0$$

2.2.3 Equilibrium Price

where the supply curve equals the demand curve

$$Q_d(P^*) = Q_s(P^*)$$

where P^* is the optimal price.

2.2.4 Surplus or excess supply

$$P > P^* \Rightarrow Q_s > Q_d$$

Suppliers will lower the price to increase sales, thereby moving toward equilibrium.

2.2.5 Shortage or excess demand

$$P < P^* \Rightarrow Q_d > Q_s$$

Suppliers will raise the price due to too many buyers chasing too few goods.

2.3 Elasticity

is a measure of how much buyers and sellers respond to changes in market conditions

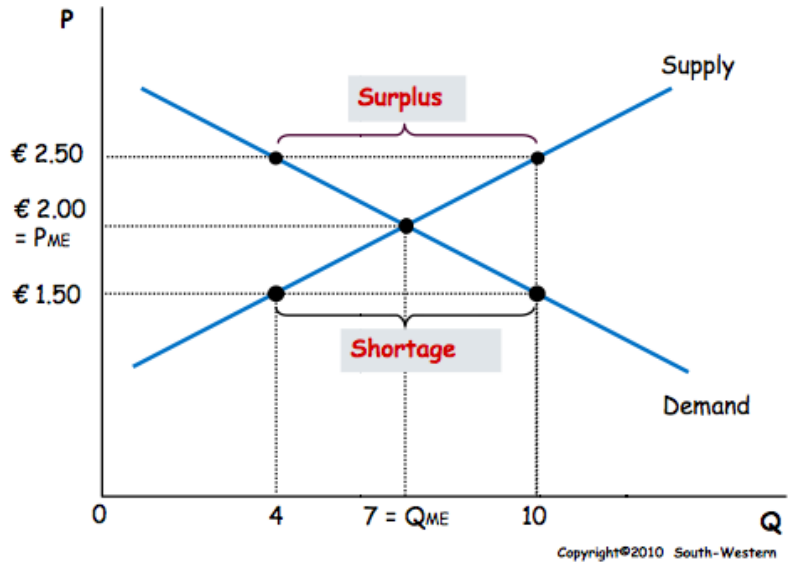


Figure 1: Surplus and shortage

2.3.1 Price elasticity of demand

$$E_d = \frac{\%\text{ change in quantity}}{\%\text{ change in price}} = \frac{dQ_d}{dP}\frac{P}{Q_d}$$

Total revenue: $TR = P \cdot Q$

$$\text{Income elasticity of demand} = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in income}}$$

$$\text{Cross-price elasticity of demand} = \frac{\%\text{ change in quantity demanded of good 1}}{\%\text{ change in the price of good 2}}$$

$$\text{Price elasticity of supply} = \frac{\%\text{ change in quantity supplied}}{\%\text{ change in price}}$$

2.4 Behavioral Economics

- People as well as their decisions aren't always rational!
- People do care about fairness (at least some ...)

3 Supply, Demand and Government Policies

3.1 Estimation of demand curve

Using empirical data and then **regression**

3.2 Controls o prices

- Price ceiling
- Price Floor

Price Ceiling If price is set above equilibrium: **not binding**, otherwise **binding**

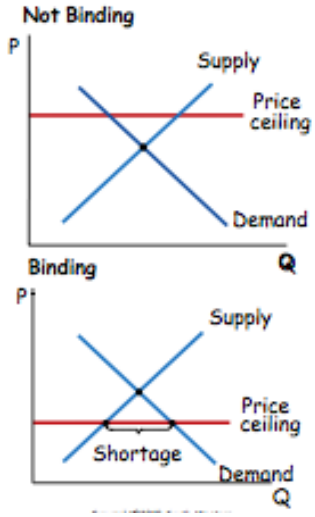


Figure 2: Price ceiling

Price floor If price floor is set above the equilibrium: **binding**, otherwise **not binding**.

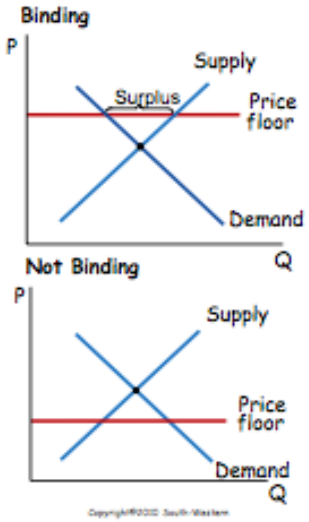


Figure 3: Price floor

3.3 Taxes

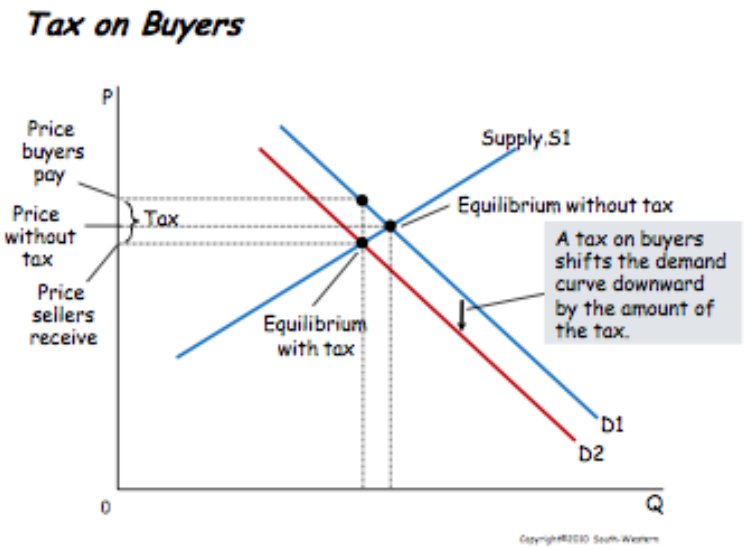


Figure 4: Tax on Buyers

Taxes on Buyers

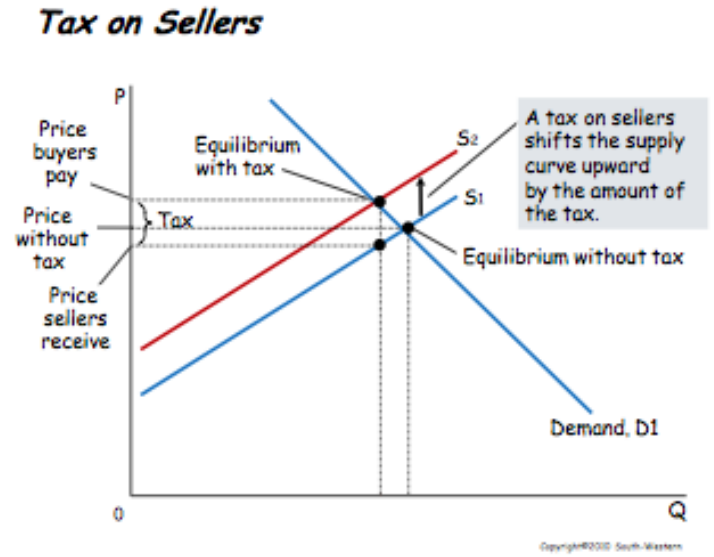


Figure 5: Tax on Sellers

Taxes on sellers

Elasticity and Tax Incidence Depending on the elasticity of the demand and/or supply the burden of the tax is shared inequally.

