香港科技大學
THE HONG KONG
UNIVERSITY OF SCIENCE
AND TECHNOLOGY

Environmental and Health Economics
ECON/ENVR/SOSC 2310

Guojun He

2019 Spring

Efficiency of Markets

- Do the equilibrium price and quantity maximize the total welfare of buyers and sellers?

- Market equilibrium reflects the way markets allocate scare resources

- Equilibrium in the market results in maximum total welfare for both the consumers and the producers of the products

Welfare

- Consumer surplus measures economic welfare from the buyer's side

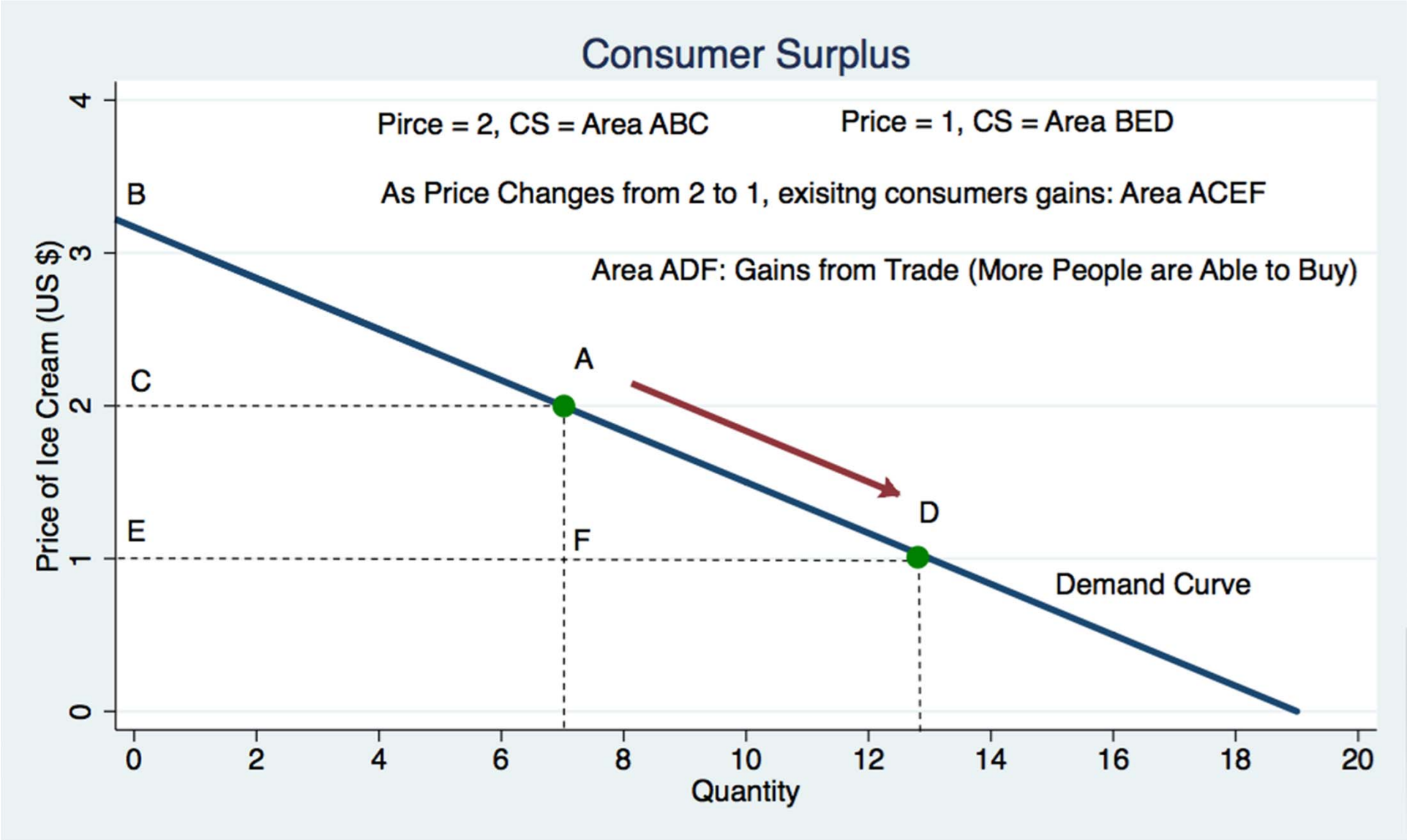
- Producer surplus measures economic welfare from the seller's side

Consumer Surplus

- Willingness to pay is the maximum price that a buyer is willing and able to pay for a good
  - It measures how much a buyer values the good or service

- Consumer Surplus (CS) is the amount a buyer is willing to pay for a good minus the amount the buyer actually pays for it

Consumer Surplus



Consumer Surplus

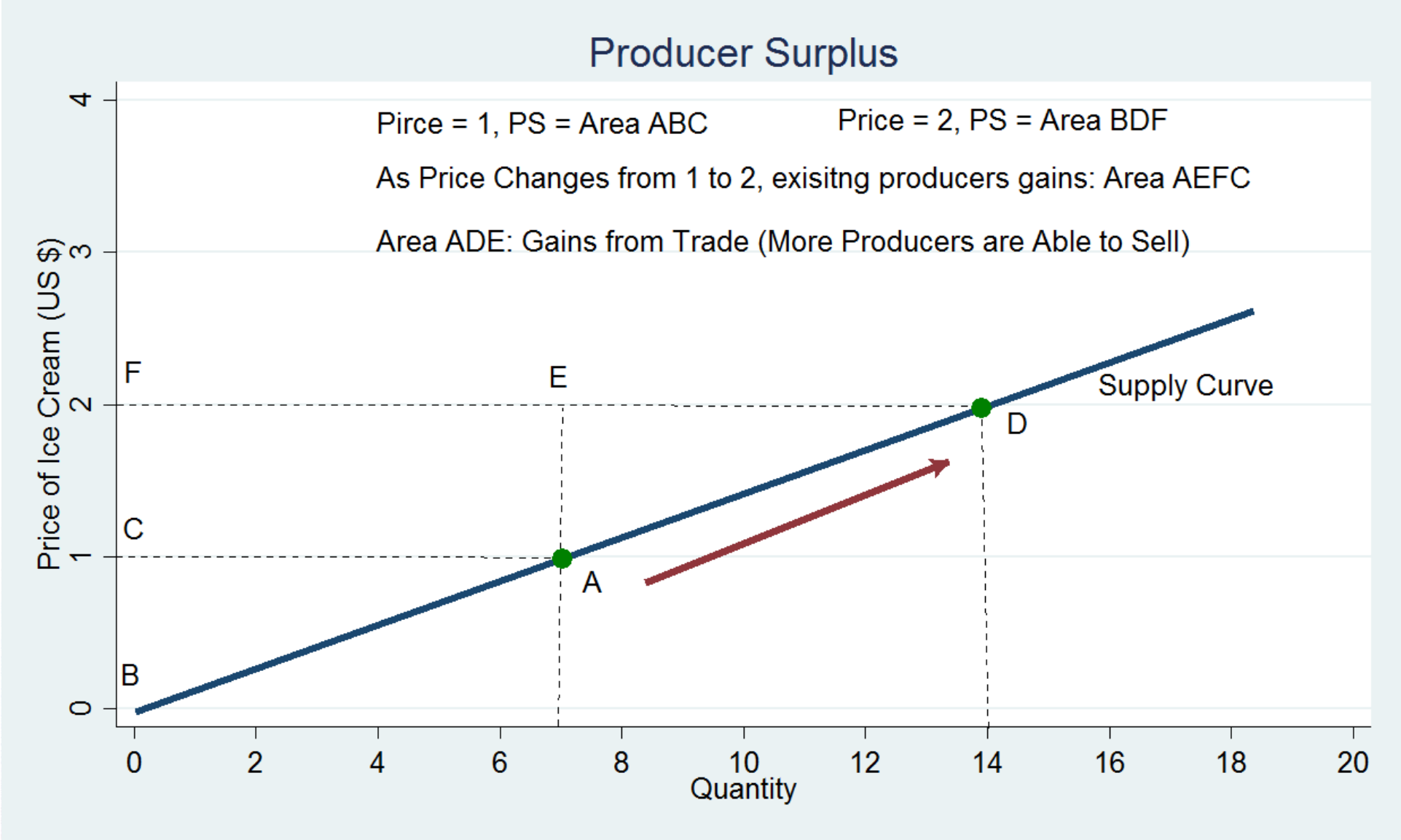
- The market demand curve depicts the various quantities that buyers would be willing and able to purchase at different price.

