Consumer, Producer Surplus, and Government Policy

Econ 50 | Lecture 18 | March 3, 2016

Lecture

- Welfare Analysis:
  Consumer & Producer Surplus
- Market Interventions:
  Taxes, Subsidies, and
  Wage and Price Controls
  - Under perfect competition
  - With market power

Group Work

- Price ceilings, market power, and consumer surplus
  [HW8 #1]
- Solving for an equilibrium with taxes
  [HW8 #2]

Part I
Welfare Analysis:
Consumer and Producer Surplus

Total Welfare for an Economy

- **Consumer welfare** is **total benefit** minus **total expenditure**:

$$TB(Q) - PQ$$

- **Producer welfare** is **total revenue** minus **total cost**:

$$PQ - TC(Q)$$

- **Total welfare** = Consumer welfare + producer welfare

$$TB(Q) - PQ + PQ - TC(Q) = TB(Q) - TC(Q)$$

Total Welfare for an Economy

- **Total welfare** = Consumer welfare + producer welfare

$$TB(Q) - PQ + PQ - TC(Q) = TB(Q) - TC(Q)$$

- **Marginal welfare:**

$$TB'(Q) - P + P - TC'(Q) = TB'(Q) - TC'(Q)$$

Price-taking consumers set this equal to zero

Price-taking firms set this equal to zero

Consumer Optimization

- Think about the consumer optimization problem:

$$u(x, y) + \lambda(I - P_x x - P_y y)$$

- The FOC for good X is:

$$MU_x - \lambda P_x = 0$$

- Rearranging:

$$P_x = \frac{MU_x}{\lambda}$$

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- Rearranging:

Dollars per unit $P_x = \dfrac{MU_x}{\lambda}$

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- Rearranging:

Dollars per unit $P_x = \dfrac{MU_x}{\lambda}$ **Utils per unit of X**

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- The FOC for good X is:

$$MU_x - \lambda P_x = 0$$

- Rearranging:

Dollars per unit $P_x = \frac{MU_x}{\lambda}$ **Utils per unit of X** / **Utils per dollar**

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- Think about the consumer optimization problem:

$$u(x,y) + \lambda(I - P_x x - P_y y)$$

- The FOC for good X is:

$$MU_x - \lambda P_x = 0$$

- Rearranging:

Marginal Benefit to Consumers [Dollars per unit]

Dollars per unit $P_x = \frac{MU_x}{\lambda}$

MU_x: **Utils per unit of X**

λ: **Utils per dollar**

Consumer Optimization

- Think about the consumer optimization problem:

$$u(x,y) + \lambda(I - P_x x - P_y y)$$

"Consumers set Price = Marginal Benefit"

- The FOC for good X is:

$$MU_x - \lambda P_x = 0$$

- Rearranging:

Marginal Benefit to Consumers [Dollars per unit]

Dollars per unit $P_x = \frac{MU_x}{\lambda}$

MU_x: **Utils per unit of X**

λ: **Utils per dollar**

Firm Optimization

“Firms set Price = Marginal Cost”

Consumers set

Price Consumers Pay = Marginal Benefit

Firms set

Price Firms Receive = Marginal Cost

If Price Consumers Pay = Price Firms Receive
and Quantity Demanded = Quantity Supplied
then Marginal Benefit = Marginal Cost