4 Welfare Economics and Deadweight Loss

4.1 Welfare Economics

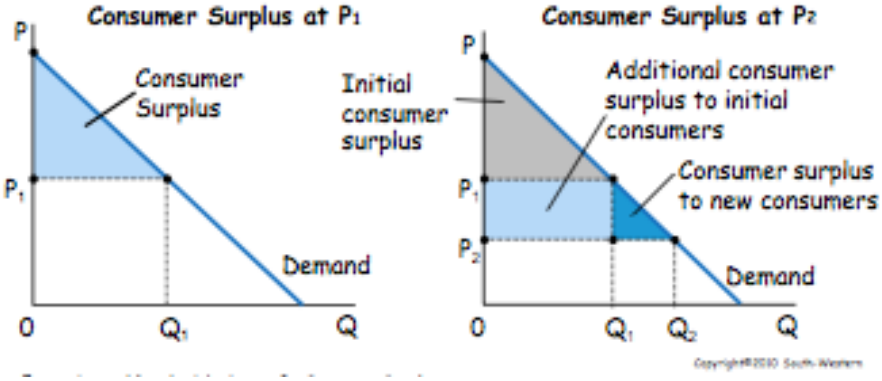
Do the equilibrium price and quantity of the allocated scarce resources maximize the total welfare of buyers and sellers?

Welfare economics is the study of how the allocation of resources affects economic well-being.

4.2 Consumer surplus (CS)

The total area below the demand curve and above the price is the sum of the consumer surplus of all buyers in the market for a good or service.

$$CS = \int_{P^*}^{P_{\max}} Q_D(P)dP \tag{1}$$



surplus.png

Figure 6: Consumer surplus

4.3 Producer Surplus (PS)

Measures economic welfare from the producer's side

$$PS = \int_{P_{\min}}^{P^*} Q_S(P)dP \tag{2}$$

4.4 Total Surplus

$$\begin{aligned} \text{Total surplus} &= \text{Consumer surplus} + \text{Producer surplus} \\ &= \text{Value to buyers} + \text{Cost to sellers} \end{aligned}$$

4.5 Market Efficiency

Benevolent Social Planner (BSP) wants to maximize the economics well-being of everyone in society

1. **Efficiency**: the property of a resource allocation of maximizing the total surplus received by all members of the society

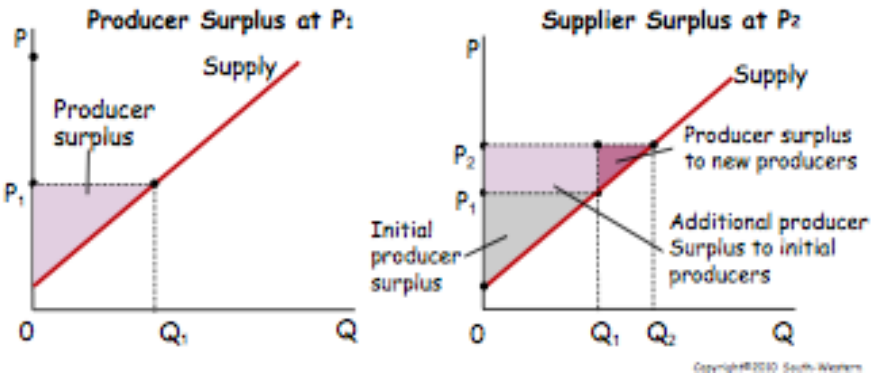


Figure 7: Producer's surplus

2. **Equity**: the fairness of the distribution of well-being among the buyers and sellers.

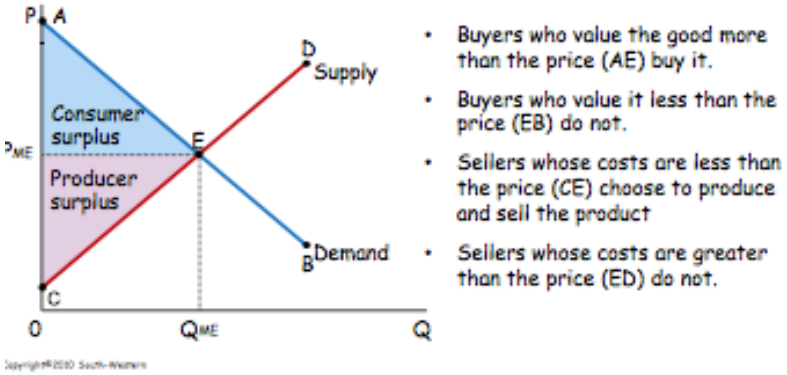


Figure 8: Market Efficiency

1. BSP should not alter market outcome
2. Byers and sellers are guided by an **invisible hand** (Adam Smith)

4.6 Deadweight Loss of Taxation

$$\text{Tax Revenue} = \underbrace{T}_{\text{Size of the tax}} \cdot \overbrace{Q}^{\text{Quantity of goods sold}}$$

