

# HS 200

# Environmental Studies

## **Environmental Economics**

## **Video 3**

Prof. Aditi Chaubal  
[aditichaubal@iitb.ac.in](mailto:aditichaubal@iitb.ac.in)

# Externalities and social optimum

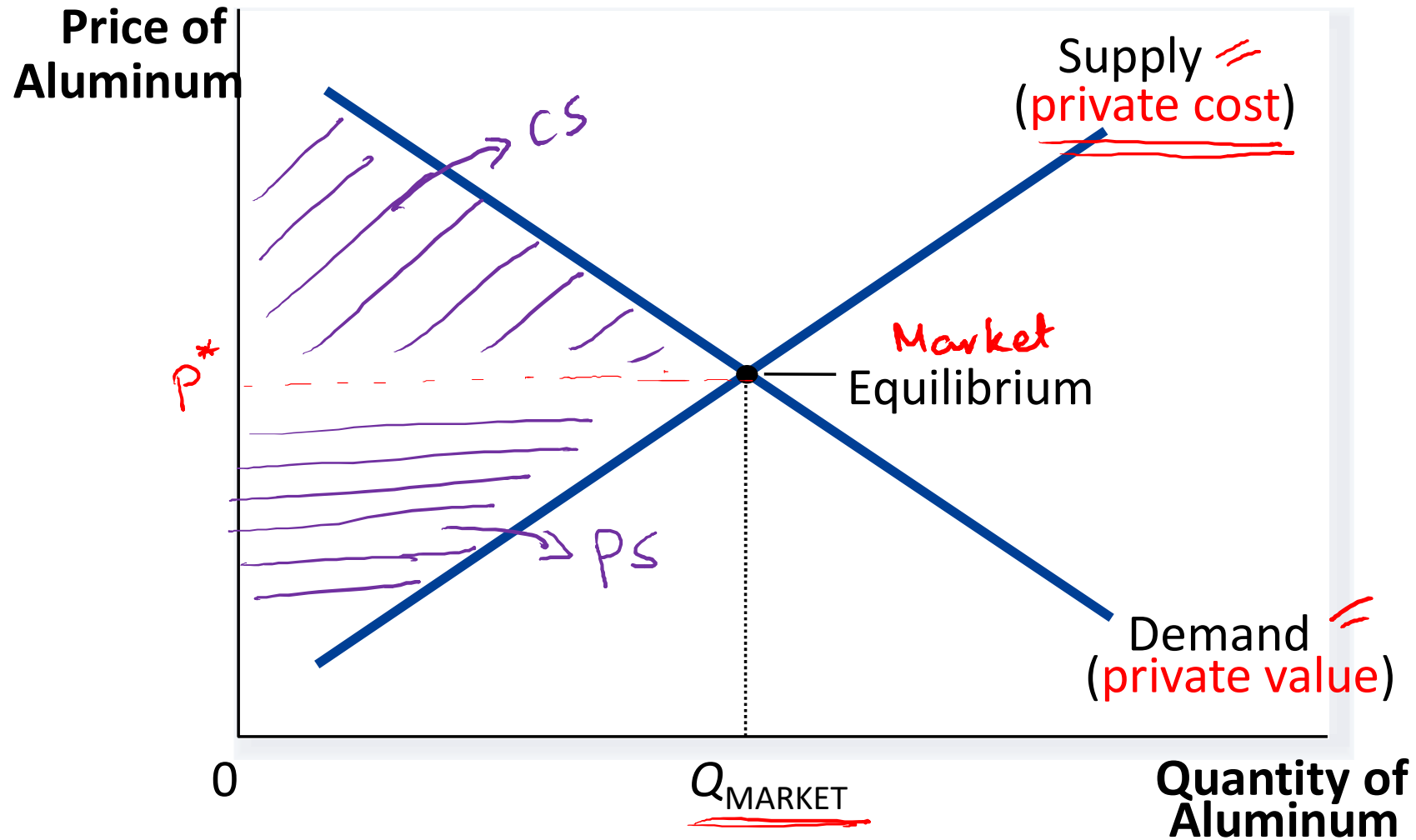
- Negative externality and social optimum
  - Social cost // [production]
  - Impact of social cost on demand and supply
  - Addressing / internalizing the externality
- Positive externality and social optimum
  - Social cost //
  - Impact of social cost on demand and supply
  - Addressing / internalizing the externality

Consumption externalities  
Social VALUE.