and <u>Total Surplus is Maximized</u>

Consumers set

Price Consumers Pay = Marginal Benefit

Firms set

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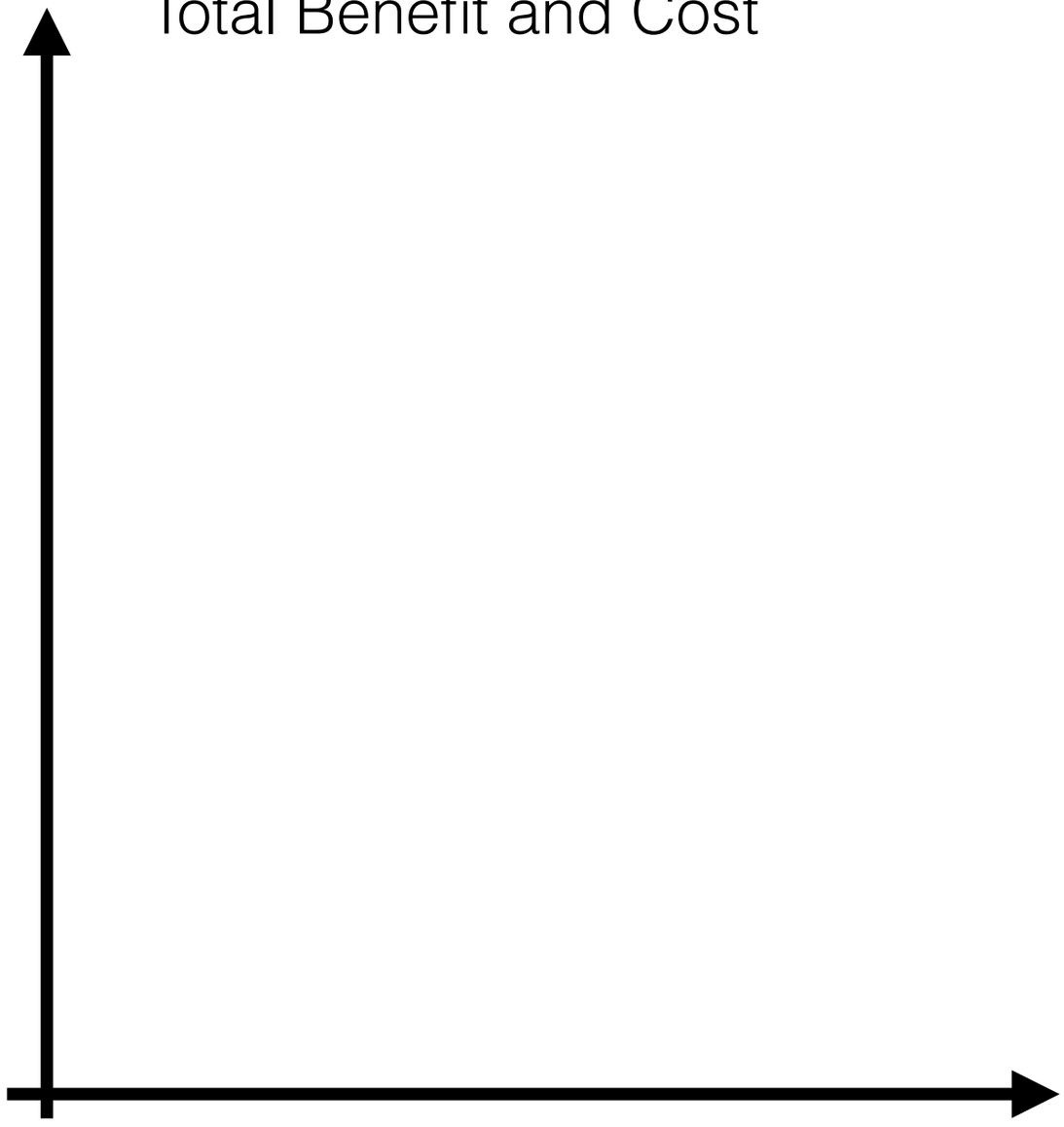
Why?

“The marginal benefit of the last unit consumed is equal to the marginal cost of producing it.”