Tax Revenues

Deadweight Loss

5 International Trade

5.1 Interdependance and the Gains from trade

Absolute Advantage if less inputs required required to produce same good

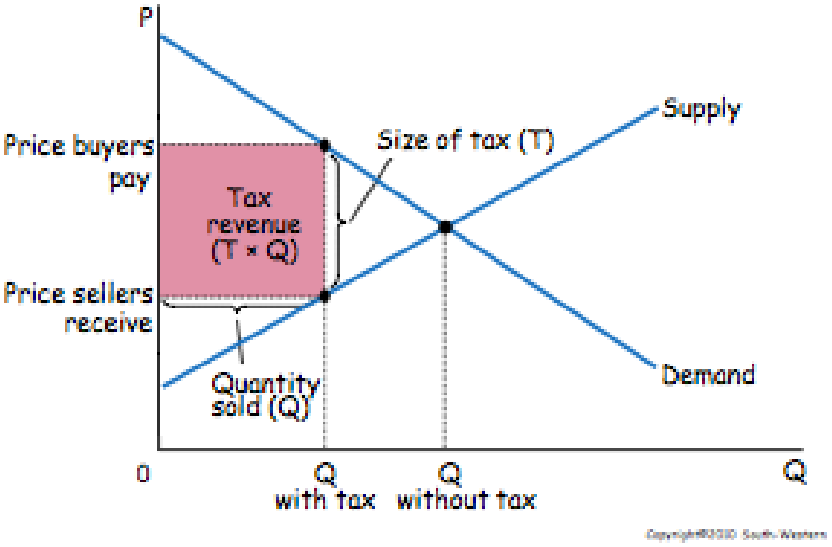


Figure 9: Tax Revenues

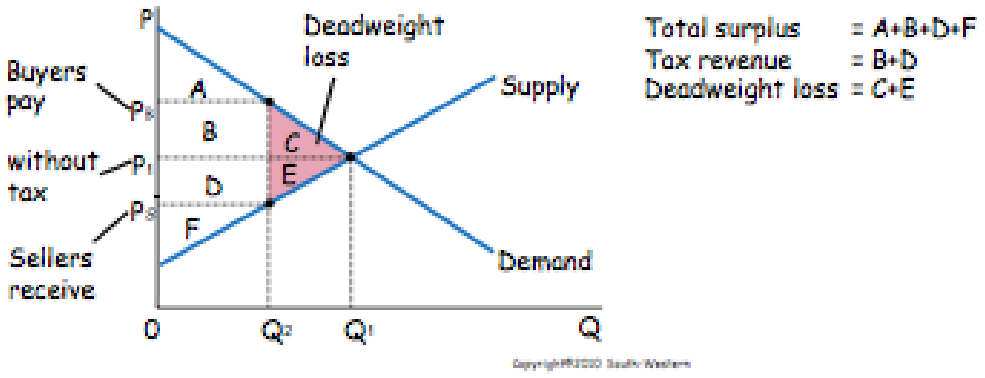


Figure 10: Deadweight Loss

Comparative Advantage is when a producer requires a smaller **opportunity cost** to produce a good

- Gains from trade are based on comparative advantage, not absolute advantage
- Trade makes everyone better off, because it allows people to **specialize** in activities where they have a comparative advantage.

5.2 Determinants of Trade

The world price refers to the price that prevails in the world market for a good.

exporter If $P_{\text{domestic}} < P_{\text{world}}$ then the country is an exporter (comparative advantage)

importer If $P_{\text{domestic}} > P_{\text{world}}$ then the country is an importer (no comparative advantage)

5.3 Exporting Country

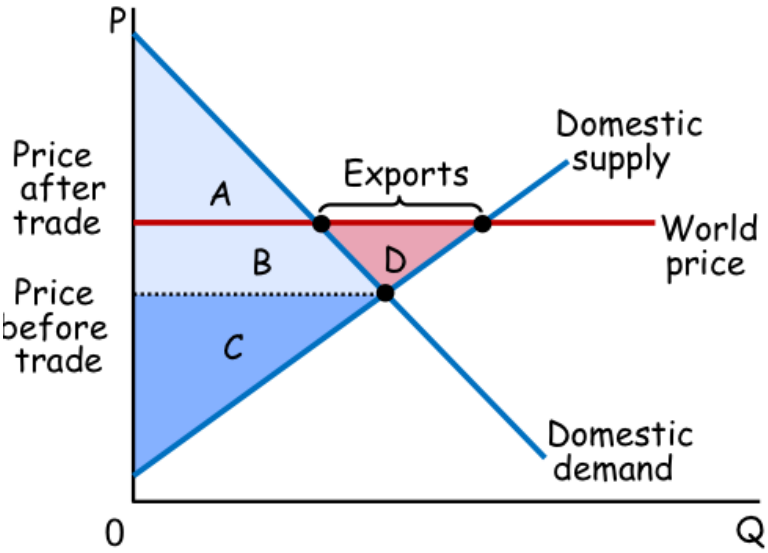


Figure 11: Exporting country

- Area D shows the increase in total surplus and represents the gain from trade
- Domestic producers of the good are better off, and domestic consumers of the good are worse off

5.4 Importing Country

- Area D shows the increase in total surplus and represents the gain from trade
- Domestic consumers of the good are better off, and domestic producers of the good are worse off

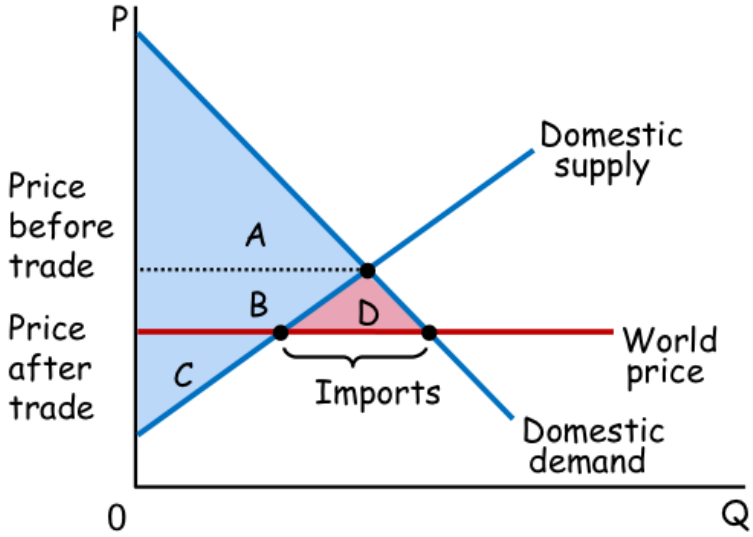


Figure 12: Importing Country

5.5 Trade Policies

Tariff is a tax on goods produced abroad and sol domestically ⇒ Tariffs raise the price of imported goods above the world price by the amount of the tariff (swiss farmers, milk producers). Note the area D and F are deadweight losses.

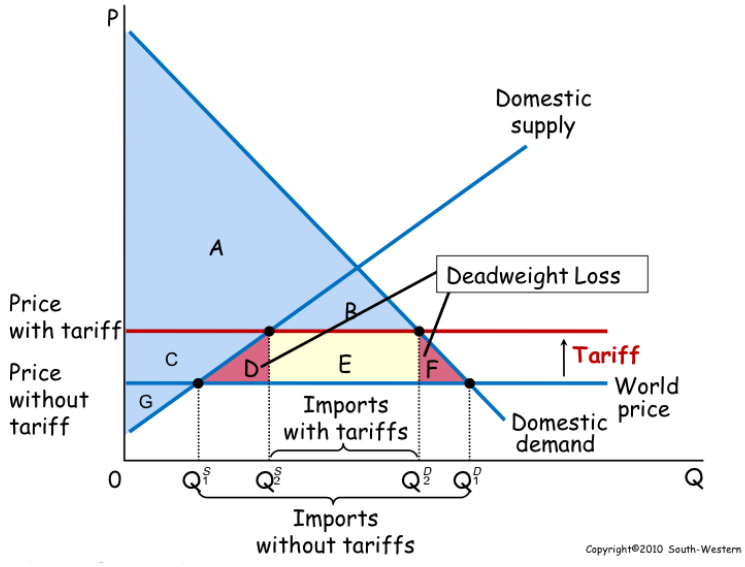


Figure 13: Tariff

Import Quota limit on the quantity of a good that can be produced abroad and sold domestically.

