Productive efficiency is achieved when all resources are fully and efficiently utilised. It is achieved when a firm produces at any point along its LRAC.

Allocative efficiency is the situation in which society produces and consumes a combination of goods and services that maximises its welfare. It is achieved when $P = MC$, or when the MSB of consumption is equal to the MSC of production. The **last unit of output** in industry is valued by respective consumers at rate equal to social opportunity cost of producing it.

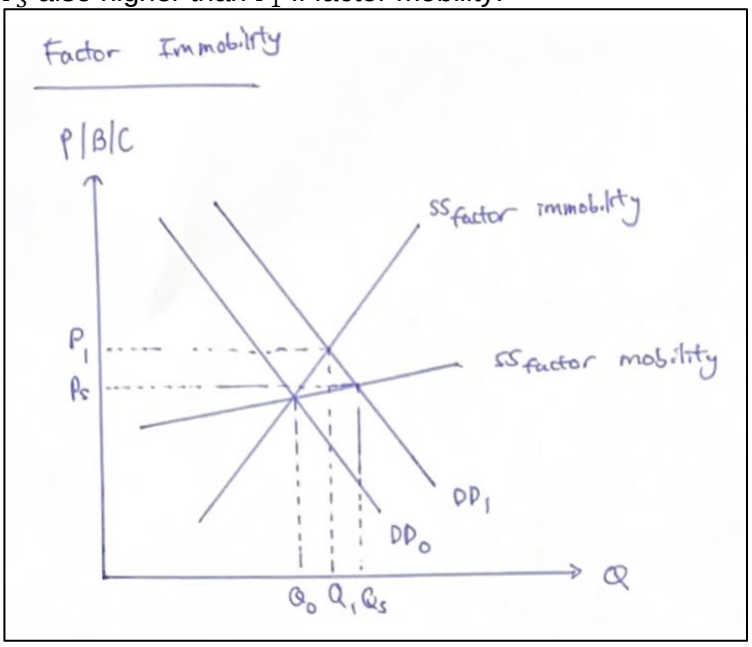
Dynamic efficiency - technologically progressive by investing in R&D for product and process innovation in order to **reduce average COP** or to **meet changing needs and wants of consumers**.

Market failure is the failure of the free market to achieve efficient allocation of resources that maximises society's welfare and to achieve efficient and equitable outcomes.

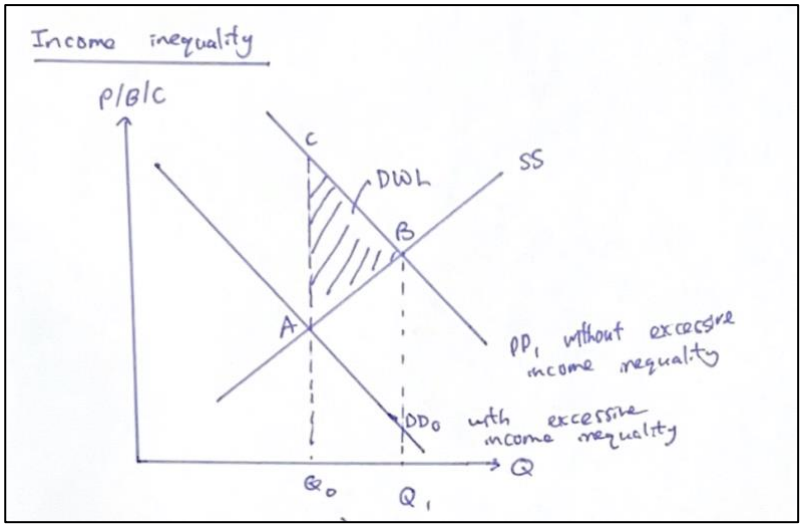
1. Externalities (4-line Graph)
    a. Externality: cost or benefits associated with production spills onto third parties, and the private decision maker does not consider these costs or benefits.
    b. In pursuit of self-interests, would only consider **their own private costs and benefits** and the price they receive/pay for the products. This results in **ignorance of external costs imposed on (externalities)** and **creates a divergence between the MPC and MSC of production.**
    c. *Explain what the externalities are and why it diverges from private benefit/costs*
    d. Opportunities for mutually advantageous trades are eliminated as society values the last unit of good more than it costs to produce it.
    e. Market equilibrium occurs when MPC = MPB, taxes or subsidies used to manipulate this to be equal to allocatively efficient level.
2. Imperfect Information: Merit/Demerit Goods (Only MPB shifts)
    a. Benefits: Individuals underestimate their own private benefits when consuming merit goods. For example, may understate the benefits of education and higher potential earnings. Perceived MPB < Actual MPB
    b. Imperfect information in demerit goods or created by persuasive advertising. Given misleading information about benefits of a good, oversell benefits of product. Results in perceived MPB > actual MPB, overconsumption occurs.
    c. Explain the private benefits and why information failure occurs
        i. Degree of imperfect information likely to be larger in countries where public education levels are low (or any other context like religion, distrust of science, etc.)
    d. In free market, rational consumers consume to the point perceived MPB = MPC, as such Qm produced. However, socially optimal level is when Actual MPB = SS.
    e. Under-allocation of resources, leading to deadweight loss, resulting in loss of societal welfare as society values last unit of good more than the cost to society to produce it. As such, the **net benefit forgone** from underconsumption leads to allocative inefficiency.
3. Public goods
    a. Difficult to provide commercially due to **non-rivalry** in consumption and **non-excludability**
    b. Non-excludable: Impossible or very costly to exclude non-payers from consuming and benefitting from the good once it is provided. No one has incentive to pay for such as good as, known as the **free-rider problem**. This results in **concealed demand** since non-payers also able to enjoy the good. With the **absence of effective demand**, there are **no price signals**, the mechanism private profit-maximising firms use to decide where to allocate their resource to. Difficult or impossible to collect revenue and hence profit maximising firms have no incentive to produce good.
    c. and profit maximising firms have **no incentive to produce** such a good.
    d. Missing market, market failure because **opportunities for mutually advantageous trades are eliminated, resulting in allocative inefficiency.**