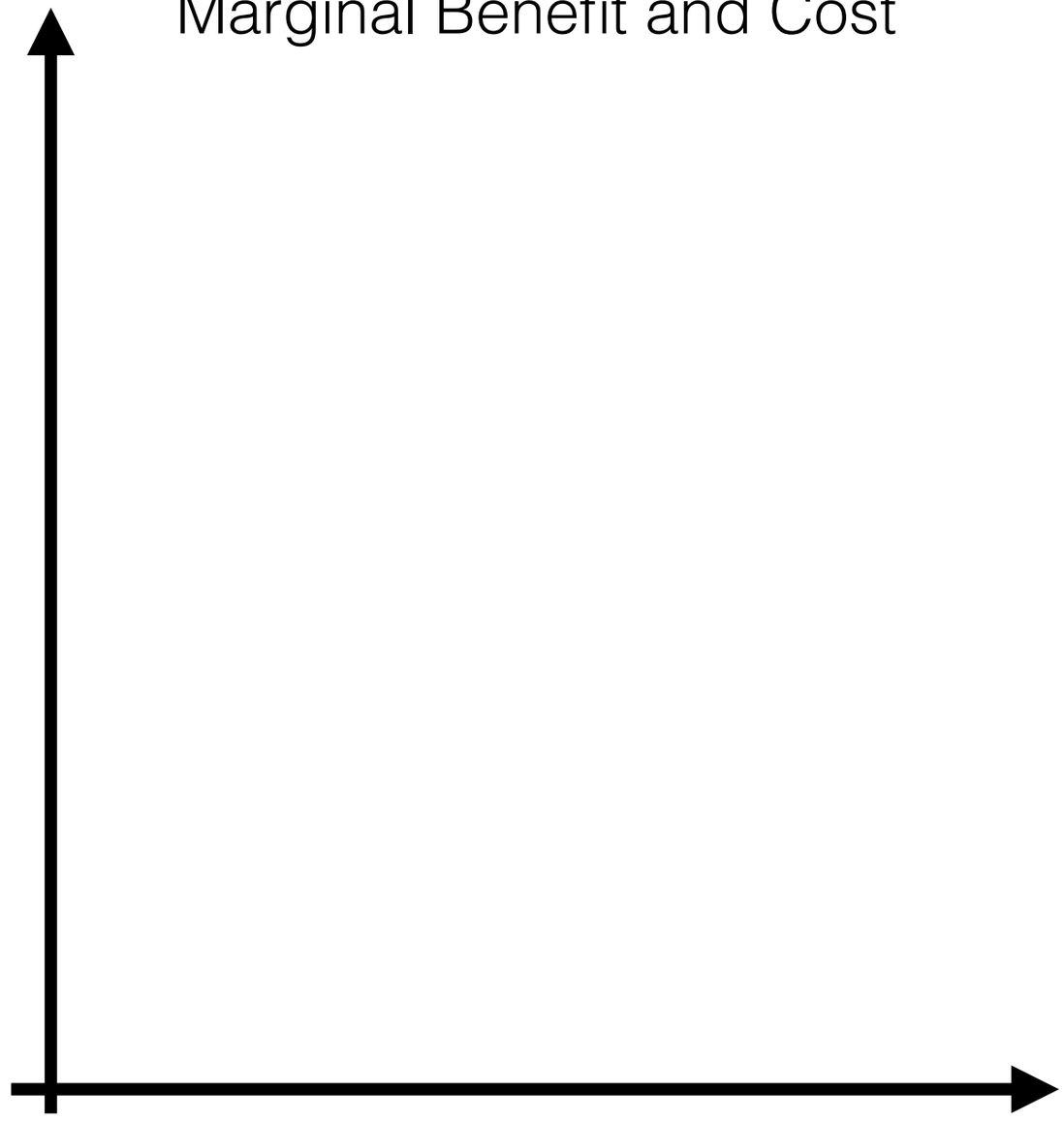
Welfare Analysis: Graphical Analysis

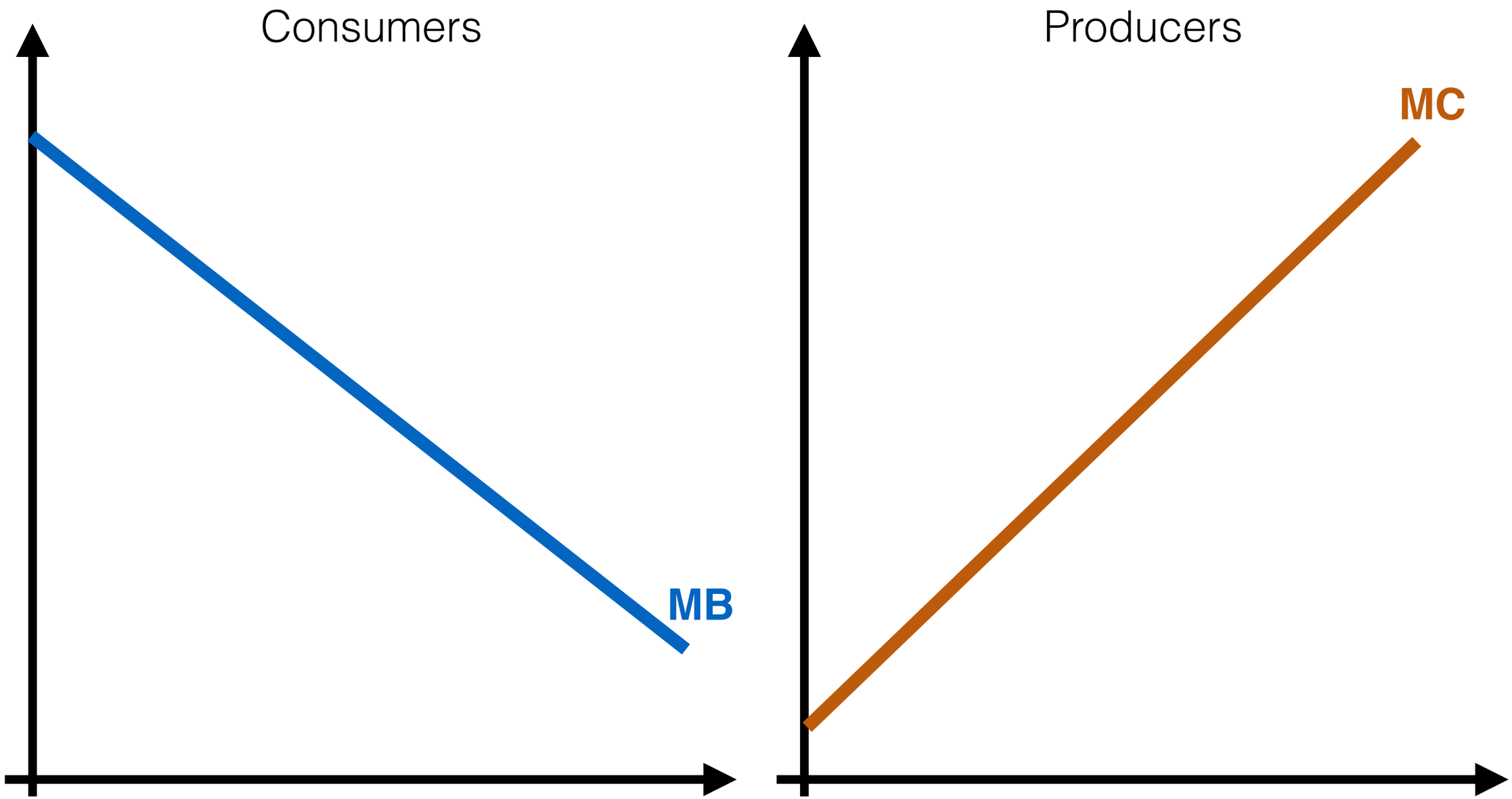
- CS and PS are represented by **areas** in a graph showing P vs. Q
  - Measured in dollars
  - Check the units: Price ($/unit) x Quantity (units) = $
- As areas, they represent the summation (integrals) of marginal benefit and marginal cost.
- Constant of integration (economic profit, economic rents) not included in calculation of consumer and producer surplus