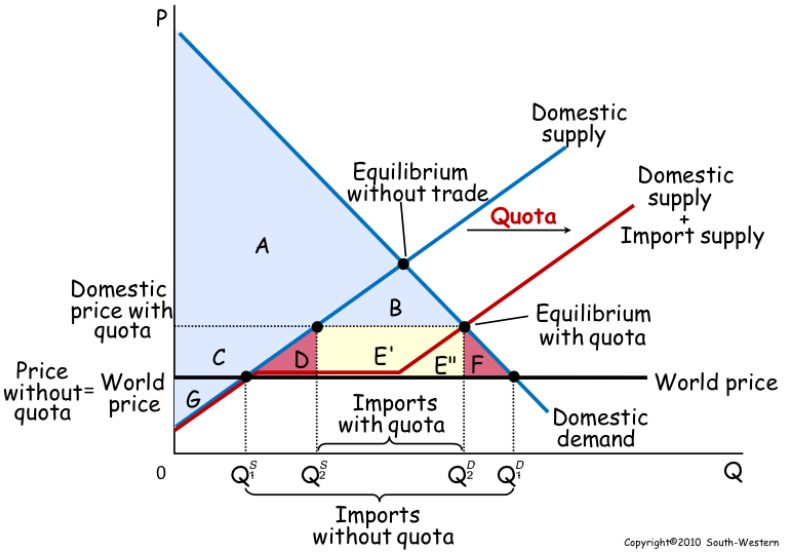


Figure 14: Import quota

5.6 Arguments for restricting Trade

- Jobs
- National Security
- Infant Industry
- Unfair Competition
- Protection as a bargaining Chip

5.7 Trade Agreements and The WTO

Unilateral when a country removes its trade restrictions on its own

Multilateral a country reduced its trade restrictions while other countries do the same.

6 Market Failure & Common Resources

todo

7 Public Sector and the tax System

7.1 Government spendings

Government spending includes all transfer payments, the purchase of public goods and services and general public policy program.

Can be measured as %of GDP.

Transfer payments are government payments not made in exchange for a good or a service, e.g. pensions or unemployment benefits.

7.2 Sources of Government Revenues

Public revenues are defined as tghe sum of financial resources accruing the public sector in order to finance **national expenditure** and th **subsidies for the economy**. It comes from

1. sales and leasing of goods and ervices
2. Taxes ad fees
3. Loans

Average tax rate is total tax paid divided by total income.

Marginal tax rate is the extra tax paid on an additonal pound of income.

Lump-sum Tax is a tax that is the same amount for every person, regardless of earnings or any actions that the person might take

Budget deficit When government spends more than it has

National debt is the value of accumulated net borrowing by that state and other public authorities from the economic system and foreign countries.

Financing of public deficit can be done in a **monetary way** (printing banknotes → inflation) or in a **non-monetary** way (issuing fixed-income bonds)

7.3 Taxes and efficiency

Efficient tax system tries to minimize the costs to taxprayers and the governments.
Costs are

- tax payment itself
- deadweight loss
- Administrative burden

7.4 Taxes and Equity

Equity How should the burden of taxes be divided among the population

Benefits principle is the idea people should pay taxes based on the benefits they receive from government services. (those who use car pay petrol tax)

Ability to pay prinicple is the idea that tax should be levied on a person according to how well that person can shoulder the burden.

- **Vertical Equity** taxpayers with greater ability to pay taxes pay more
  - Proportional tax
  - Regressive tax
  - Degressive tax
- **Horizontal equity** idea that taxpayers with same ability to pay taxes pay the same amount.

7.5 Tax Incidence and Tax Equity

Tax equity and efficiency are the two most important goals of the tax system.

Tax incidence is the study of who shares the burden of the tax

8 The Cost Of Production

8.1 Introduction

Behind the supply curve

- Production function
- Cost function

8.2 Production theory

Production Technology Combination of inputs in order to produce finished goods and services

Cobb Douglas Production Function

$$Q = zC^{\alpha}L^{\beta} \tag{3}$$

if CRS, constant return to scale, (see system dynamics), $\alpha + \beta = 1$, IRS and DRS also exist

8.3 Costs

$$\text{Profit} = \text{Total revenue} - \text{Total cost} \tag{4}$$

Economic profit the total revenue minus total cost, including both explicit and implicit costs.

Accounting profit total revenue - total explicit cost

Production Function reltionship between quantity of inputs used and the quantity of output

Marginal product Increase in output that arise from an additional unit of input

Diminishing marginal product When the derivative of the marginal product is negative, the double derivtaive of the production function is negative...

Fixed Costs FC Costs that do not vary with the quantity of output produced

Variable costs VC Costs that DO vary with amount of output produced

Total Costs TC

$$TC = FC + VC + \dots \tag{5}$$

Average Total Cost AVC

$$AVC = \frac{VC}{Q} \tag{6}$$

The curve is usually U-shaped

Marginal cost MC

$$MC = \frac{dTC}{dQ} \tag{7}$$

Efficient scale quantity of output that minimizes average total cost

8.4 Costs in the short and long run

in the short run, some costs are fixed, in the long run, fixed become variable costs.

8.5 Economies and diseconomies of scale

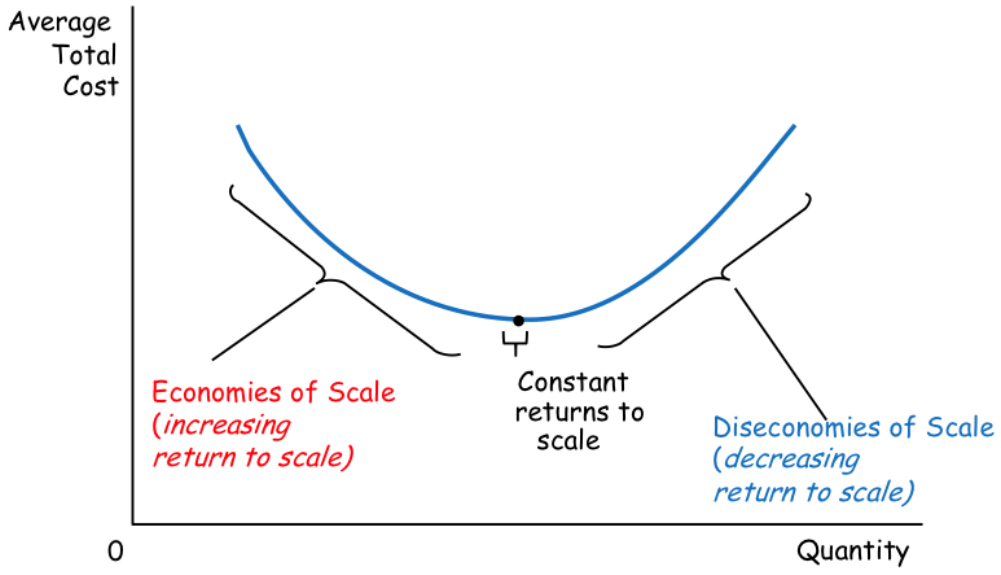


Figure 15: Economy of scale

Economies of Scope If the joint output of a single firm is greater than the output that could be achieved by two different firms when each produces a single product, we speak of economies of scope.