# Pollution and the social optimum [Negative externality]

- Consider the example of a factory producing a good (say, aluminum)
- The demand and supply curves for the firm help determine the market equilibrium
- The demand curve reflects the value of aluminum to consumers in terms of the prices they are willing to pay //
- The supply curve denotes the costs of producing (different quantities) aluminum
- In the **absence of government intervention**, the prices adjust to balance the demand and supply and attain the efficient market equilibrium (maximizing the total surplus)
- The quantity produced and consumed in the market equilibrium is efficient in the sense that it maximizes the sum of producer and consumer surplus.

# The Market for Aluminum



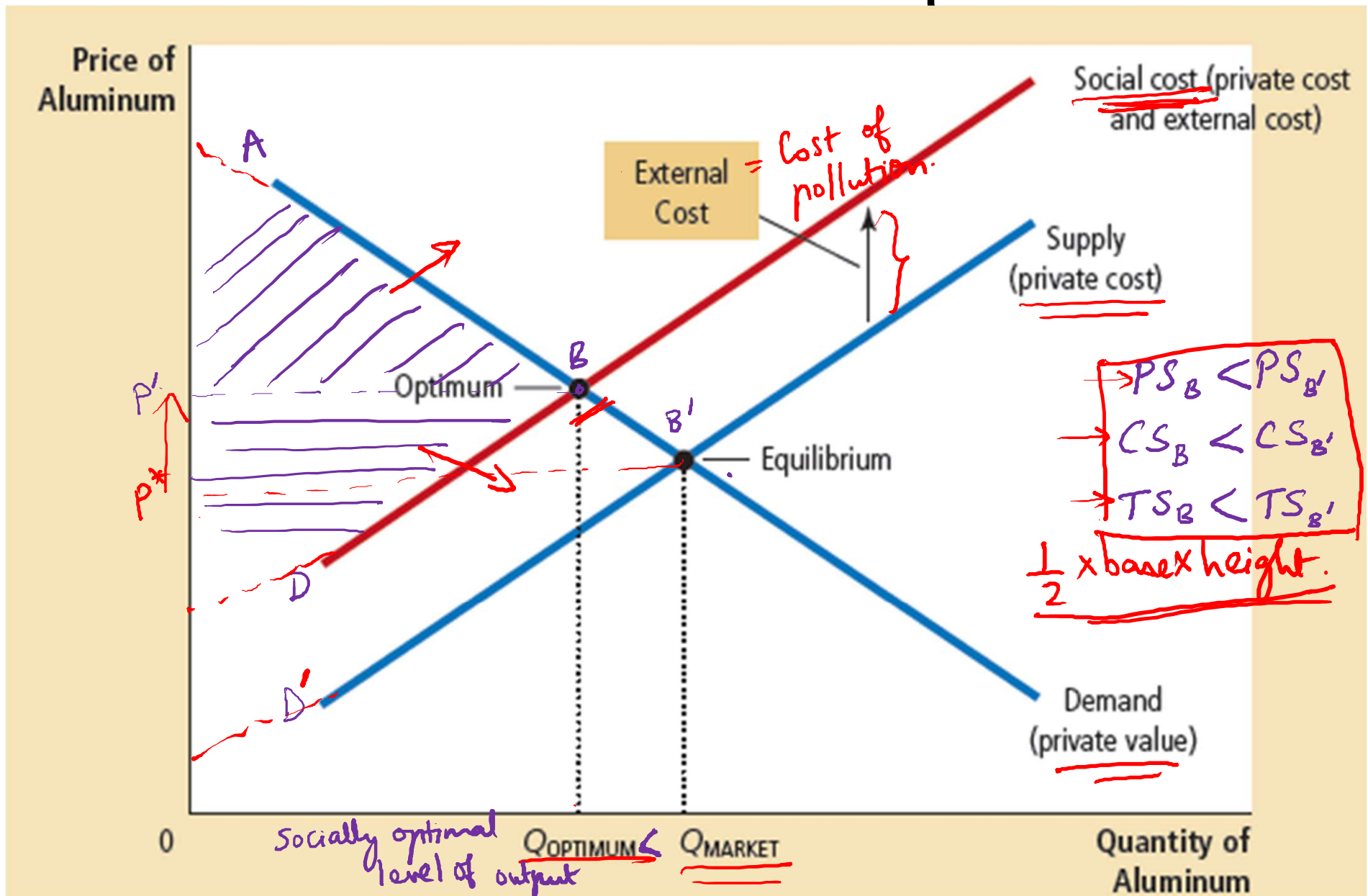
## *Introducing inefficiency:*

### *Case 1: Negative externality*

- If the aluminum factories emit pollution (a negative externality), then the cost to society of producing aluminum is larger than the cost to aluminum producers.
- For each unit of aluminum produced, the social cost includes:
  - = (the private costs to the producers)
  - + (the cost to the bystanders adversely affected by the pollution).

*Social cost > private cost.*
- Social cost curve lies above the supply curve as it accounts for the external costs imposed on society by the producers (supply curve only includes private cost)
- Cost of pollution =?