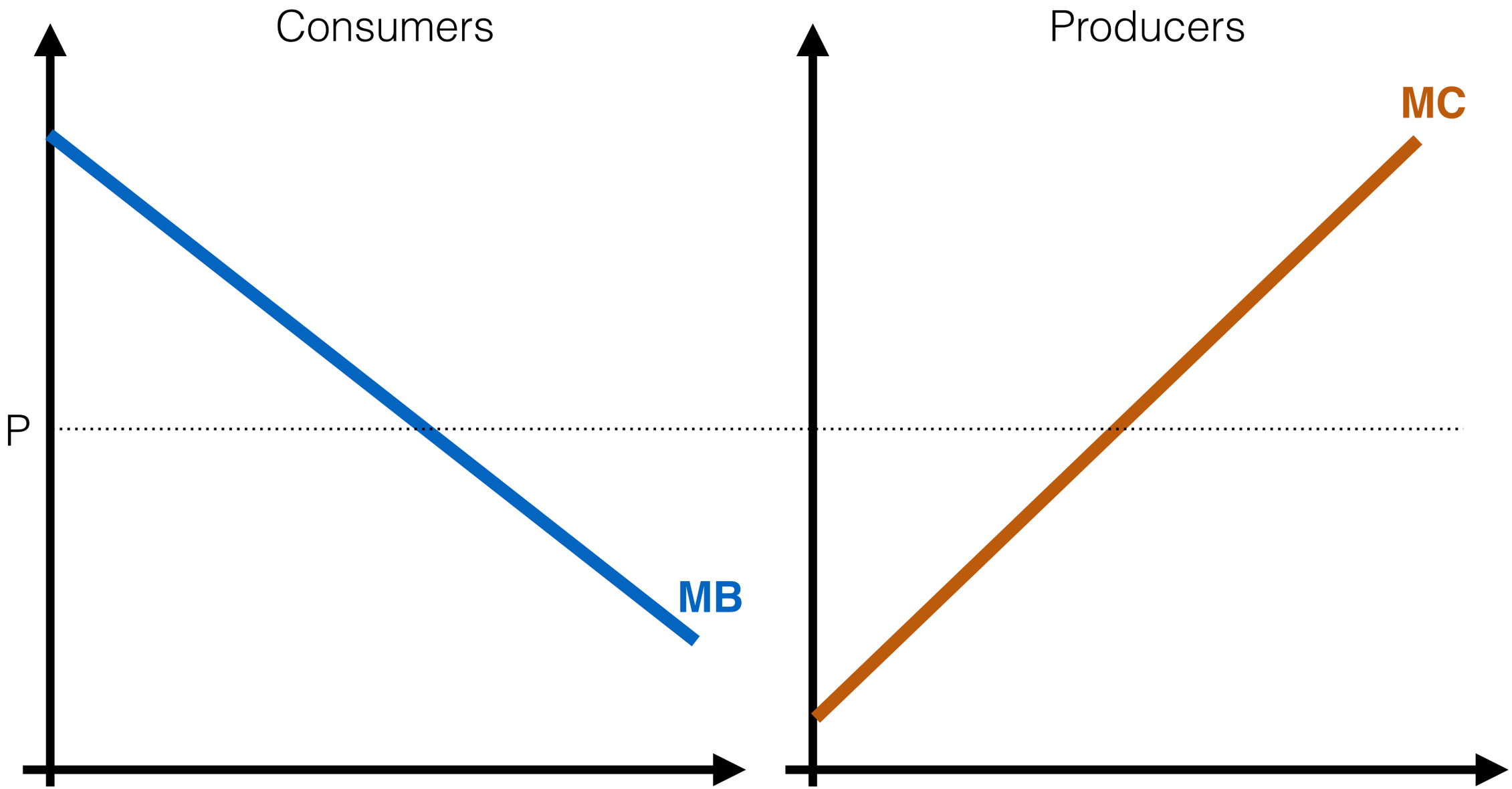
Total Benefit and Cost