Learning Curve A firm's production cost may fall over time as managers and workers become more experienced and more effective at using the available plant and equipment. The learning curve shows the extent to which hours of labor needed per unit of output fall as the cumulative output increases.

9 Firms in Competitive Markets

Competitive Market a market with many buyers and sellers that are *price takers*

Average revenue

$$AR = \frac{TR}{Q} \tag{8}$$

where $TR = P \cdot Q$ is the total revenue and Q the quantity sold.

Marginal revenue

$$MR = \frac{\mathrm{d}\, TR}{\mathrm{d}\, Q} \tag{9}$$

For a competitive firm the following holds

$$P = AR = MR \tag{10}$$

Profit maximization a firm maximizes its profit when the "marginal profit" is zero, that is

$$\text{"marginal profit"} = \frac{\mathrm{d}(TR - TC)}{dQ} = \frac{dTR}{dQ} - \frac{dTC}{dQ} = 0 \tag{11}$$

Firm's decision to shutdown

$$\begin{aligned} \text{shutdown if} \quad & TR < VC \\ & TR/Q < VC/Q \\ & P < AVC \end{aligned}$$

Firm 's decision to quit in the long run

$$\begin{aligned} \text{exit if} \quad & TR < TC \\ & TR/Q < TC/Q \\ & P < ATC \end{aligned}$$

reciprocally

$$\text{enter if} \quad P > ATC$$

Sunk cost a cost that has already been committed and cannot be recovered

Measuring profit for the competitive firms

$$\begin{aligned} \text{Profit} &= TR - TC \\ &= (TR/Q - TC/Q) \cdot Q \\ &= (P - ATC) \cdot Q \end{aligned}$$

Zero Profit In the long runy, competitive firms make a zero profit. (however this is not an accountant profit, it includes implicit costs)

10 Monopoly

A firm that is the sole seller of a product without close substitutes

11 Monopolistic Competition

11.1 Monopolistic Competitions

a market structure in which many firms sell products that are similar but not identical.

11.2 Monopolisitic Competition in the Short Run

11.3 Monopolistic Competition in the Long Run

Monopolistic competition is one of the four market structure. Examples: gasoline, cars.
Attributes

- many sellers
- product differentiation
- free entry and exit

In the short run a monopoly market and monopolistic competitive market are identical (choose quantity as well as price).

- Short run economic profit encourage new firms to enter the market
- Short run economic loss encourage firms to exit the market

Firms will enter and exit the market until firms are making zero profit.
Two characterstics

- As in a **monopoly**, price exceeds marginal cost
- As in a **competitive market**, price equals average total cost

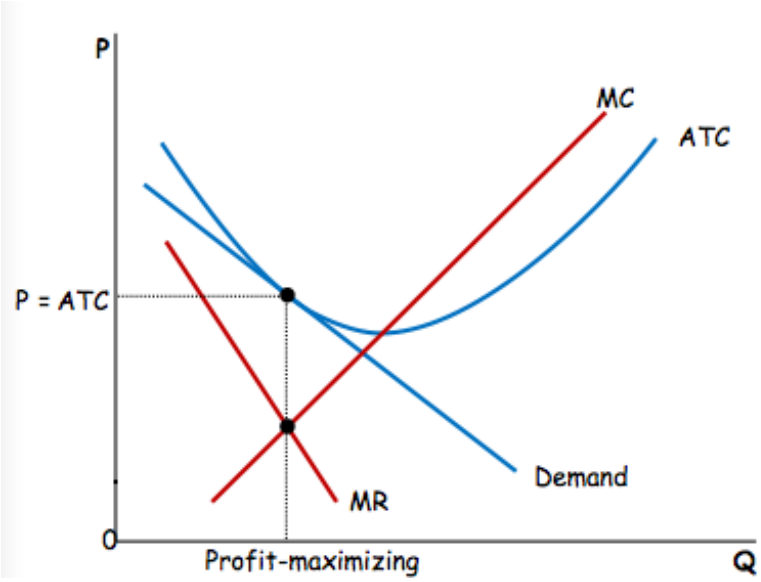


Figure 16: Monopolistic Competition in the Long Run

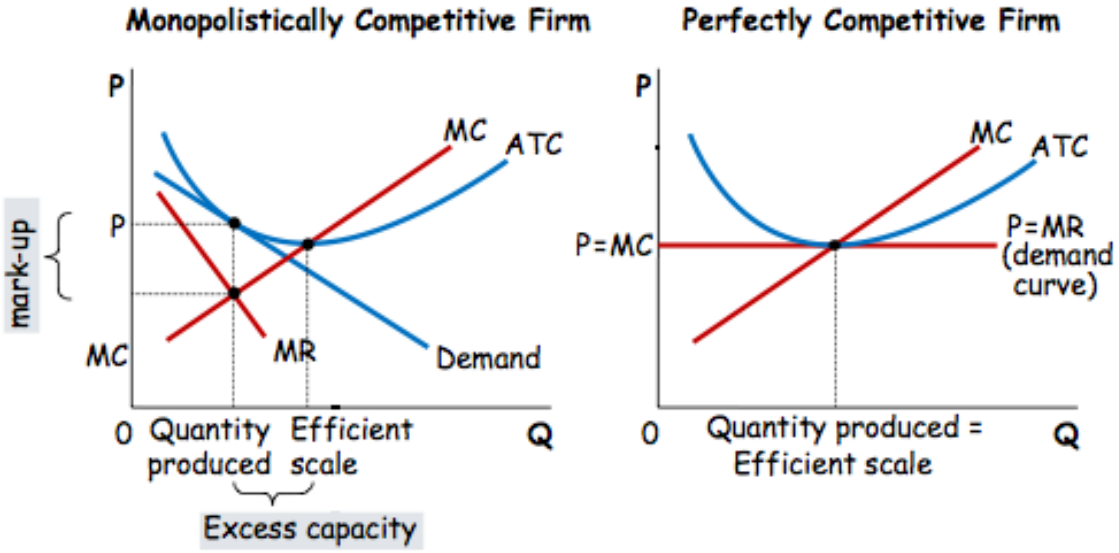


Figure 17: Monopolistic vs perfect competition

11.4 Comparison of different Market Structures

11.4.1 Mark up over original cost

- for a competitive firm marginal cost equals price
- for a monopolisticalls competitive firm, price exceeds marginal cost
- because price exceed marginal cost, an extra unit sold at the posted price means more profit for the monopolistically competitive firm

11.4.2 Excess capacity

- Free entry results in competitive firms producing at the point where average total cost is minimized, which is the efficient scale of the firm.
- In monopolistic competition, output is less than the efficient scale of perfect competition.