    e. Non-rivalrous when consumption by one person does not reduce amount available to others. **Marginal cost of allowing an additional user to share in the usage of the good is zero.** Since MC=0, to achieve allocative efficiency, good should be priced at zero but **no rational profit-maximising firm** would be willing to set price at zero.
    f. Government required to intervene through direct provision
4. Market imperfections and dominance (F&D DWL Graph)
    a. Under imperfect competition, firms profit maximised when MR=MC, rather than when AR=MC. This leads to underproduction and DWL.
5. Asymmetric Information (Adverse Selection)
    a. W*ho has more information, why he has more information, incentive to conceal information?*
    So what? (Raises prices, etc.)
    Why does it cause adverse selection and possibly a missing market (for whatever good is selected against)?
    b. **Missing market**, market failure because **opportunities for mutually advantageous trades are eliminated.** Underproduction and underconsumption, society value the last good produced more than it would cost to produce it, loss of potential societal welfare.
    c. Market for used cars. Sellers of used cars are aware of vehicles defects while buyers are not, unlikely to want to reveal to buyers' full information. Buyers with less information **likely to offer lower price** as they are taking risk in buying car with unknown defects. Discourages sellers to sell higher quality goods (unable to earn profits). Only lower quality products offered for sale, missing market for good cars. **Market adversely selects against higher quality products.**
    d. Private insurance. Buyers of health insurance know more about their own health problems than insurance companies. Incentive for less healthy to conceal unfavourable health records to be accepted by insurer and pay less premium. Greater expected expenditure due to greater risk undertaken and more chance of needing to pay out, people with greater health risks such as smokers, drinkers, and people with underlying health issues more likely to buy health insurance. To remain profitable, firms further raise average price of insurance coverage for everyone as it **cannot distinguish between healthy and less healthy individuals.** Given higher prices, customers with better health are less likely to be willing and able to afford insurance. **Adverse selection and missing market against healthy individuals buying insurance.**
6. Moral Hazard
    a. Economic agents take greater risks than they normally would because the **costs that would result would not be solely borne by the economic agent** themselves.
    b. Insurance, less bothered to chain up bicycle or lock front door. Patients more likely to ask for pricier medical services because they no longer must bear the full cost of medical fees. Only consider minimal part of the cost and less likely that rational decision maker would go out of the way to prevent consequences (private cost of event is lower).
    c. Asymmetric information as insurer is unable to monitor and obtain full information of the behaviour of the insured after purchasing insurance
    d. Greater occurrence of claiming of insurance, results in more expensive insurance for everyone (which could result in adverse selection).
    e. **This leads to overconsumption over the socially optimal level and hence market failure.**
7. Immobility of factors of production (cannot vary production levels quickly) [land, labour, capital]
    a. Occupational: Workers made redundant in an industry may find it difficult to gain re-employment as they may have job-specific skills not necessarily needed in growing industries. **Mismatch between skills on offer and those required by employers** looking for workers, leading to **structural unemployment.**