- The area below the demand curve and above the price measures CS.

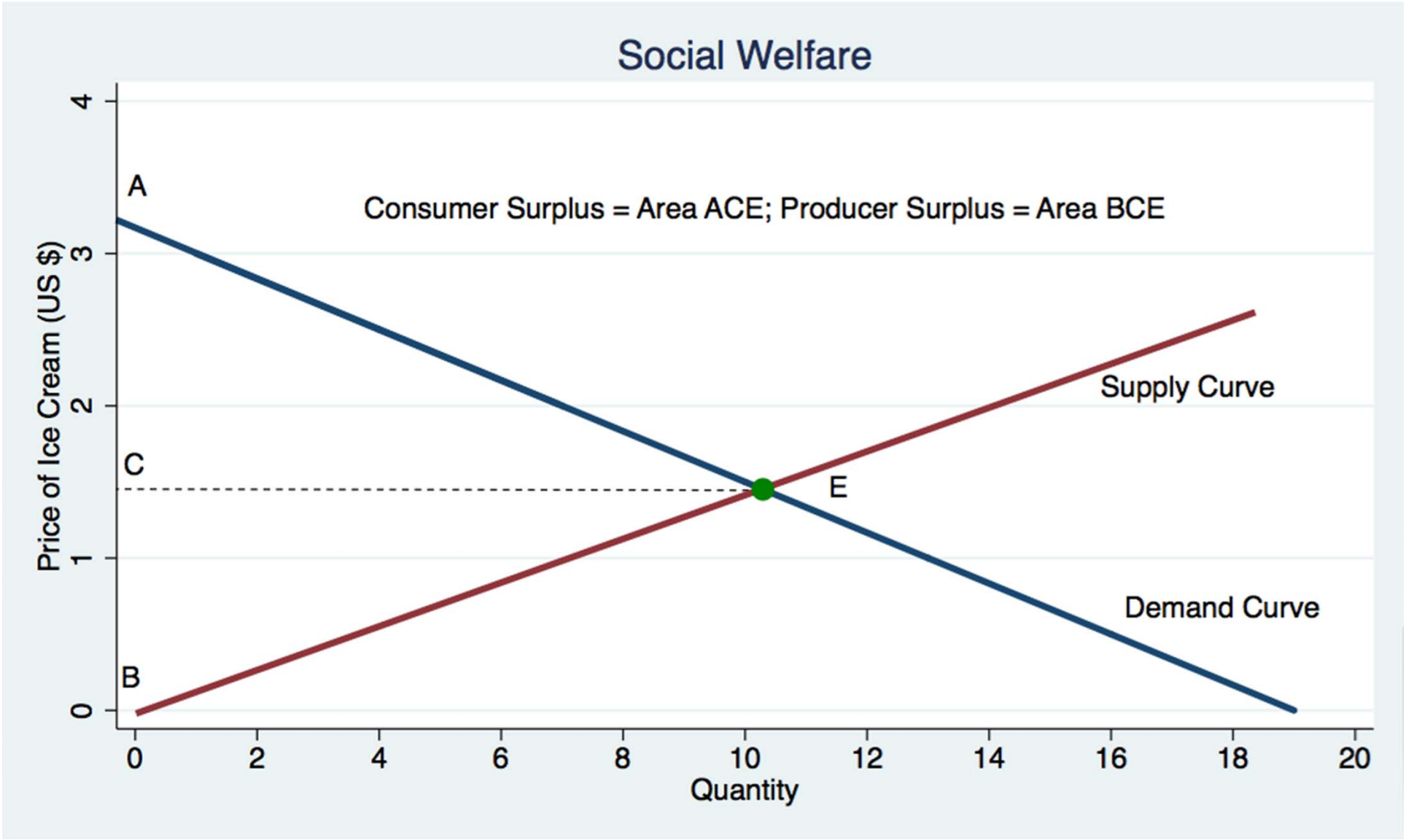
Producer Surplus

- Producer Surplus (PS) is the amount a seller is paid minus the cost of production
- At any quantity, the price given by the supply curve shows the cost of the marginal seller, the seller who would leave the market if the price were any lower
- The area below the price and above the supply curve measures PS

Producer Surplus



Consumer Surplus and Producer Surplus



Market Efficiency

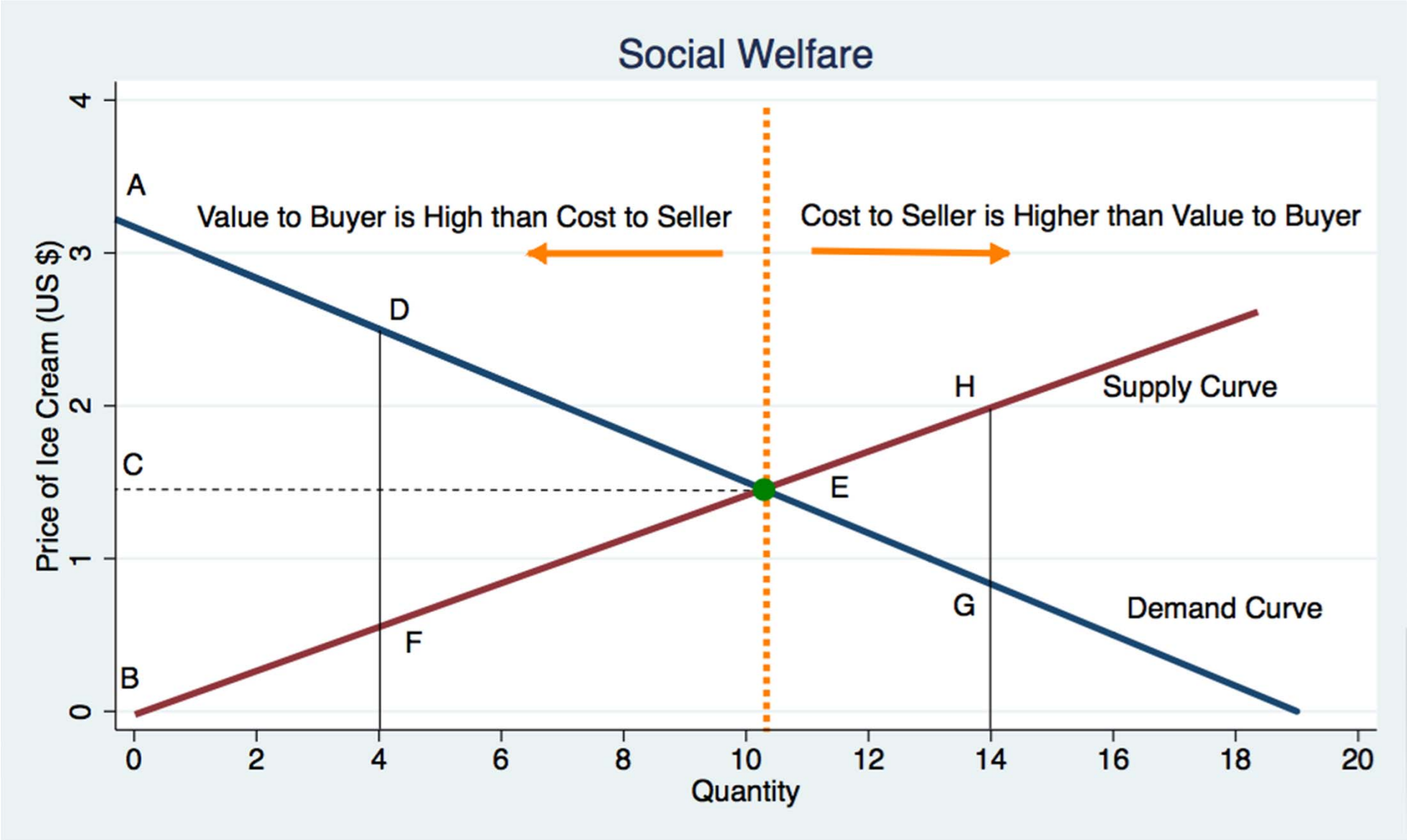
- CS = Value to buyers – Amount paid by buyers
- PS = Amount received by sellers – Cost to sellers
- Total Surplus = CS + PS = Value to buyers – Cost to sellers