# Pollution and the social optimum



# Negative Externalities

- The intersection of the demand curve and the social-cost curve determines the socially optimal output level. ( $Q_{\text{optimal}}$ )
- The socially optimal output level is less than the market equilibrium quantity ( $Q_{\text{market}} > Q_{\text{optimal}}$ ).
- What does this mean in terms of producer and consumer surplus?
- Below the social optimal, value of aluminum to consumers exceeds social cost of producing it.
- The producer does not produce more than the social optimal as social cost of producing more exceeds its value to the consumers.

# Negative Externalities

- How can the social planner achieve the optimal outcome? *Optimal*
- *Internalizing an externality* involves altering incentives so that people take account of the external effects of their actions.
- To achieve the socially optimal output...
  - the government can *negative* *internalize an externality* by imposing a tax on the producer to reduce the *market* equilibrium quantity to the socially desirable quantity.



## Case 2: Positive Externalities

[production]  
Technology spillover

- When an externality benefits the bystanders, a positive externality exists.

- The **social cost** of the good <sup>is less than</sup> ~~exceeds~~ the **private cost**.

=> Social cost curve lies below the supply curve. //

- A **technology spillover** is a type of positive externality that exists when a firm's innovation or design not only benefits the firm, but enters the society's pool of technological knowledge and benefits society as a whole. //