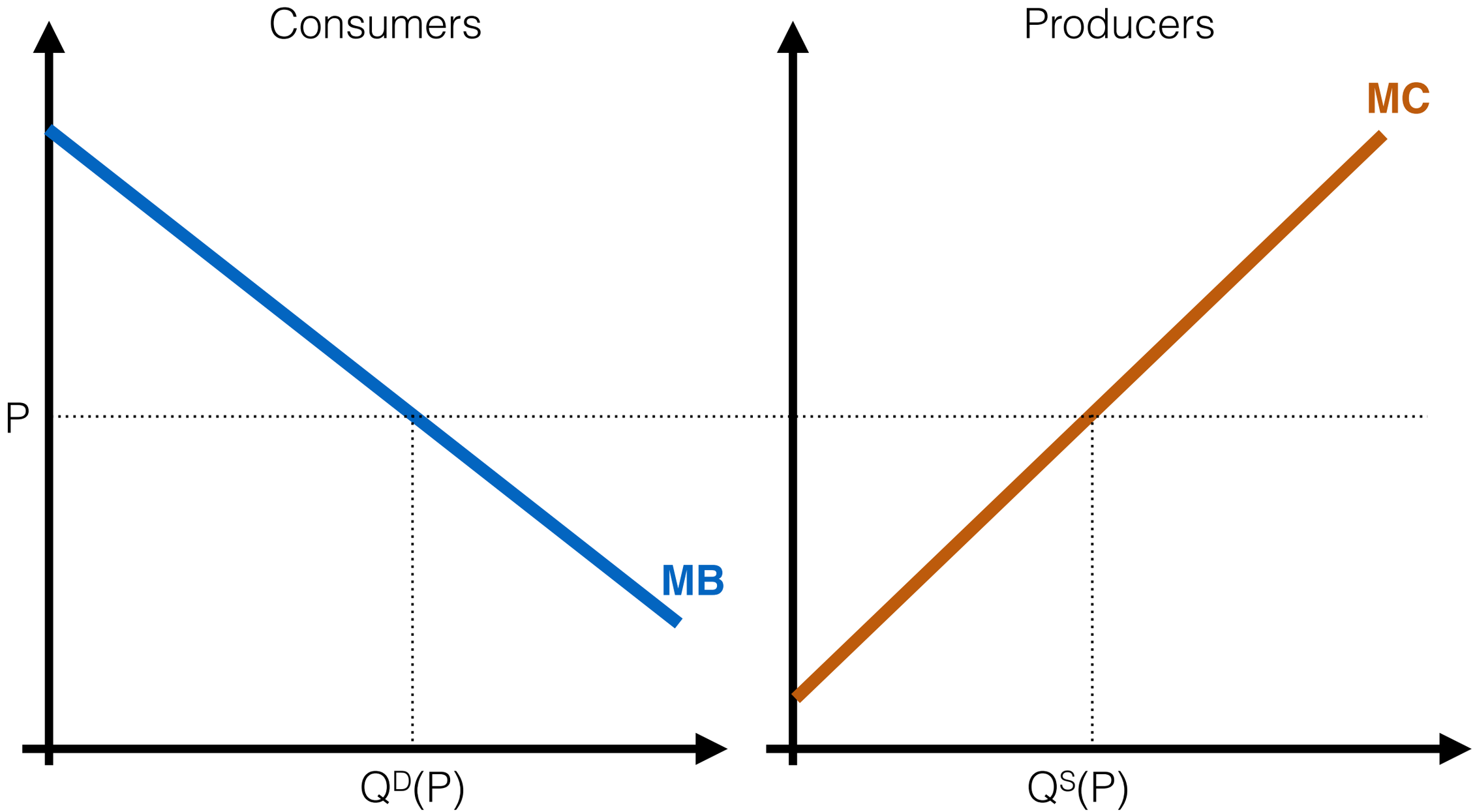


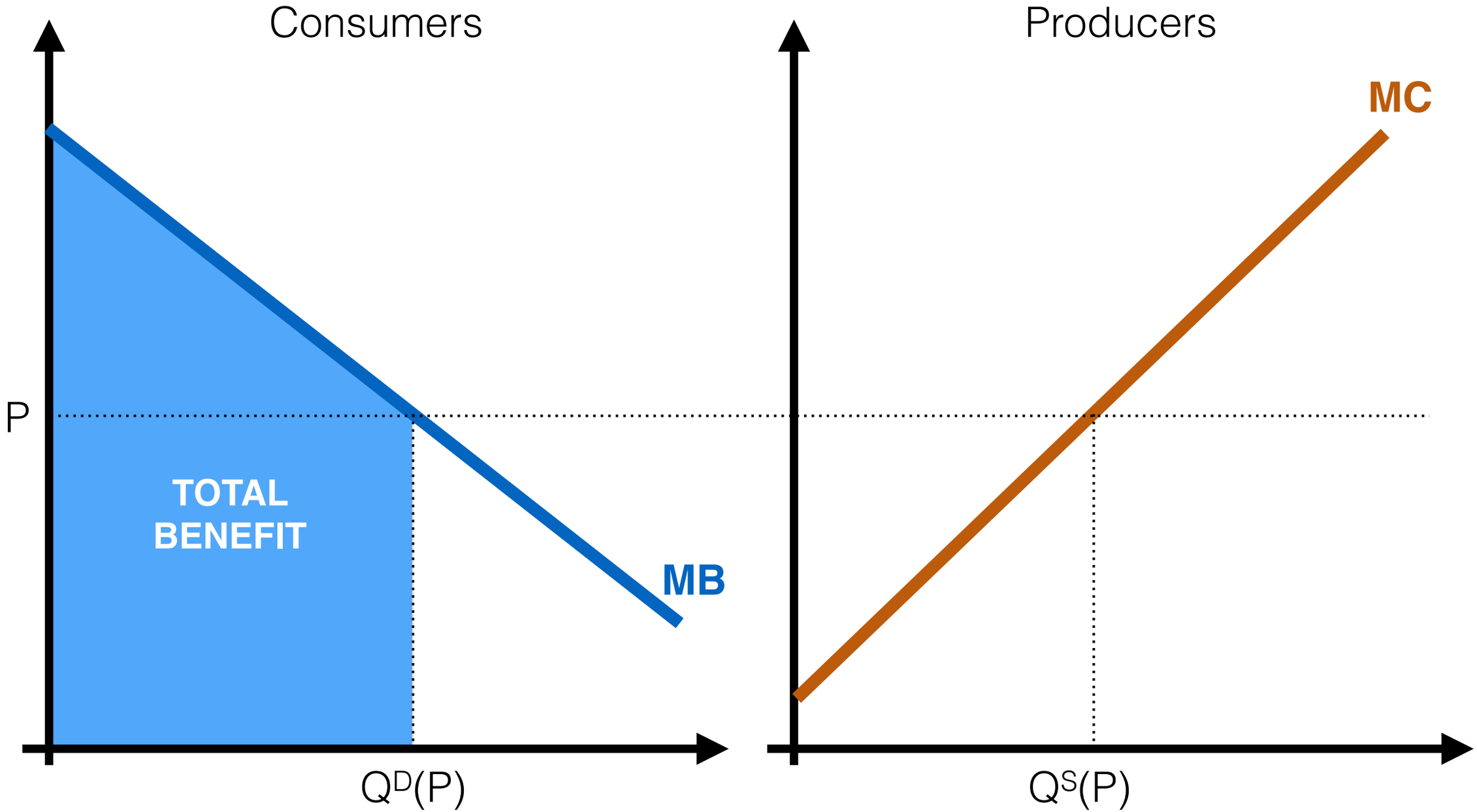