Market Efficiency

- Market Efficiency is achieved when the allocation of resources maximizes total surplus

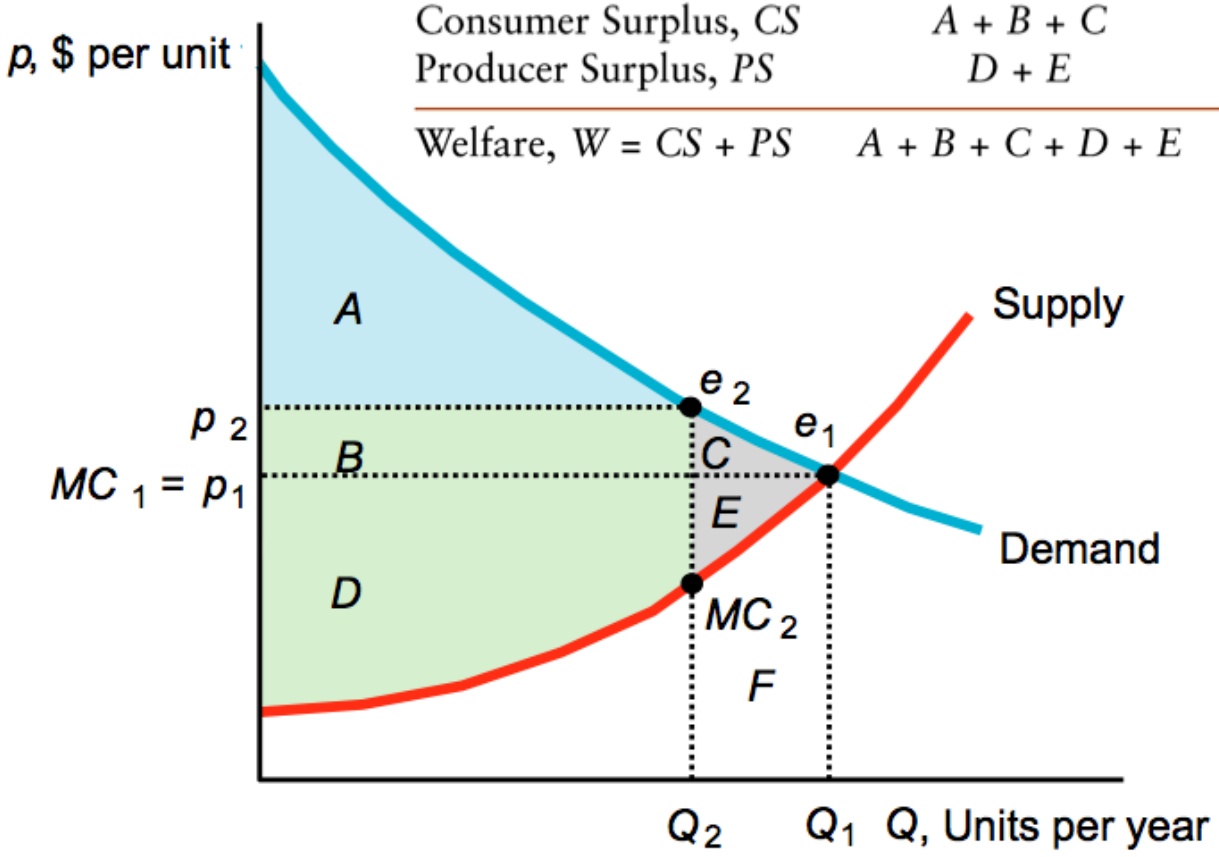
- In addition of market efficiency, a social planner might also care about equity – the fairness of the distribution of well-being among the various buyers and sellers