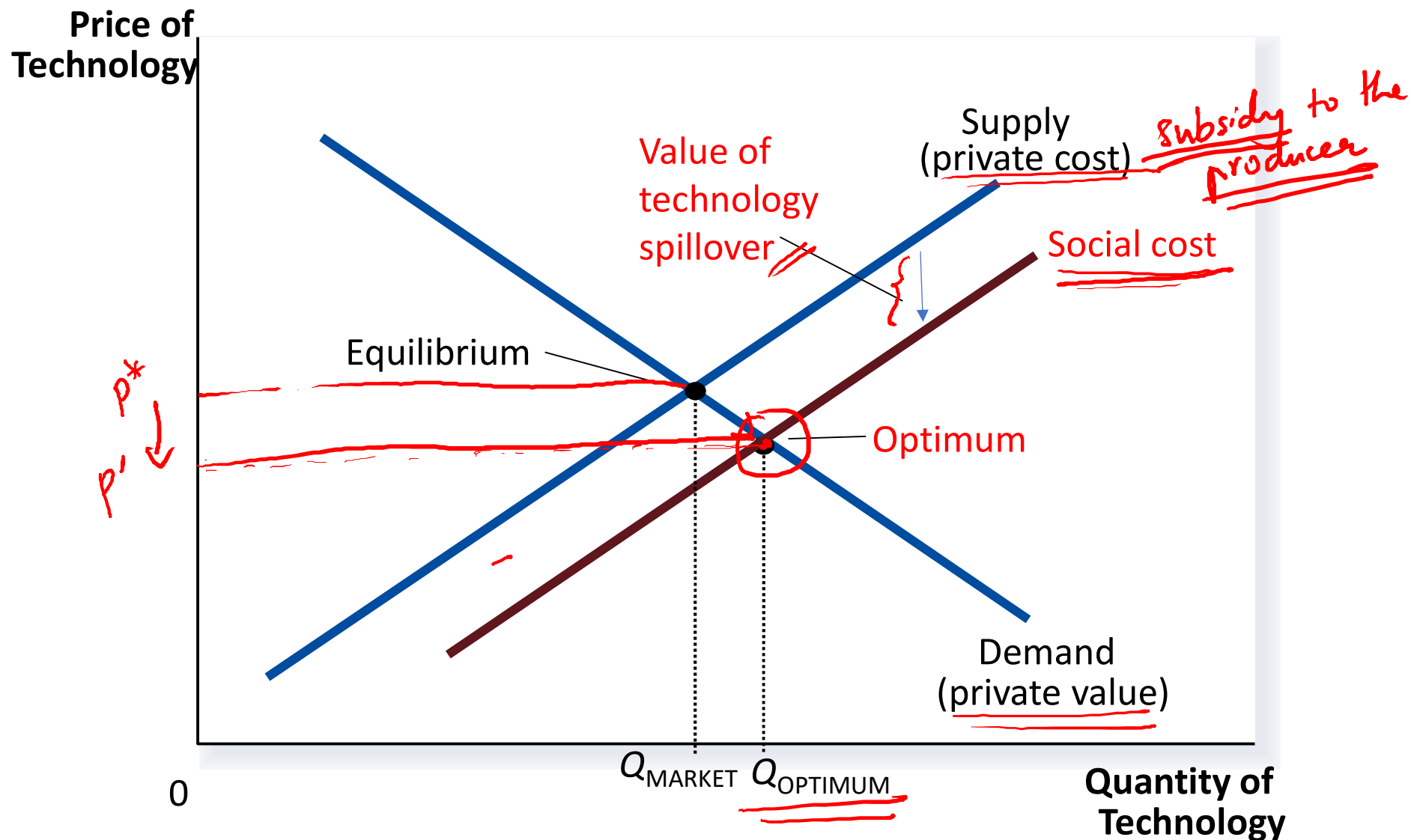
[production]

- Education imposes a positive externality on the society as the consumer would reap the benefits in terms of higher wages. [consumption]

- Production externality vs. consumption externality



# Technology spillover and the Social Optimum



# Positive Externalities

- The intersection of the supply curve and the social-cost curve determines the optimal output level.
  - The optimal output level is more than the equilibrium quantity ( $Q_{\text{optimum}} > Q_{\text{market}}$ ).
  - The market produces a smaller quantity than is socially desirable.
  - The social value of the good exceeds the private value of the good (social cost of production < private cost of production).