Marginal Benefit and Cost

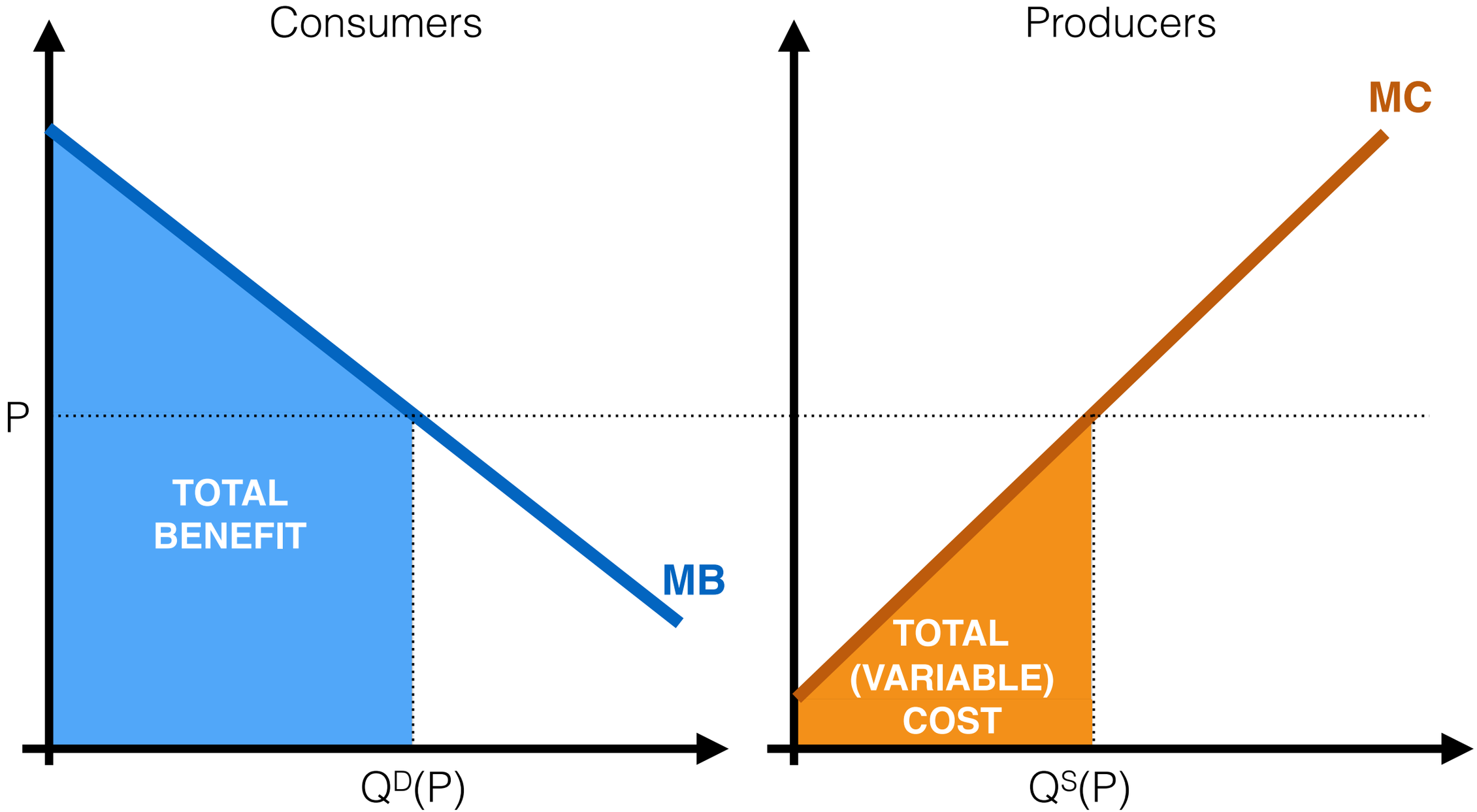