11.5 Monopolistic Competition and Welfare

Monopolistic does not have all the desirable properties of perfect competition.

- Normal deadweight loss, caused by mark-up of price over marginal cost
- Number of firms is not "ideal"

... but the administrative burden of regulating the different would be overwhelming.

11.6 Advertising

When firms sell differentiated products and charge prices above marginal cost, each firm has an incentive to advertise in order to attract more buyers. Typically between 10 and 20% of revenue.

11.7 Brand Names

- − consumers perceive changes that do not exist
- + ensure consumers buy a product of high quality

11.8 Introduction to Oligopoly and Game theory

11.8.1 Game theory

Dominance A strategy is dominant if it outperforms all other choices no matter what opposing players do.

Rationalizable strategies are the sets of all strategies that are not strictly dominated.

11.9 Monopoly and its Causes

Why Monopolies Arise There are generally three causes

- A key resource is owned by a single firm
- Government created monopolies: patent and copyright
- Natural monopoly: a monopoly that arises because a single firm can supply a good or service to an entire market at a smaller cost than could two or more firms.

Price Discrimination the business practice of selling the same good at two different prices.

12 Oligopoly

13 National Accounting

13.1 Gross Domestic Product (GDP), Produit Intérieur Brut (PIB)

is a measure of the income and expenditures of an economy (total income = total expenditure).

GDP is the total market value of all final goods and services produced within a country in a given period of time.

1. output is valued at market price
2. includes all items produced in the economy and legally sold in markets
3. it only includes the value f final good, not intermediate goods (counted only once)
4. it includes both tangible goods (food, clothing, cars) and intangible (services: haircuts, housecleaning, doctor visits).
5. it includes goods and services produced not transactions involving goods produced in the past.
6. for only one country
7. it is measured in a certain timespan (generally a year or quarter)

GDP exludes most items that are produced and consumed at home and that never the marketplace.

It excludes ilegally sold items.

The GDP can be measured from

1. the demand side - private & public
2. from the production side - labour, productivity
3. from the income side - labour and capital income

13.1.1 Tangible and intangible

In law, tangibility is the attribute of being detectable with the senses.

13.1.2 The componenents of GDP

$$\underbrace{Y}_{\text{GDP}} = \overbrace{C}^{\text{Consumption}} + \underbrace{I}_{investment} + \overbrace{G}^{\text{Government purchase}} + \underbrace{NX}_{\text{Net exports}}$$

13.1.3 Real vs Nominal GDP

- **Real GDP** values the production of goods and srvices at *constant prices*
- **Nominal GDP** values the production of goods and services at *current prices*[1]

13.1.4 The GDP deflator

$$\text{GDP}_{\text{deflator}} = \frac{\text{GDP}_{\text{nominal}}}{\text{GDP}_{\text{real}}} \cdot 100$$

13.1.5 What can't measure GDP?

- value of leisure
- value of clean environment
- value of almost that's outside of the marketplace

13.2 Inflation and Deflation

13.2.1 Inflation

refers to a situation in which the economy's overall price level is rising.

13.2.2 Deflation

refers to situation in which the economy's overall price level is falling.

13.3 Consumer Index Price (CPI)

The CPI is a measure of the overall cost of the goods and services bought by a typical consumer.

It is used to monitor changes in the cost of living

If it increases, the consumer typically has to spend more money to maintain his standard of living.

13.3.1 Calculation of CPI

- Fix the basket
- Find the prices
- Compute basket's cost

[1] compare with 1.4

- Choose a base year and compute the index

$$\text{CPI in year } t = \frac{\text{Price of basket in year } t}{\text{Price of basket in base year}} \cdot 100$$

- Compute the percentage price inflation rate

$$\text{Inflation rate in year } n+1 = \frac{\text{CPI}_{n+1} - \text{CPI}_n}{\text{CPI}_n} \cdot 100$$

14 Production and Growth

The factors of production incude

1. physical capital
2. human capital
3. natural resources
4. technological knowledge

14.1 FYI: The Production Function

$$\boxed{Y = Af(L, K, H, N)}$$

where

- Y: quantity of output
- A: available production technology
- L: quantity of labor
- K: quantity of physical capital
- H: quantity of human capital
- N: quantity of natural resources
- $f()$: is a function that shows how the inputs are combined

It has a **constant return to scale (CRS)** if

$$cY = Af(cL, cK, cH, cN) \tag{12}$$

Investment is tightly linked with income per person.

15 Savings and Investment

15.1 Financial Institutions

Financial Markets are the institutions where buyers and savers meet.

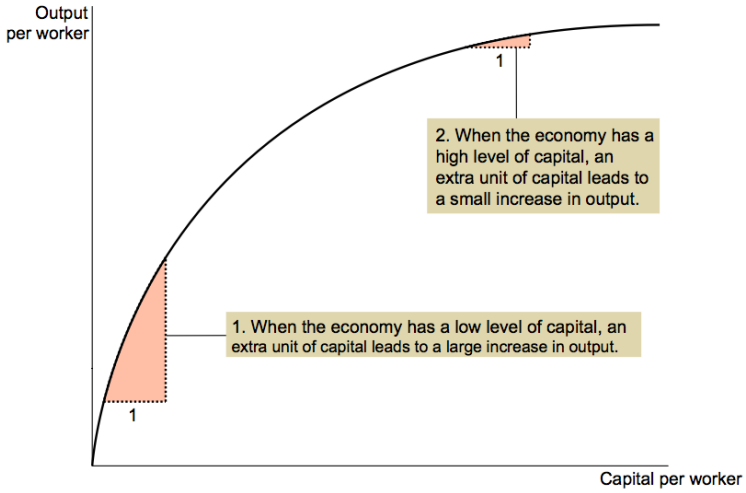


Figure 18: Catch-up effect

Bond is a certificate of indebtedness that specifies obligations of the borrower to the holder of the bond.

Stock represents a claim to partial ownership in a firm and is therefore, a claim to the profits that the firm makes.

Financial Intermediaries Financial institutions where savers can indirectly provide their funds to borrowers.

Mutual Funds Fonds de placement

15.2 Saving and Investment in the National Income Accounts

The GDP in a closed economy ($NX = 0$)

$$Y = C + I + G \tag{13}$$

thus

$$\underbrace{Y - C - G}_{S} = I \tag{14}$$

$$S = \underbrace{(Y - T - C)}_{\text{Private saving}} + \underbrace{(T - G)}_{\text{Public saving}} \tag{15}$$

- $T > G$, budget surplus, gov receives more money than it spends
- $T < G$, budget deficit, gov uses more money than it spends

investment Creation of **new** product assets by firms and households

Net investment

$$\text{net investment} = \text{investment} - \text{depreciation} \tag{16}$$

15.3 The Market for Loanable Funds

Where buyers and sellers demand funds.