Efficiency of the Equilibrium



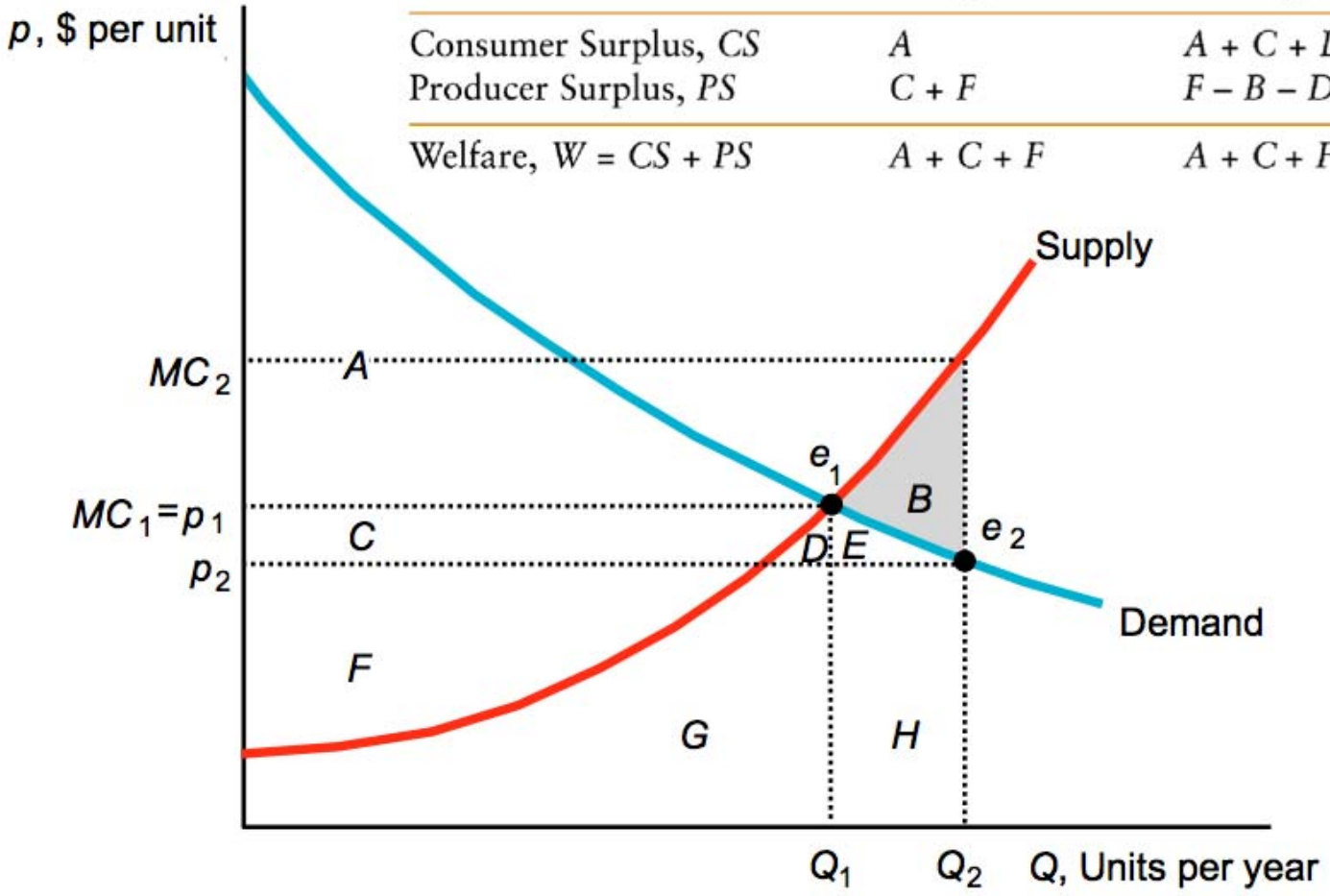
Produce Less

	Competitive Output, Q_1 (1)	Smaller Output, Q_2 (2)	Change (2) – (1)
Consumer Surplus, *CS*	$A + B + C$	A	$-B - C = \Delta CS$
Producer Surplus, *PS*	$D + E$	$B + D$	$B - E = \Delta PS$
Welfare, $W = CS + PS$	$A + B + C + D + E$	$A + B + D$	$-C - E = \Delta W = DWL$



Produce More

	Competitive Output, Q_1	Larger Output, Q_2	Change
Consumer Surplus, *CS*	*A*	*A* + *C* + *D* + *E*	*C* + *D* + *E* = Δ*CS*
Producer Surplus, *PS*	*C* + *F*	*F* − *B* − *D* − *E*	−*B* − *C* − *D* − *E* = Δ*PS*
Welfare, *W* = *CS* + *PS*	*A* + *C* + *F*	*A* + *C* + *F* − *B*	−*B* = Δ*W* = *DWL*



Three Insights about Market Outcomes

- Free markets allocate the supply of goods to the buyers who value them highly
- Free markets allocate the demand for goods to sellers who can produce them at least cost
- Free market produce the quantity of goods that maximizes the sum of CS and PS

Efficiency of the Market

- Free markets achieves efficiency, the social planner shall leave the market outcome as the buyers/sellers find it.

- Adam Smith's "Invisible Hand"

- "Markets are usually a good way to organize economic activity."

Competitive Markets and Efficiency

- A competitive economy will result in an efficient allocation of resources.

- Assumptions:
  - Assumption 1: The market is perfectly competitive, there exists no market power
  - Assumption 2: There is no externalities

In reality…

- In reality, these assumptions are often violated: both market powers and externalities are common

- However, the “Efficient Market” provides us a benchmark or reference

- We compare the outcomes under various conditions with the “Efficient Market” outcome.

Market Power

- If a market system is not perfectly competitive, market power may result.
- Market power is the ability to influence prices.
- Market power can cause markets to be inefficient because it keeps price and quantity from the optimal level.

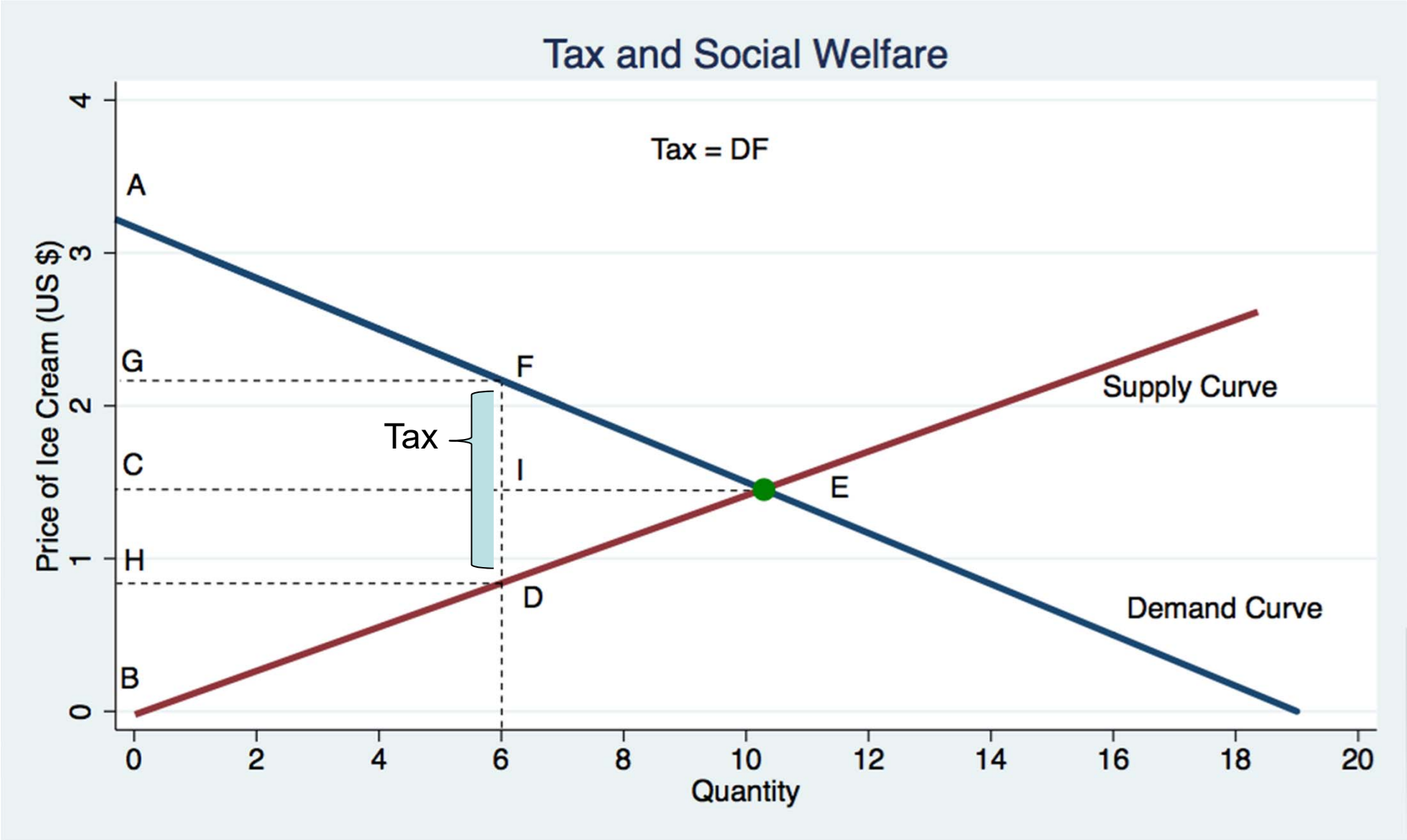
Externalities

- Externalities are created when a market outcome affects individuals other than buyers and sellers in that market.
- Welfare in a market depends on more than just the value to the buyers and the cost to the sellers.
- When buyers and sellers don't consider externalities, the equilibrium in the market can be inefficient