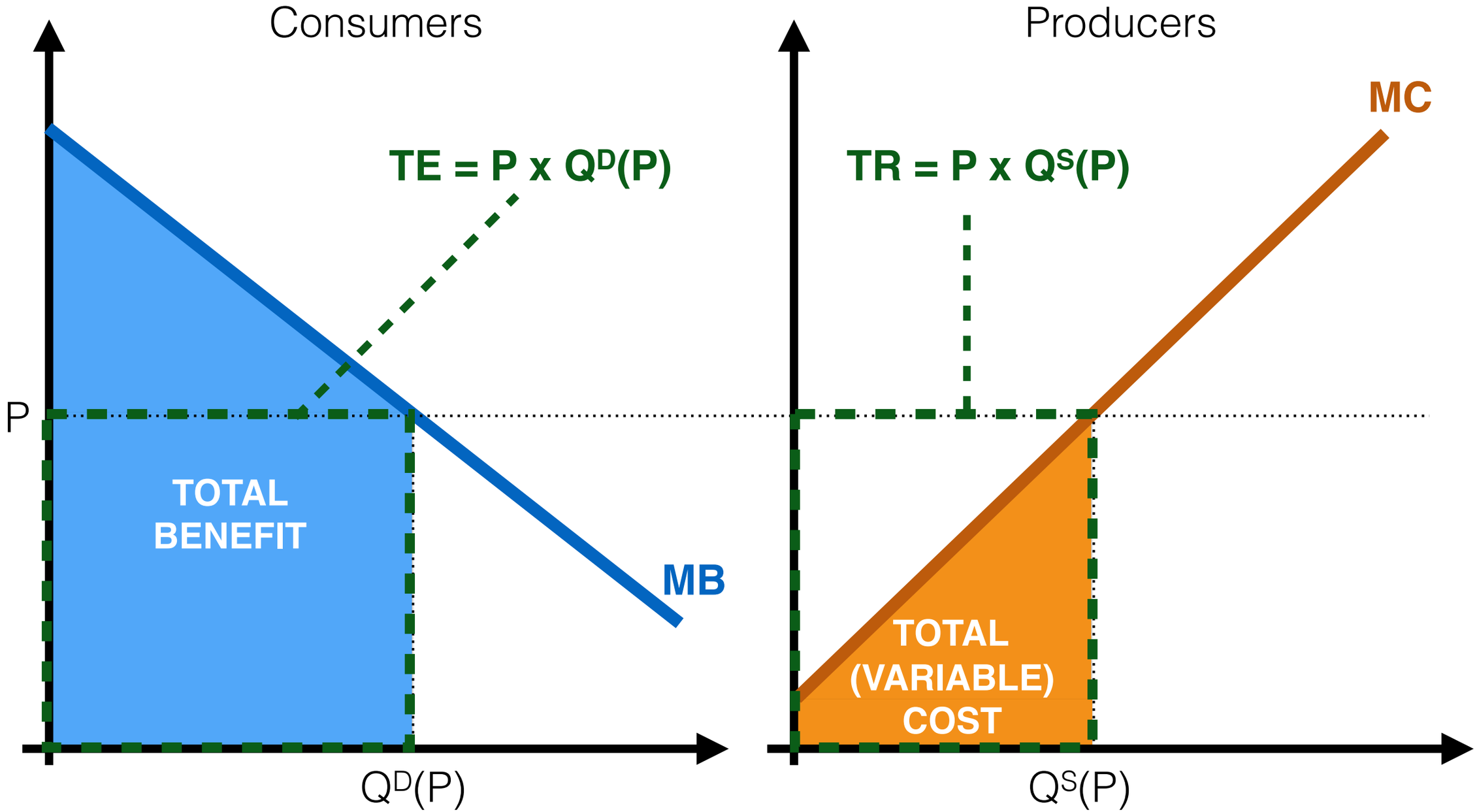

Consumers
MB
Producers
MC