b. **Hysteresis:** Out of work for long time, compounding effects as employees find it more difficult to re-join workforce. Resource wastage, inefficient allocation of resources.
c. Some units of capital are specific to the industry they have been designed for. If demand for goods provided by industries fall, units of capital **left un-utilised or under-utilised. Wastage of scarce resources.**
d. Geographical immobility: People resist moving from one area to another due to family and social ties, financial costs involved in moving and potentially higher cost of living.
e. When demand increases from DD_0 to DD_1, less than proportionate increase in quantity supplied from Q_0 to Q_s (as compared to potential Q_1 if factor mobility). Price P_S also higher than P_1 if factor mobility.



8. Income inequality
    a. The rational decision can only consume a quantity of a good for which he is both willing and able to consume. Due to excessive income inequality, there will be a **lack of effective demand** since lower-income groups are unable to afford in a free market **in absence of dollar votes**.
    b. This is particularly dominant in developing countries where a sizeable number of people live below the poverty line (or developed countries where high SOL means that consumers have little purchasing power outside necessities)
    c. The free market allocates resources based on **dollar votes**, where DD0 = SS, and produce and consume at Qe units of output. However, consumers who lack willingness and ability to afford will be **priced out of market** due to **lack of effective demand** at the prevailing market equilibrium prices due to their **lack of dollar votes.**
    d. Meanwhile, society's welfare will **improve if income is less unequal** as that would cause effective demand to increase from DD0 to DD1 and vaccination rate increase to Qs.
    e. Benefits from consumption of QeQs units of vaccines is greater than cost savings from not producing QsQe units of vaccines, net benefit forgone and allocatively inefficient.


Income inequality
P/B/C
C
DWL
SS
B
A
PP1 without excessive income inequality
DD0 with excessive income inequality
Q
Q0
Q1

Government intervention (For each one, explain policy and then limitations)

General disadvantages of policies

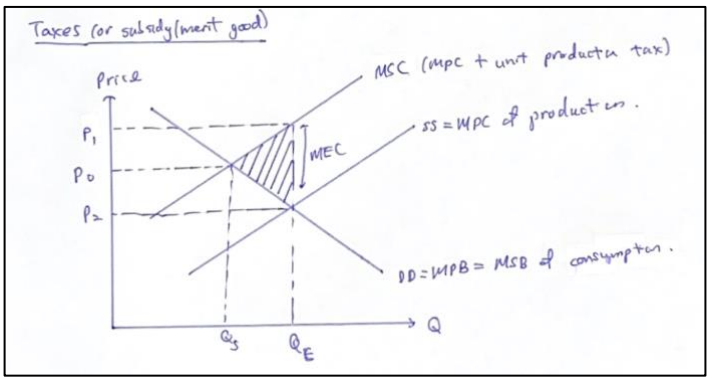
General antithesis: Government must collect accurate and up-to-date information both before and during the implementation of the policy. **Government failure** situation where government intervention in market leads to worse outcome in greater inefficiency and greater misallocation of resources. Occurrence of **unintended consequences** as local conditions subject to constant and unpredictable changes.

Government intervention may result in **unintended consequences. Perverse incentive** has an **unintended and undesirable result contrary to interests of policy maker**. Fuel tax to lower air pollution in Athens created more air pollution because people chose relatively cheaper wood instead that emitted more pollutants. **Unexpected drawbacks** refer to **unexpected detriment occurring** in addition to desired effect of policy. Tax on junk food in Denmark in 2011 abandoned in 2013 as research showed that drove Danes across the border to Germany or Sweden. Adversely affected businesses and rise in unemployment.