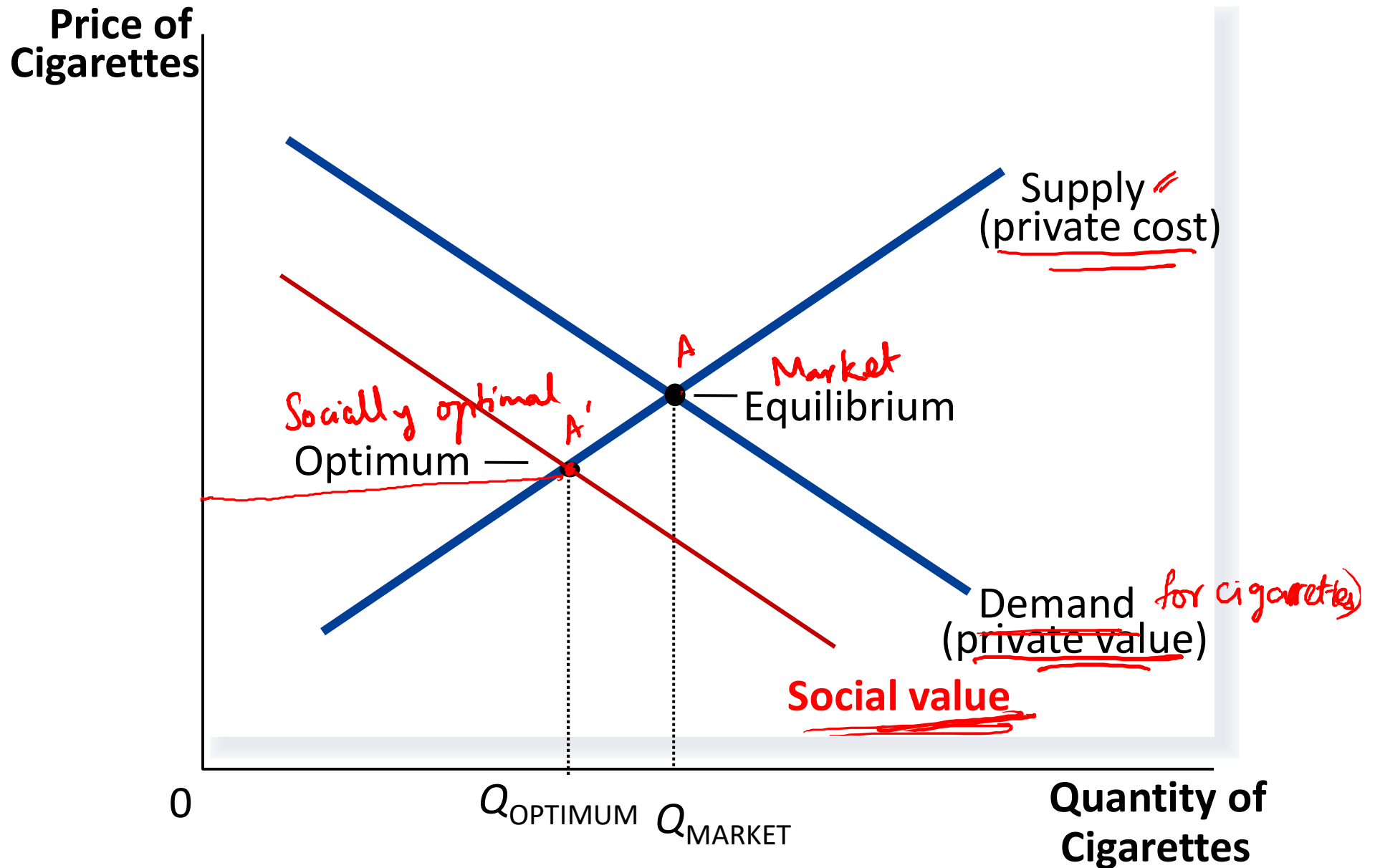
# Positive Externalities

- Internalizing positive externalities: //
- **Subsidies**
  - Used as the primary method for attempting to internalize positive externalities.
- **Industrial policy**
  - Government intervention in the economy that aims to promote technology-enhancing industries
    - **Patent** laws are a form of technology policy that give the individual (or firm) with patent protection a *property right* over its invention.
    - The patent is then said to internalize the externality.

# Consumption externalities

- Externalities related to consumption side of the market.
- The <sup>market</sup> demand curve does not reflect the value (positive or negative) of the good to society.
- **Negative consumption externality:** [Cigarettes]
  - Social value is less than the private value //
  - Social optimal is less than the quantity determined by the private market  
on the consumer.
  - *Internalizing*: Impose a tax (which results in fall in demand to socially optimal level) => demand for the good reduces => prices and quantities adjust to lower socially optimal values