Taxes and Social Welfare

- How do taxes affect social welfare?
- Recall:
  - A tax places a wedge between the price buyers pay and the prices sellers receive
  - The quantity sold falls below the level that would be sold without a tax
  - Government Tax Revenue = Tax Rate * Quantity sold

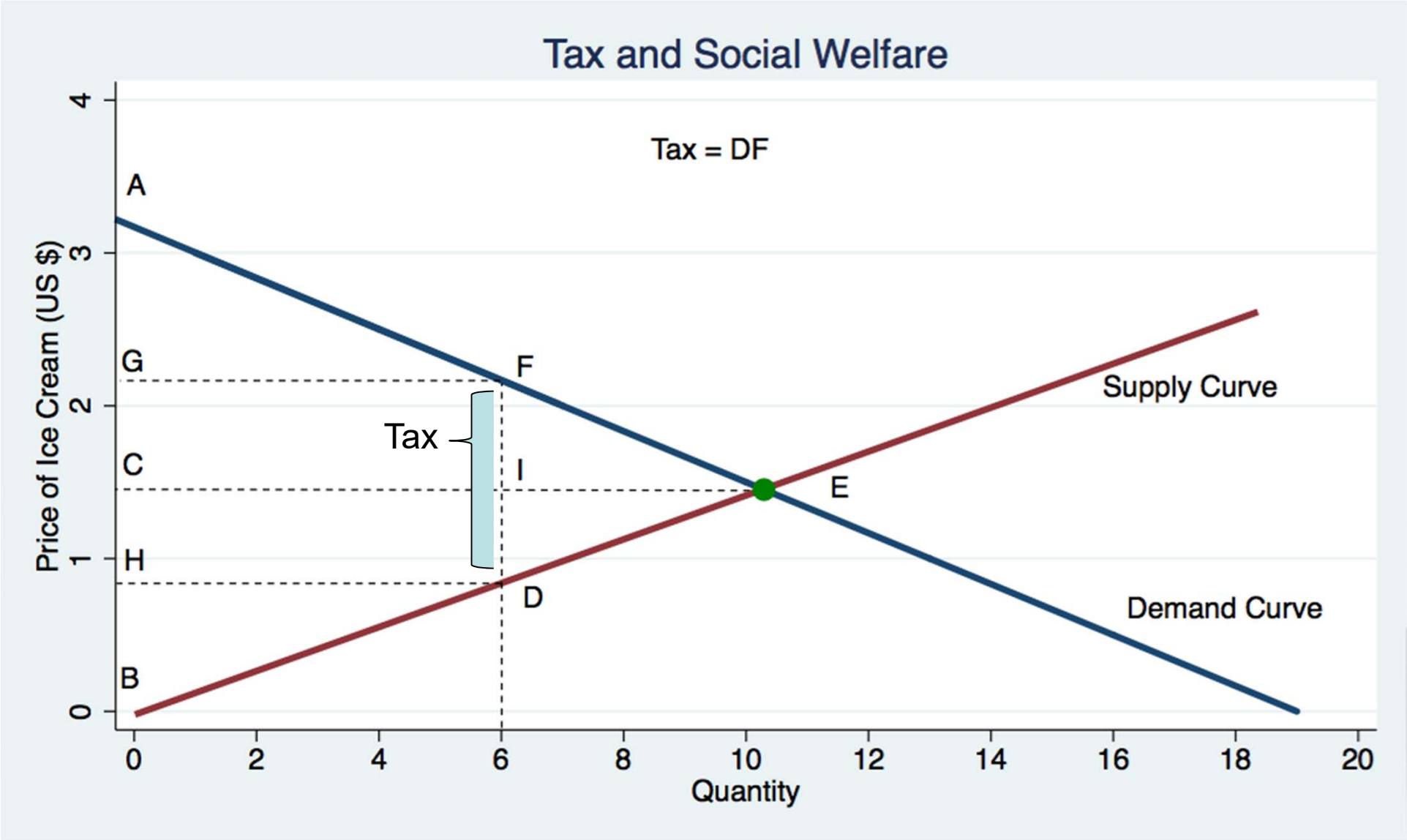
The Effect of a Tax



How a Tax Affects Welfare

- Total welfare:
  - Consumer Surplus
  - Producer Surplus
  - Government Revenue
- Compare the total welfare before and after a tax

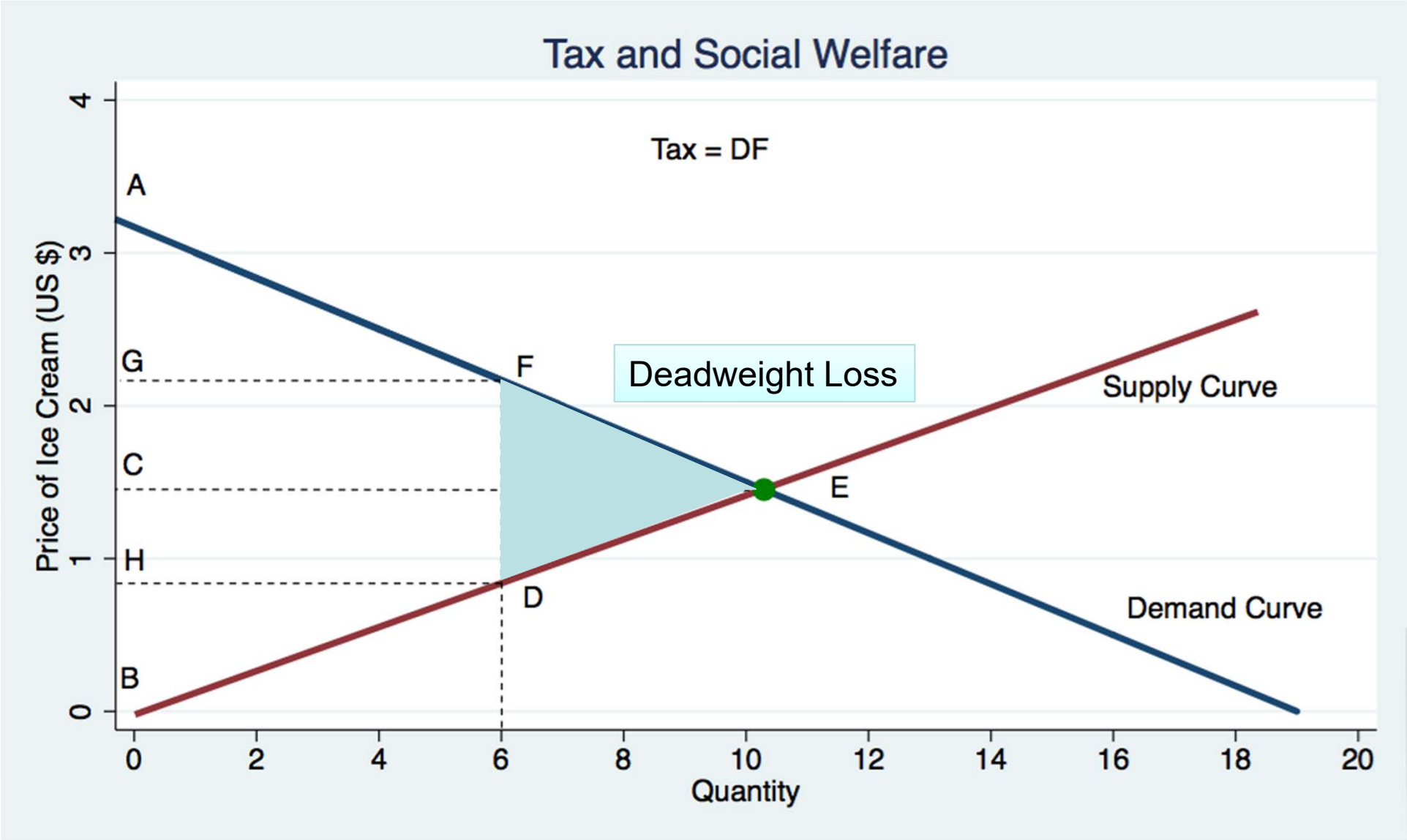
The Effect of a Tax



Welfare Effect of a Tax

- No Tax:
  - Social Welfare = CS + PS = Area ABE
- After Tax:
  - CS = AGF; PS = BHD
  - Tax Revenue (Government) = Tax * Quantity = HDFG
  - Total = AFDB
- Welfare Difference: ABE – AFDB = DEF
- It is called Deadweight Loss.