Supply and Demand Here again the law of supply and demand applies.

- Lots of people who want to borrow, few who wants to loan → **high interest rates**
- Lots of people who want to loan and few to borrow → **low interest rates**

(the usual graphical analysis, where the optimum is where supply & demand cross, is still valid)

Government Budget Deficit Note that when gov spends more than it earns, it reduces the supply thus making **higher interest rates** (confidence towards state is reduced)

16 Unemployment

16.1 How is unemployment measured

Natural rate of unemployment unemployment that does not go away with long time

Cyclical unemployment year to year fluctuations in unemployment
There are 3 categories

- employed
- unemployed
- economically inactive (not in the labor force)

BFS Bundesamt für Statistik (office fédéral de la statisitque)

- potentially part of labur force if $15 < \text{age} < 74$.
- a peron is considered **employed** if he or she has spent at least one hour of the previous week working at a paid job or in an unpaid job in a family-run business
- A person is **unemployed** if he or she did not work in the reference week, has been looking for a job for four weeks, and is immediately available for a new job.
- A person who fits neither of these categories, such as a full-time student, homemaker, or retiree, is **not in the labor force**.

Labor force The labor force is the total number of workers, including both the employed and the unemployed.

$$\begin{aligned} \text{Labour force} &= \text{Number of employed} + \text{number of unemployed} \\ \text{Unemployment rate} &= \frac{\text{number of unemployed}}{\text{Labour force}} \\ \text{Labour force participation rate} &= \frac{\text{labor force}}{\text{adult population}} \end{aligned}$$

How long are the unemployed without work most unemployment are short. Most of the economy's unemployment problem is attributable to relatively few workers who are jobless for long periods of time.

16.2 Why unemployment ?

Frictional unemployment time to find new job

structural unemployment because in a certain sector not enough jobs

Job search Process by which people look for new jobs

Unemployment Insurance Helps unemployed people

16.3 Unions and collective Bargaining

Union is a type of cartel that tries to exert its market power

Collective Bargaining The process by which unions and firms agree on new conditions

Strike If they don't agree on terms, they organize a strike

Efficiency wages Wages over equilibrium in order to

17 The Monetary System

17.1 The Function of Money

- **Medium of exchange**
- **Unit of account**
- **Store of value**

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

17.2 Kinds of money

- **Commodity Money**: have intrinsic value (gold, silver, cigarettes)
- **Fiat money**: does not have intrinsic value (coins, currency, ...)

17.3 Money in the Economy

- **Currency** is the paper bills and coins in the hands of the public
- **Demand deposits** are balances in bank accounts, customers can access easily

17.4 Measuring the quantity of money

There are several means to measure the amount of money (taking in account different parameters): range from $M0$ to $M3$.

17.5 Functions of a Central Bank

- Act as banker's bank (making loan to banks)
- Conducts **Monetary policy** (controlling money supply, internal and external value of the currency)

17.5.1 Tools of the central bank

- open market operations (sell and buy gov bonds)
- Reserve requirements (choose on the reserve requirements for banks)
- discount rate (interest rate they charge banks for loans)

17.6 Money multiplier

A bank loans money to another bank, that loans money to another bank and so forth "creating" money

$$\text{Money multiplier} = \frac{1}{R}$$

Where R is the reserve requirement.

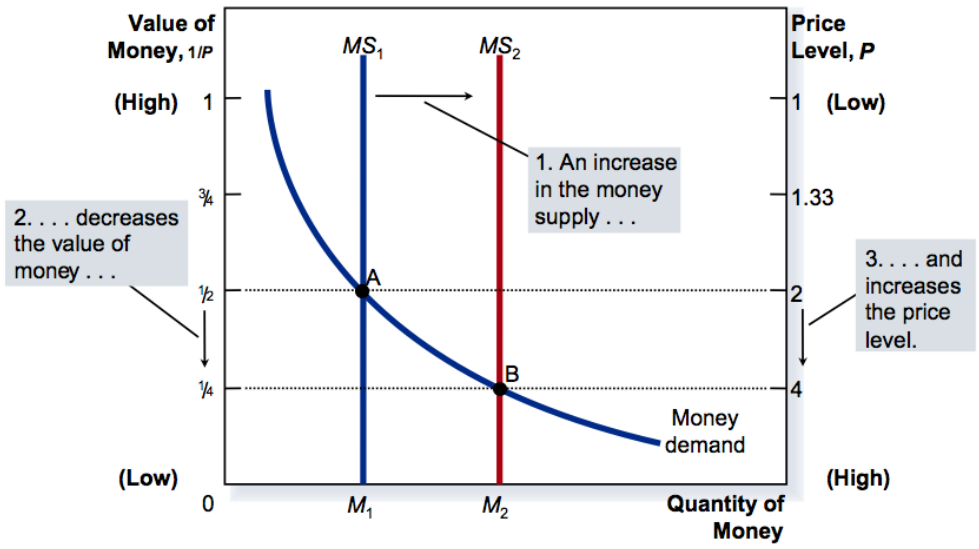


Figure 19: Increase in the money supply

Increase in the money supply

Velocity of Money The quantity equation:

$$V \cdot M = Y \cdot P \tag{17}$$

where V is the velocity of money, M the amount of money, Y quantity of output and P the price level.

Classical Dichotomy and monetary neutrality

- **Nominal variables** measured in monetary units
- **Real variables** measured in physical units

The **classical dichotomy** is the theoretical separation of nominal and real variables.

Fisher Efect the one-for-one adjustment of the nominal interest rate to the inflation rate.

Inflation tax when government prints out too much money it is said to levy an inflation tax.

Costs of inflation

- **Shoeleather cost** the waste by trying to always only hold a little amount of money (since you go often to the bank you use your shoes...)
- **Menu costs** cost of changing prices (restaurants have to print new menus)
- **Relative price variability and the misallocation of resources** inflation distorts relative prices
- **Inflation-induced Tax distortions**
- **Confusion and inconvenience**
- **Arbitrary redistribution of wealth**

18 International Trade

see section 5

19 Open Economy Macro

Closed economy An economy that does not interact with the rest of the world

Open economy An economy that freely interacts with the rest of the world

Exports and imports goods that are imported ore exported

Trade surplus an excess of exports over imports

Trade deficit an excess of imports over exports

Balanced trade a situation in which imports equal exports

Net capital outflow (NCO) refers to the purchase of foreign assets by domestic residents minus the purchase of domestic assets by foreigners.

$$\underbrace{NCO}_{\text{net capital outflow}} = \underbrace{NX}_{\text{net exports}} \tag{18}$$

Before we saw

$$\begin{aligned} S &= Y - C - G \\ &= I + NX \end{aligned}$$

now we have

$$\underbrace{S}_{\text{national savings}} = \underbrace{I}_{\text{domestic investments}} + \underbrace{NCO}_{\text{net capital outflow}} \tag{19}$$

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

Figure 20: Summary of the different possible outcomes for an open economy

Nominal exchange rate The rate at which a person can trade a currency into another

- **Appreciation** an increase in the value of a currency as measured by the amount of foreign currency it can buy.
- **Depreciation** a decrease in the value of a currency as measured by the amount of foreign currency it can buy.

