

**Question 3**

- (a) Explain, using examples, what is meant by:
- a public good.
  - negative externalities.
- [10]
- (b) Negative externalities arising from production of a good gives rise to market failure. Discuss the extent to which the price elasticity of demand for a good affects the effectiveness of using indirect taxation to correct this market failure.
- [15]

**Suggested answer outline:**

- (a) Explain, using examples, what is meant by:
- a public good.
  - negative externalities.
- [10]

a(i) **Public Good** Goods that are both non-excludable and non-rival

Non-excludable:

Definition	A good is non-excludable if it is impossible or difficult and costly to exclude non-payer from consuming the good
Example	Street-lighting is non-excludable as it would not be possible to obscure the view of the brightly lit street from passers-by even if they had not paid for it
Effect	Consumers are able to enjoy something without paying for it → no one can stop them from consuming the goods regardless of whether they can pay or not → arising from free rider problem → No effective demand → firms cannot charge a price for these goods → profit seeking firm will not have an incentive to produce public good
Outcome in free market	Non-provision (where no firms will produce public goods) → missing market

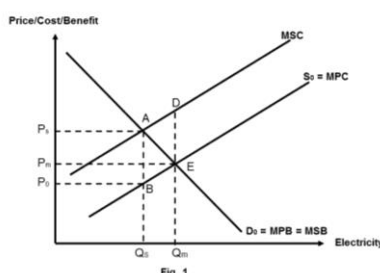
Non-rival:

Definition	A good is non rival when one person's consumption of the good does not reduce the quantity available to another good
Example	Street-lighting is not dimmed just because of an additional person's consumption, hence it is non-rivalry in consumption
Effect	Once good produced in the market → cost of providing the good to an additional consumers is zero ( $MC = 0$ )
Outcome in free market	For market to be allocative efficient, $P = MC$ . So for market for public good to be efficient, $P = 0$ .

a(ii) **Negative Externalities**

Definition	Negative externalities are costs incurred by third parties who are not involved in the production or consumptions of the good and are incurred without compensation.
Example	Third Party: People staying near power plants that emit harmful smoke. Third Party Cost: Healthcare cost that they incur to treat respiratory problems due to hazardous smoke

Effect



Presence of negative externalities in the production of good → Divergence between MPC and MSC → Market Eqm Output where  $MPC = MSC$  @  $Q_m$ , Social Optimal Output where  $MSC = MSB$  @  $Q_s$  in Fig.1.

Outcome in free market Additional unit produced from  $Q_s$  to  $Q_m$ ,  $MSC > MSB$  → DWL of area ABE (Fig.1) → Market fails.

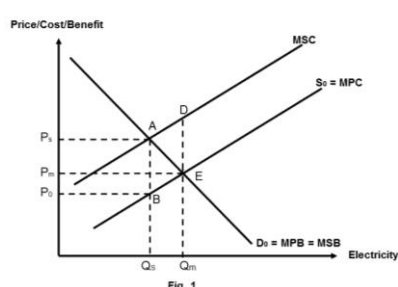
**Requirements (Overview) for part (a)**

Candidates should show a good understanding of both public good and negative externalities, and the implications on efficient resource allocation. Good candidates should be able to use examples to demonstrate their understanding of the non-excludability and non-rivalry characteristics of public goods as well as the 3<sup>rd</sup> party and 3<sup>rd</sup> party effects in the case of negative externalities.

- (b) Negative externalities arising from production of a good gives rise to market failure. Discuss the extent to which the price elasticity of demand for a good affects the effectiveness of using indirect taxation to correct this market failure. [15]

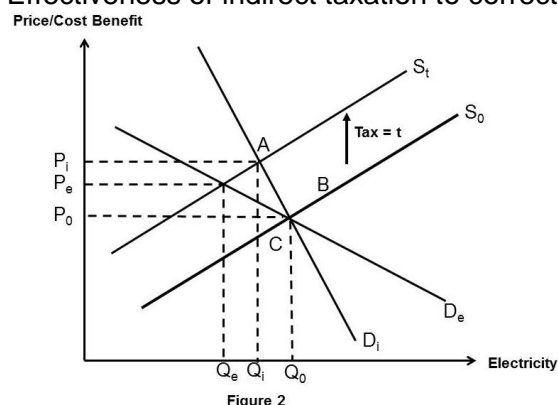
Intro: Third party cost incurred due to production of goods (e.g.: production of electricity, airline services) → Result in market failure.  
Use of taxation to correct market failure → Effectiveness could depend on PED of good but also due to other factors.