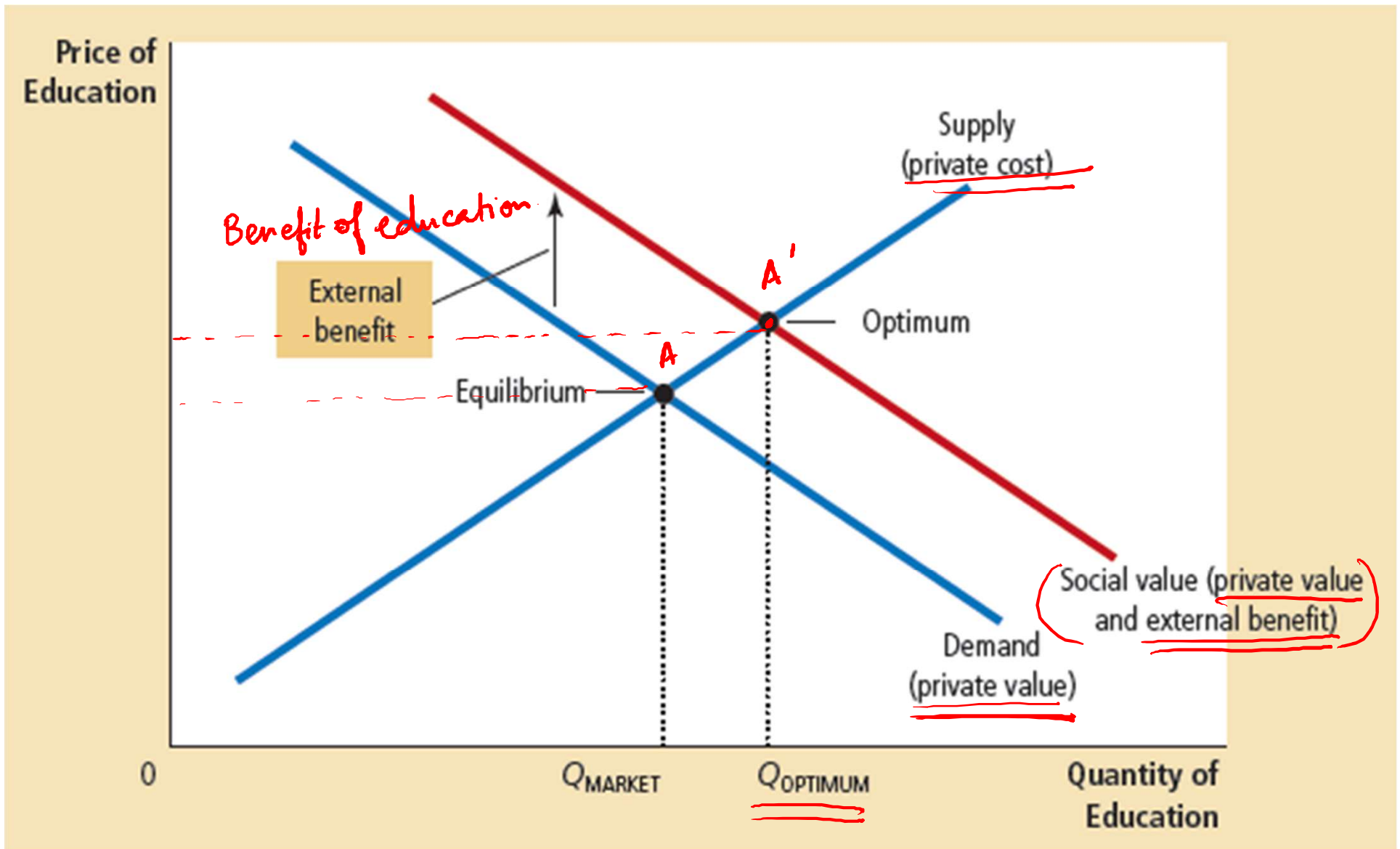
# Negative consumption externality



# Consumption externalities (contd...)

- **Positive consumption externality:** [Education]
  - Social value is greater than the private market value //
  - Social optimal quantity is greater than the quantity determined by the private market
- **Internalizing:** Provide a subsidy (consumer)  $\Rightarrow$  demand for the good increases  $\Rightarrow$  at that demand, a higher price is charged by the market resulting in the socially optimal equilibrium

# Positive consumption externality





# Summarizing –

- Negative externalities (production or consumption) result in markets producing a larger quantity (at market equilibrium) than is socially optimal.  
→ Tax.
- Positive externalities (production or consumption) result in markets producing a ~~larger~~ quantity (at market equilibrium) than is socially optimal.  
→ Subsidy  
→ Industrial policy.

# Thank you