Real exchange rate is the rate at which a person can trade the goods and services of one country for the the goods and services of another country

$$\text{Real exchange rate} = \text{nominal exhange rate}\frac{\text{domestic price}}{\text{foreign price}} \tag{20}$$

19.1 Purchasing-Power Parity (PPP)

based on the *law of one price*

Law of One Price a good must sell for the same price in each locations

Arbitrage Taking advantage of price differences: if arbitrage occurs price will eventually reach an equilibrium.

Purchasing-power parity a unit of currency must have the same purchasing power in all countries and exchange rates move to ensure that.

$$\text{nominal exchange rate} = \frac{\text{domestic price}}{\text{foreign price}} \tag{21}$$

Common currency area An area encompassing several countries where the same currency is used

20 A macroeconomic theory of the open economy

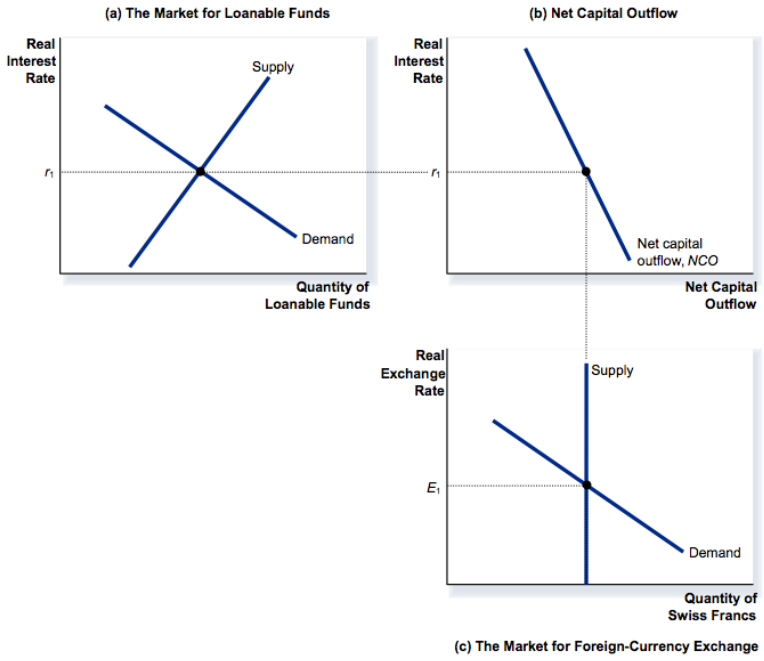


Figure 21: The real equilibrium in an open economy

Capital flight

21 Aggregate Demand and Aggregate Supply

Economic activity the amount of buying and selling that take place in an economy in a period of time.

Standard of living the amount of goods and services that can be purchased by the population of a country

Recession A period of declining real incomes and rising unemployment

Depression A severe recession

21.1 3 Key facts about economic fluctuations

1. Economoic fluctuations are irregular and unpredictable
2. Most macroeconomic quantities fluctuate together
3. As output falls, unemployment rises

21.2 The model of aggregate demand and aggregate supply

Aggregate demand curve shows the quantity of goods and services that households, firms and the government want to buy at each price level.

Aggregate supply curve shows the quantity of goods and services that firms choose to produce at each price level.

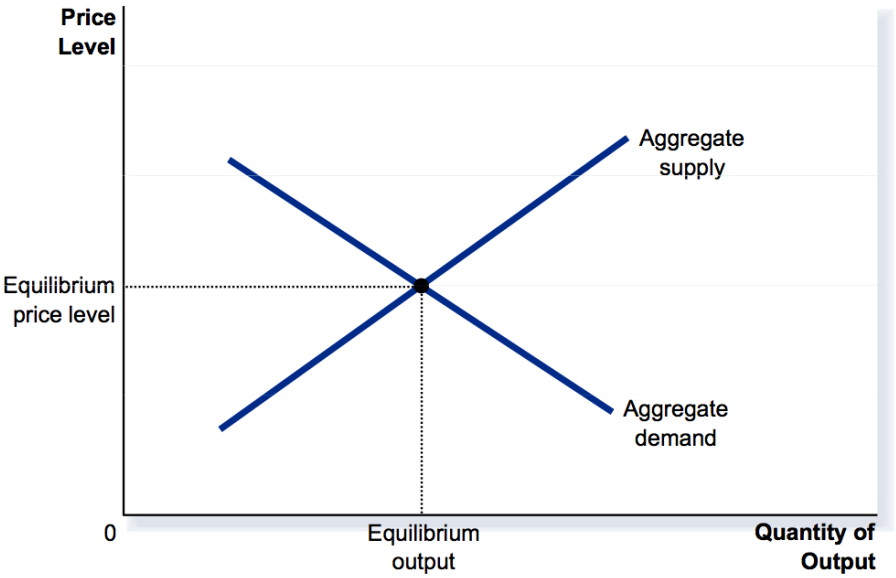


Figure 22: Aggregate demand and supply

21.2.1 Aggregate Demand curve

Why the aggregate demand curve is downward sloping

1. price level and consumption: the wealth effect
2. price level and investment: the interest rate effect
3. price level and net exports: exchange rate effect

Why the aggregate demand curve might shift Shifts might arise from

1. Consumption
2. Investment
3. Government purchases
4. net exports
5. Money supply

21.2.2 Aggregate supply curve

The aggregate supply curve in the long run the supply curve is vertical because the price level does not affect long run determinants of real GDP.

In the short run the aggregate supply curve is downward sloping

Natural rate of output the output level in an economy when all existing factors of production (land, labor, capital and technology) are fully utilized and where the unemployment is at its natural rate.

Why the long run supply curve might shift

- Labor
- Capital
- Natural resources
- Technological knowledge

Why the aggregate supply curve slopes downward in the short run there are three theories

- Stocky wage theory
- stocky price theory
- misperception theory

All three theories suggest that output deviates in the sort run from from the natural rate when the actual price level deviates from the price level that people had expected to prevail.

$$\text{Quantity of output supplied} = \text{natural rate of output} + a\,(\text{actual price level} - \text{expected price level}) \tag{22}$$

Stagflation A period of falling output and rising prices

22 Monetary and Fiscal Policy

23 Philips Curve

24 Summing up: The Financial Crisis