Government requires **accurate and complete information** on the size of external costs, but it is difficult to quantify externalities. Sometimes leads to government having **inaccurate valuation of MEB/MEC.** If overvaluation Q>Qs and leads to wastage of scarce resources, undervaluation Q<Qs and the market failure is not fully resolved. **Lack of precision, society welfare cannot be maximised.**

Tax, Quotas, Tradable permits: Could create a **perverse incentive** for firms to transfer their production elsewhere to locations with a **comparative advantage.** Less regulation and lower costs elsewhere, could produce for lower COP and hence rational firm can maximise profits. Example: Australia has been discussing tradable permits since 2009 however 12 years later has not taken of as they feel it requires **universal policy.** This could result in unemployment and negative economic growth, as well as fall in productive capacity.

1. Taxes
    a. Direct Tax – tax on consumption (ERP/Road Tax)
    b. Indirect Tax – tax on production
        i. Tax on unit output: Increases cost of production at every level of output, incentivising profit-maximising producers to reduce quantity supplied.
        ii. Tax per unit pollutants: Creates incentives for firm to buy fewer polluting resources and to switch to less polluting alternative technologies
    c. **Compels the firm into internalising the external costs**
    d. Marginal external costs of production will eventually fall, resolving the **root cause** of the problem and the market failure. Could also encourage **dynamic efficiency** by encouraging firm to undergo R&D.



    e. Advantages

        i. Taxes provide revenue for government which can be used to (do something with context relevant to the question, like invest in healthcare, education, or redistribution of wealth)
    f. Disadvantages of taxes
        i. Difficult to put monetary value to externalities generated. Tax too low firms absorb increased COP; tax too high may result in under-allocation of resources
        ii. (Direct Tax, Consumption) Limited by the PED of the good. Small tax imposed on price inelastic good like cigarettes (addictive) / car (%Y) will have little effect. Large tax needed instead, and this could be unpopular
        iii. Goods and services taxes could also hurt citizens with low income disproportionately as more of their income spent on necessity goods, resulting in greater proportion of income spent paying tax. **Exacerbates income inequality.**
2. Subsidies
    a. Direct subsidy (demand curve shift) – subsidy on consumption (i.e., Edusave) → consumers willing and able to consume a greater amount
    b. Indirect subsidy (supply curve shift)– subsidy on producers (i.e., subsidies for the cost of B and C class wards in restructured clinics) → lowering cost of production → Pass on cost savings to consumers
    c. Even though consumers still undervalue these goods (due to imperfect information/not considering external benefits), the lower price that consumers pay/that firms incur after receiving the subsidy incentivises the self-interested consumers/firms to increase their quantity demand/supplied of the goods because the lower price/cost increases their willingness and ability to pay for/supply these goods. Hence removes the underconsumption.
    d. Disadvantages
        i. Difficult to assess magnitude of subsidy required. Subsidise too little, unable to fully correct market failure as some people with still under consume, subsidise too much and government funds being wasted and causing overconsumption
        ii. Requires government funding, leading to opportunity cost and more strain on future generations. Could lead to governmental budget deficit → interest on borrowed money needs to be paid off → future generations have higher taxes and less government expenditure
        iii. Overconsumption – artificially low prices, moral hazard as people consumes more than they need.
3. Legislation and Regulations
    a. Quotas
        i. Limit on quantity produced (vertical line on graph passing through ideal equilibrium)
        ii. Simpler to implement compared to market-based measures, guarantee that amount produced follows a specific amount. **Greater certainty** in achieving targeted output level than taxes as not reliant on (uncertain) market forces.
        iii. **Enforcement of such laws difficult and expensive** as constant checking is required and could translate into high costs for the government.
        iv. Government suffers from **imperfect information.** Government requires specific details about industries and alternative technologies that industries to adopt.
    b. Mandatory consumption
        i. Government decides that socially optimal output is considerably high and can set a law mandating it (education and vaccinations). Increases DD until MPB is equal to MSB.
    c. Tradable permits
        i. Permits for pollution, cannot produce without buying permits on free markets. Firms that can reduce pollution for cheaper amounts will invest while selling

off permits for a profit. Firms encouraged to invest in R&D/greener technology over purchasing permits, hence more **cost-effective**.
    1. Fixes total pollution with a **hard limit,** resulting in **greater certainty**
    2. **Large administrative costs and potential for unfair giving.**