BP1: How taxation correct market failure from production of electricity



Impose tax of amount equal to MEC ( $P_0P_s$ ) → tax on production have same effect as an increase in COP of power plants → shift MPC to coincide to MSC. If tax is calculated correctly, it forced firms to internalize external cost → firms face true cost of production → Firms reduce output from  $Q_m$  to  $Q_s$  (where  $MSC = MSB$ ) → corrects market failure

BP2: Effectiveness of indirect taxation to correct market failure does depend on PED



May not be very effective if  $0 < PED < 1$ :

If dd of the good is price inelastic,  $D_i$  (eg: electricity), imposing a tax,  $t$  → shift supply curve from  $S_0$  to  $S_t$  → less than proportionate for in qty dd (from  $Q_0$  to  $Q_i$ ). If dd is price elastic,  $D_e$  → same amount of tax will cause eqm quantity to fall more than proportionately (from  $Q_0$  to  $Q_e$ ) → therefore larger amount of tax is required to reduce production of electricity from  $Q_M$  to social optimal

output.

Indirect taxation may more effective to correct market failure due to negative externalities arising from production of a good if  $PED > 1$

Eval However, although PED may affect the effectiveness of indirect taxation, government may still use it due to its benefits. Higher indirect taxation can enable the government to generate more tax revenue which can be used by government to subsidise R&D efforts to solve to the problem of negative externalities further. For example, tax on greenhouse gases can be used to subsidise R&D efforts to promote greener forms of energy which will lead to less carbon emission. In addition, in case of goods that have price inelastic demand (e.g. provision of air travel services by airlines) government can complement the policy of indirect taxation with other policy such as education efforts (e.g. campaigns to discourage domestic air travel and switch to other modes of transport) to make the demand for the good more price elastic so as to increase the effectiveness of indirect taxation.

BP3/4: Effectiveness of indirect taxation also depends on other factors - amount of information available, political acceptance

Difficult to determine the negative externalities in monetary terms due to lack of appropriate measuring device and non-quantifiable and long-term impact of the negative externalities (e.g. lack of measuring device for different types of pollutants, negative environmental effect of air pollution produced by power plant) → may end up over estimating amount of tax to impose → may reduce market eqm output less than social optimal output → deadweight loss incurred → reduce effectiveness of indirect taxation

Indirect taxation is also not popular among electorates → government may not willing or able to impose indirect tax to correct market failure if public do protest/express dissatisfaction → making indirect taxation not effective. For example, if dd for good is price inelastic, government will need to increase indirect tax by a large extent, this however may cause the price of the good to rise by a large extent thus may be deemed as inequitable as there will be a heavier burden on the poor, especially if the good is a necessity (e.g.: Electricity). Thus, the fear of a political backlash from this group of consumers may prevent the government from implementing the policy of taxation effectively.

The government will also need to consider the negative macroeconomic impact of indirect taxation. For example, many countries are not willing to implement the carbon tax for fear that it will lead to higher cost of production which will reduce the competitiveness of the domestic industries which will affect the macroeconomic performance of the country.

Conclusion/ Overall evaluation	PED of the good will affect effectiveness of indirect tax to reduce output of firms to social optimal output but this should be weighed against the benefits of taxation. In addition, there could be other important factors (e.g. ability to get accurate information and political acceptance) that will also determine the effectiveness as well. In the case where PED is an important consideration, the government may then have to consider using other policies such as regulation which is a direct measure and is hence not affected by PED.
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### **Requirements (Overview) for part (b)**

Candidates should show a good understanding how indirect taxation is used to negative externalities due to production of goods. Good candidates should be able to explain how indirect taxation works, how the price elasticity demand of the good produced could affect the effectiveness of indirect taxation and other possible factors that could affect the effectiveness of indirect taxation.