Deadweight Loss



Tax Distortion

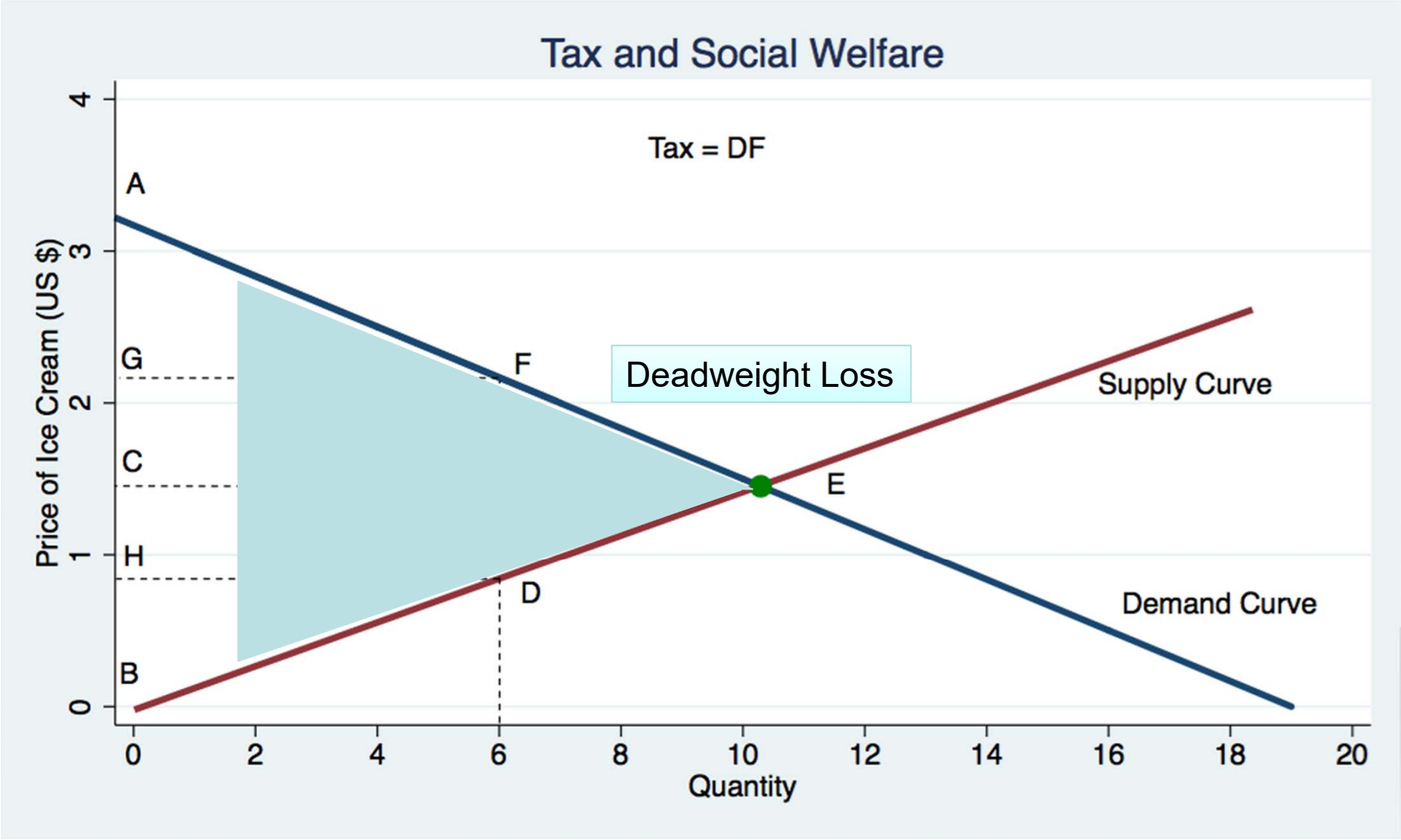
- The losses to buyers and the sellers exceed the revenue of the government.
- This fall in total surplus is called deadweight loss.
- We call it a tax distortion.
- Taxes cause deadweight losses because they prevent buyers and sellers from realizing some of the gains from trade.

Tax, Deadweight Loss and Tax Revenue

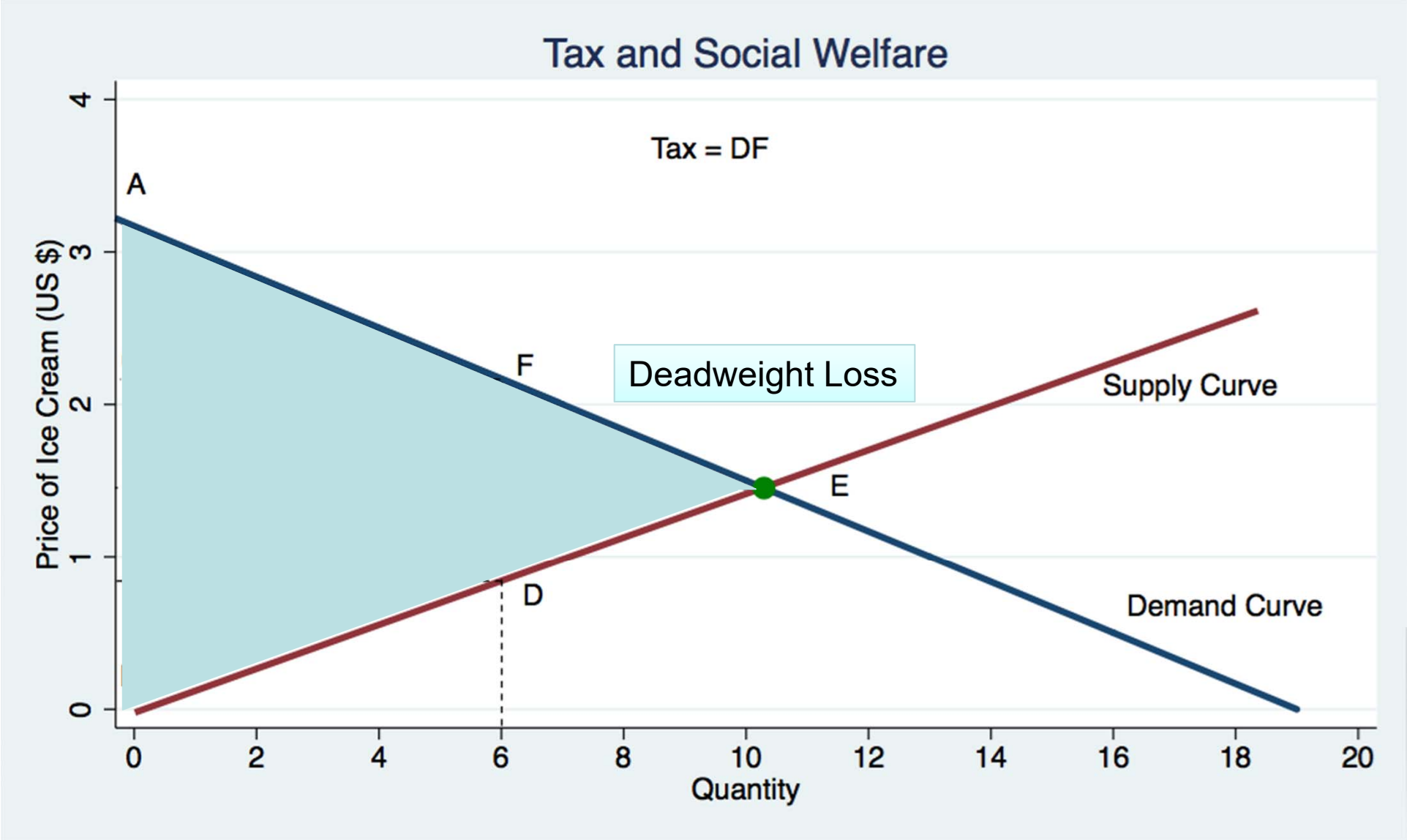
- As the government increases tax rate, the deadweight lost increases