4. Direct government/Free provision (Merit goods) / Nationalisation
    a. Deems that output level is lower than socially optimal
    b. Government supplements private sector
        i. Free market equilibrium lower than socially optimal level. Government acts as **supplier of merit goods** seeks to achieve allocative efficiency.
        ii. Upwards shift in SS curve
        iii. Direct control over quantity and provides competition for private sectors
    c. Government as only supplier (Free Provision) (Public goods / Markets with large externalities)
        i. Government supplies goods and services directly to consumers, free of charge at point of use. This helps to reduce the underconsumption arising, largely from excessive income inequality, by removing barriers to purchase for consumers who are unable to afford goods.
        ii. No missing markets, public goods provided, increases welfare of citizens for AE
        iii. Consumers increase quantity demanded until level where MPB of consumption equals their MPC of consumption (zero)
    d. Disadvantages
        i. Civil servants **lack profit maximising motive**, **productive inefficiency**
        ii. Corruption (especially in developing countries), difficult to ensure that the primary beneficiaries of government vaccination programs have been professionals in industries and richer individuals. Could make purchase at higher-than-market prices to help favour personal gain/take bribes.
        iii. (For Government supplement private sector) May push firms out of the marker by **crowding out** private sector, reducing market share of firms. Firms may struggle to enjoy same levels of EOS they did before, leading to severe fall in profits. If subnormal profits achieved in long run, or if TVC < TR, firm may shut down.
5. Substitutes
    a. Government could invest in other related markets
    b. Substitutes with CED > 0
    c. More consumers switch to related market (use of public transport instead of use of cars); demand curve shifts so that DD1 intersects MPC equal to DD0 intersect MSC.
6. Education, Campaigns and Advertisement (Does NOT apply to producers)
    a. Explain how campaign is implemented on a large scale over a long period of time
    b. Roadshows: interesting games to educate consumers, social media, and advertisement
    c. Bangladesh: government creates videos depicting stressful plight of frontline workers like healthcare workers to instruct others in community to self-isolate and get vaccinate by helping them understand the consequences of their inaction. This helps reduce the divergence between the perceived and actual marginal benefits in the eyes of the consumers.
    d. Influence behaviour of **customers**, hoping that private demand for merit goods would move to socially desirable levels, causing firms to produce levels that correspond with socially optimal level.
    e. Advantage: Targets and **resolves root cause** of market failure (effective in the long run)
    f. Disadvantages
        i. Long time for effects of policy to be realised
        ii. (**Habituality**) Consumers may not be receptive to campaigns because habits take time to change. May lead to **campaign fatigue** if consumers feel the same messages being repeated too much

iii. Required to be sustained over long period of time, funds and manpower be spent elsewhere **(opportunity cost)**

7. Reducing Market Dominance
    a. Legislation (Firm-PED reduction graph)
        i. Reduce Barriers to entry allows foreign firms to operate or grant more operating licenses, makes market more contestable reduces market share.
        ii. Anti-trust laws: curb anti-competitive firms (e.g., price fixing, mergers, and predatory pricing) in order to destroy competition.
            1. Singapore Competition Commission empowered to check and take task any firm ground guilty of anti-competitive behaviour. Grab Uber fined $13M in 2018
            2. Very difficult to prove the firms engage in anti-competitive actions
        iii. Statutory institutions ensure standards of provision
    b. Price regulation for natural monopoly (Natural Monopoly Fix Price Graph)
        i. Downward sloping demand curve, pricing at AC leads to DWL while pricing at MC leads to losses. Government subsidises firm.
        ii. As compared to profit maximising price, both AC and MC pricing reduce price and increase output, increasing consumer surplus, **which measures consumer welfare.**
        iii. Disadvantage: required to make indirect subsidy, increasing supernormal profits
    c. Lump sum tax
        i. Fixed amount regardless of output level. Fixed cost to firm, causes AC curve to shift upwards. Reduces supernormal profits and promotes equity
        ii. Disadvantage: Ability of firms to undergo R&D is reduced. Fall in process and product innovation, no **long-run reduction in AC** and no improvement in quality of products. Lack of dynamic efficiency reduces range and quality of products, reducing **consumer choice and societal welfare.**
8. Asymmetric information
    a. Address overconsumption
        i. Regulate advertising standards to ensure more informative, less persuasive, and misleading. Reduces **perceived MB** of customers and brings MPB perceived closer to MPB actual.
        ii. Lemon Law (Consumer Protection Act): Consumer can make claim for defective product within product within 6 months of purchase. Seller must repair, replace, or refund. Reduces incentive for seller to hide information about defects alleviates problem of adverse selection
            1. May reduce variety of good if law is too prohibitive.
    b. Address adverse selection
        i. Legislation: compulsory enrolment by the government (CPF Medshield Life) [Worsens moral hazard]
        ii. Compulsory submission of medical details
        iii. Invasion of privacy
    c. Moral hazard
        i. Co-payment before insurance pay-out, financial incentive to avoid unnecessary treatments (some people may not be able to afford co-payment)
9. Immobility of FOP
    a. Training schemes: Subsidies for education and retraining, easier to find employment, resources allocated efficiently.
    b. Reduces **mismatch of skills** between employers and employees, **reduces structural unemployment**. Benefits income inequality.
10. Income Inequality
    a. Minimum wage (Price floor diagram)
        i. Price floor for labour, income of workers above poverty level to raise SOL
        ii. Qd Qe workers retrenched, policy hurts the workers who are retrenched. Only those who keep jobs benefit
        iii. Involuntary unemployment, waste of resources (productive inefficiency)

    iv. Normal → subnormal profits as firms FOP operating cost of hiring labour increases, push for firm to shut down if TVC is high
    v. Rise in price as **costs are passed on to consumers** (should mainly do this for luxury industries)
    vi. Unintended consequence: increase school drop-out rate (benefit of school is reduced and **opportunity cost of not workin**g increases)
b. Improve productivity of low-skilled workers to increase demand
    i. Subsidise training
    ii. Workers and firms may be reluctant as time off for training reduces their short-run productivity.
c. Reduce supply of low-skilled workers
    i. Higher foreign worker levy, restrict issue of work permit
    ii. Increases cost for firms, deters investments, and affects economic growth
d. Taxes and subsidy
    i. Progressive tax structure, higher incomes receive higher taxes
    ii. Limitation: Tax rate highly progressive, could result in brain drain and reduce quantity of labour offered.

Examples

- Externalities
  - Negative externalities from production MSC>MPC: Petro-chemical factories pollute reivers and fishermen located downstream use river water for daily catch
  - Negative from consumption MSB<MPB: When somkers smoke, external costs to non-smokers from second-hand smoke
  - Positive externalities from consumption MSB>MPB: With greater level of education, can raise overall societal level of education and raise the skill level of the workforce, increasing social welfare in long run
  - Positive externalities from production MSC<MPC: Research and development from building of smartphones
- Imperfect information
  - Cigarattes (Health in LR)
  - Alcohol, gambling, drugs, sweetened beverages or junk food (overestimate MPB because they do not take into account long-run)
  - Education: Reduce equity and increase social mobility. Attract foreign investment if Singapore have skilled workforce, providing more job opportunities for Singaporeans as easier for firms to match demand for skilled labour if Singapore has concentration of skilled labour.
- Public goods:
  - Firefighting, street lights, national defence
- Inequity/Inequality
  - Education: Groups of people who will not have ability to pay for basic education
  - Vaccinations: Groups of eople who are unable to afford vaccinations for children (Overall societal loss, as vaccinations have greater societal benefit by preventing others from getting virus through transmissions)

Legislation

- Government may set law mandating for vaccinations or education
- Taxes: Alcohol and tobacco
- Subsidies
  - Direct subsidies: edusave account
  - Indirect subsidies: building schools, infrastructure for public transport etc
- Indirect government provision
  - Supplement private sector: Singapore healthcare (9 public hopsitals in addition to private hospitals)
- Reducing market dominance
  - Granted licensces to more public bus operators including foreign ones
  - Granted more lisences for telecommunications industry, TPG Telecom won rights to act as 4th telco (reduction in prices from Singtel and M1)
  - Grab and Uber fined a total of $13 million after attempted merger (monopoly in ride-sharing industry)
- Assymetric information
  - Accurate labelling in food, nutrition value on SSD and warning of possible health conditions (cigarettes).