- The tax revenue first rises with the size of a tax, but then, as the tax gets larger, the market shrinks so much that tax revenue starts to fall.

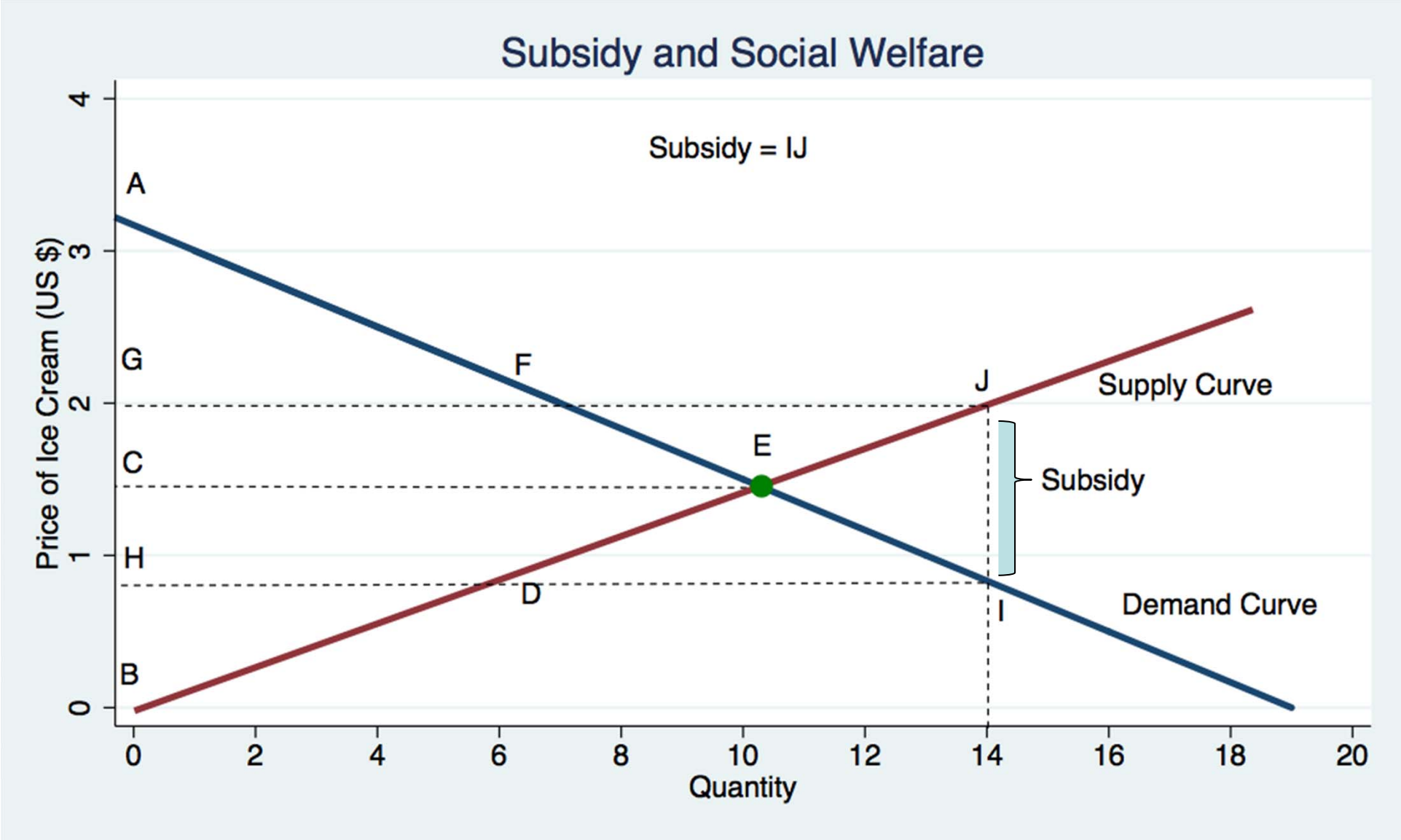
Deadweight Loss



Tax is so high that it eliminates the market, results in no tax revenue at all



Subsidy and Social Welfare



Subsidy: Welfare Analysis

- Consumer Surplus:
  - Before? After?
- Producer Surplus:
  - Before? After?
- Other parties: such as the government:
  - Before? After?
- Total Welfare?
- Deadweight Loss?

Pareto Optimal

- ***Pareto Optimal (or Pareto Efficient)***
  - A resource allocation such that you cannot improve any individual's welfare without hurting at least one other individual.

Pareto Improvement

- **Pareto improvement** is defined to be a change to a different allocation that makes at least one individual better off without making any other individual worse off, given a certain initial allocation of goods among a set of individuals.

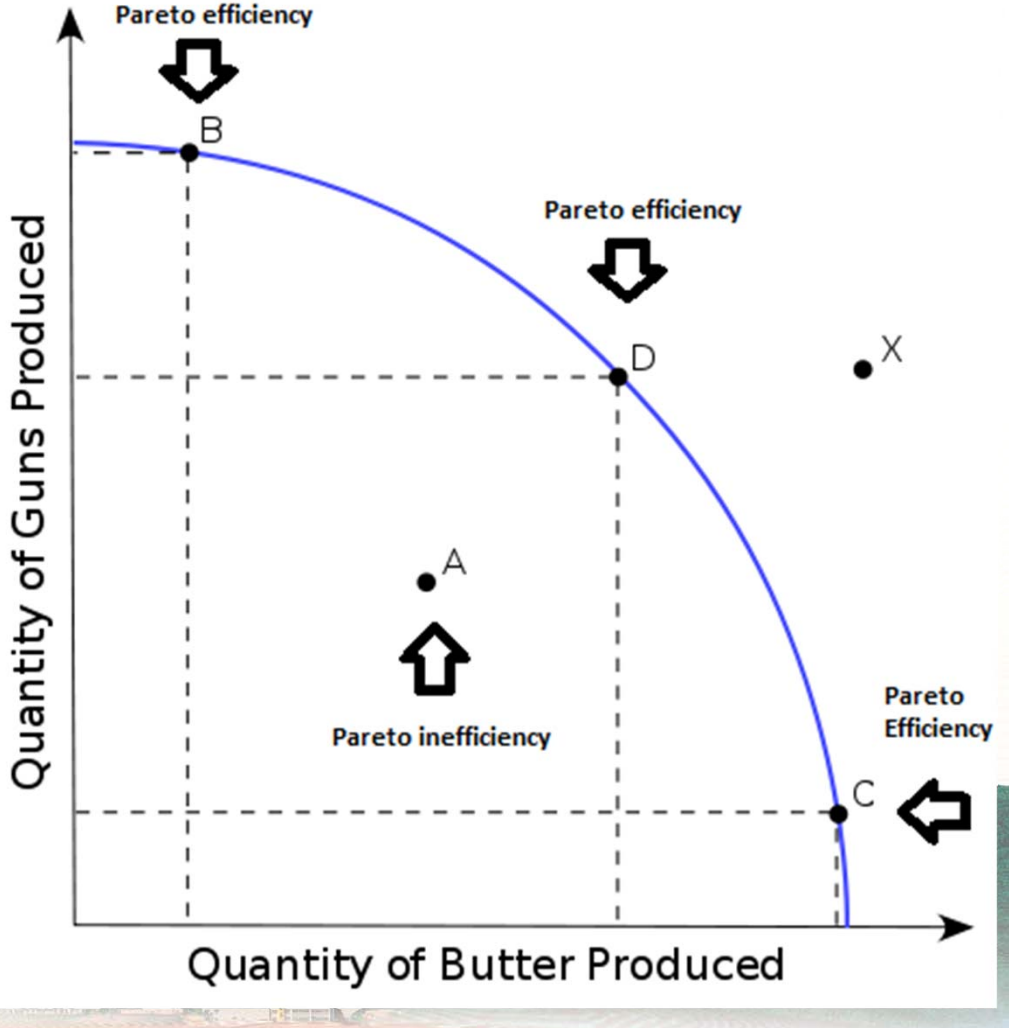
Pareto Optimal

- Two people and two goods
- Apples and bananas
  - A likes apples and dislikes bananas
  - B likes bananas and dislikes apples.

- Pareto efficient allocation: Person A has all the apples and Person B has the bananas.

Pareto Improvement Example

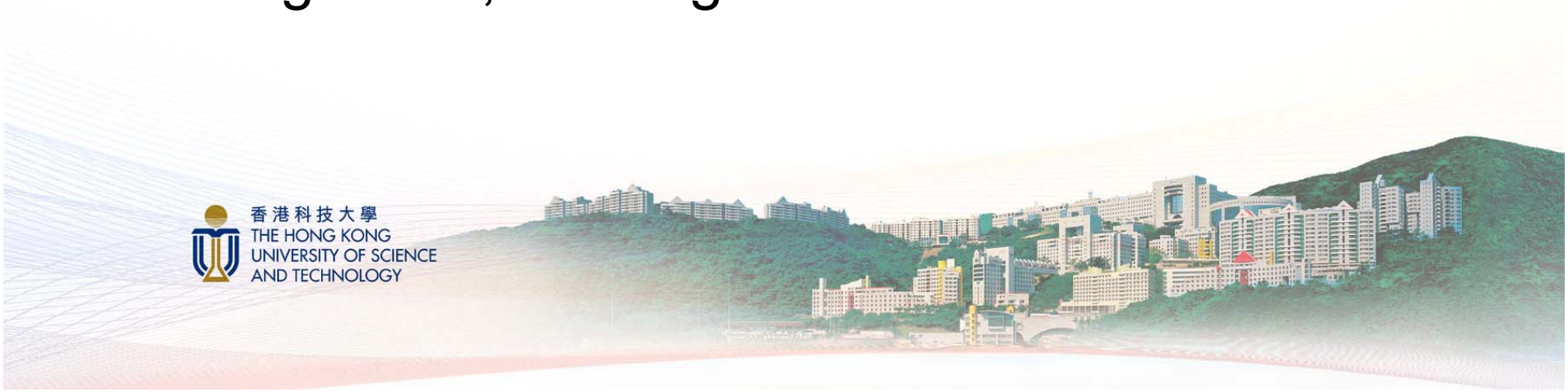
A production-possibility frontier is an example of a Pareto-efficient frontier.



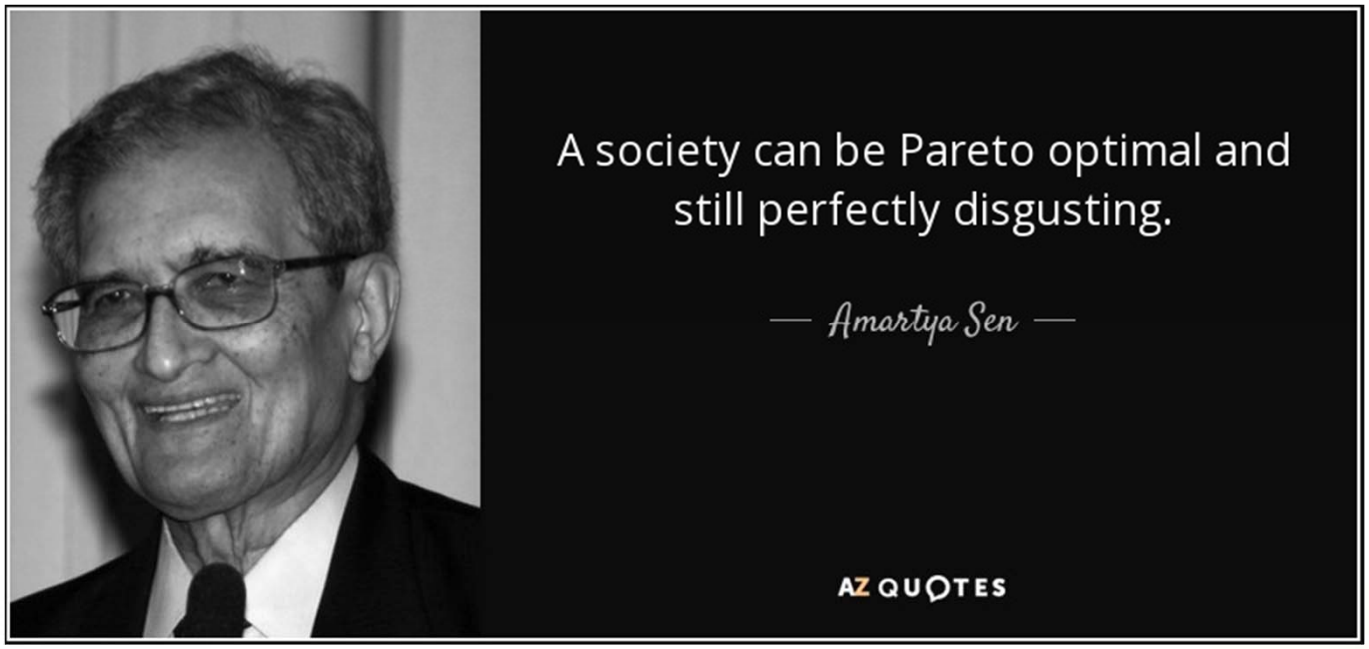
香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

Dividing Gold Coins

- Two pirates (A and B) decided to divide 100 gold coins, which of the following is Pareto efficient allocation:
  - A gets 100, and B gets 0
  - A gets 0, and B gets 100
  - A gets 50, and B gets 50



- Pareto efficiency does not necessarily result in a socially desirable distribution of resources: it makes no statement about equality, or the overall well-being of a society.



Pareto Efficiency and Economic Efficiency

- When the social welfare is maximized, we say it is efficient (economic efficiency).

- A change from an inefficient allocation to an efficient one is not necessarily a Pareto improvement.
  - A change in economic policy eliminates a monopoly
  - Loss to the monopolist will be more than offset by the gain in efficiency