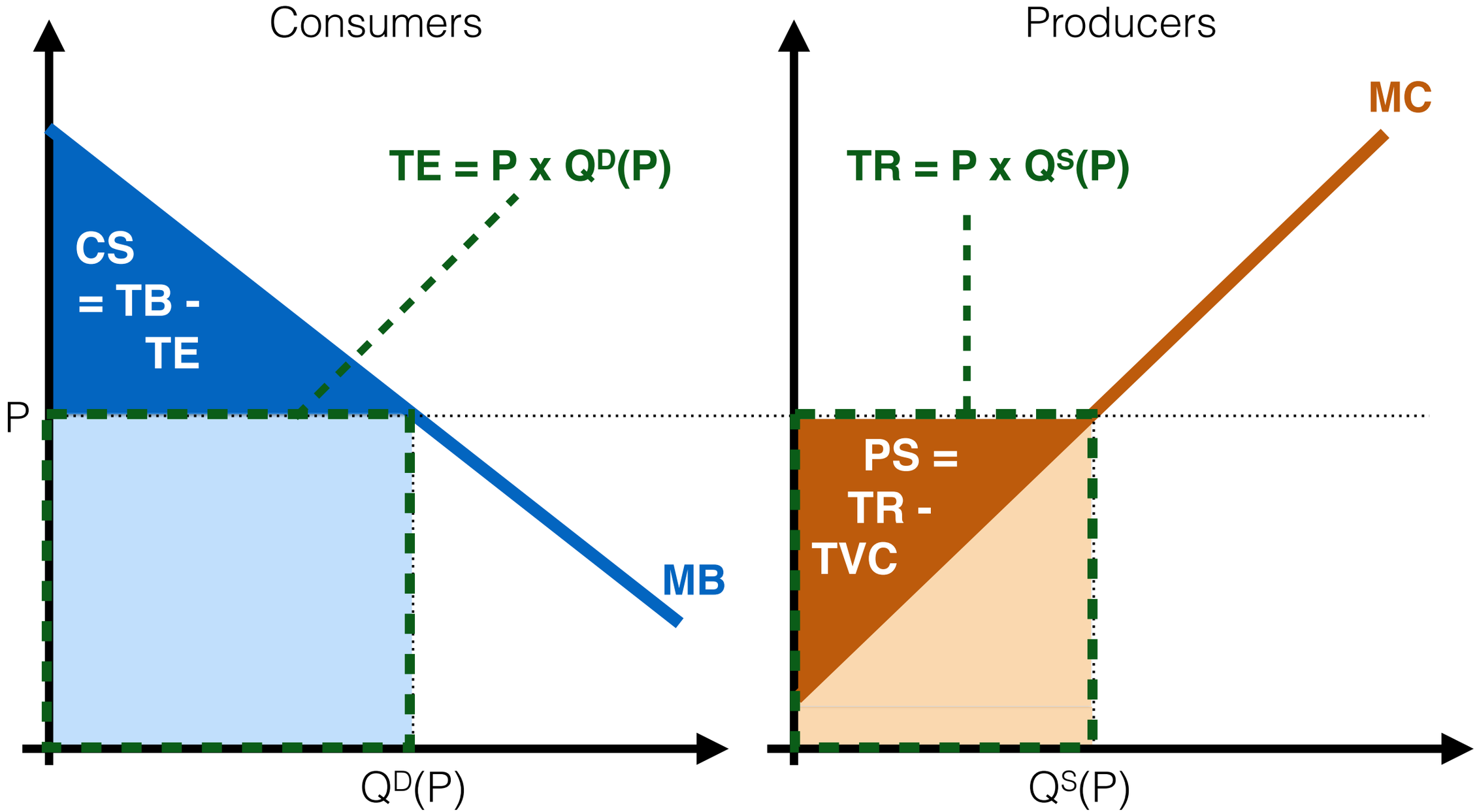

Consumers
Producers
MC
P
MB

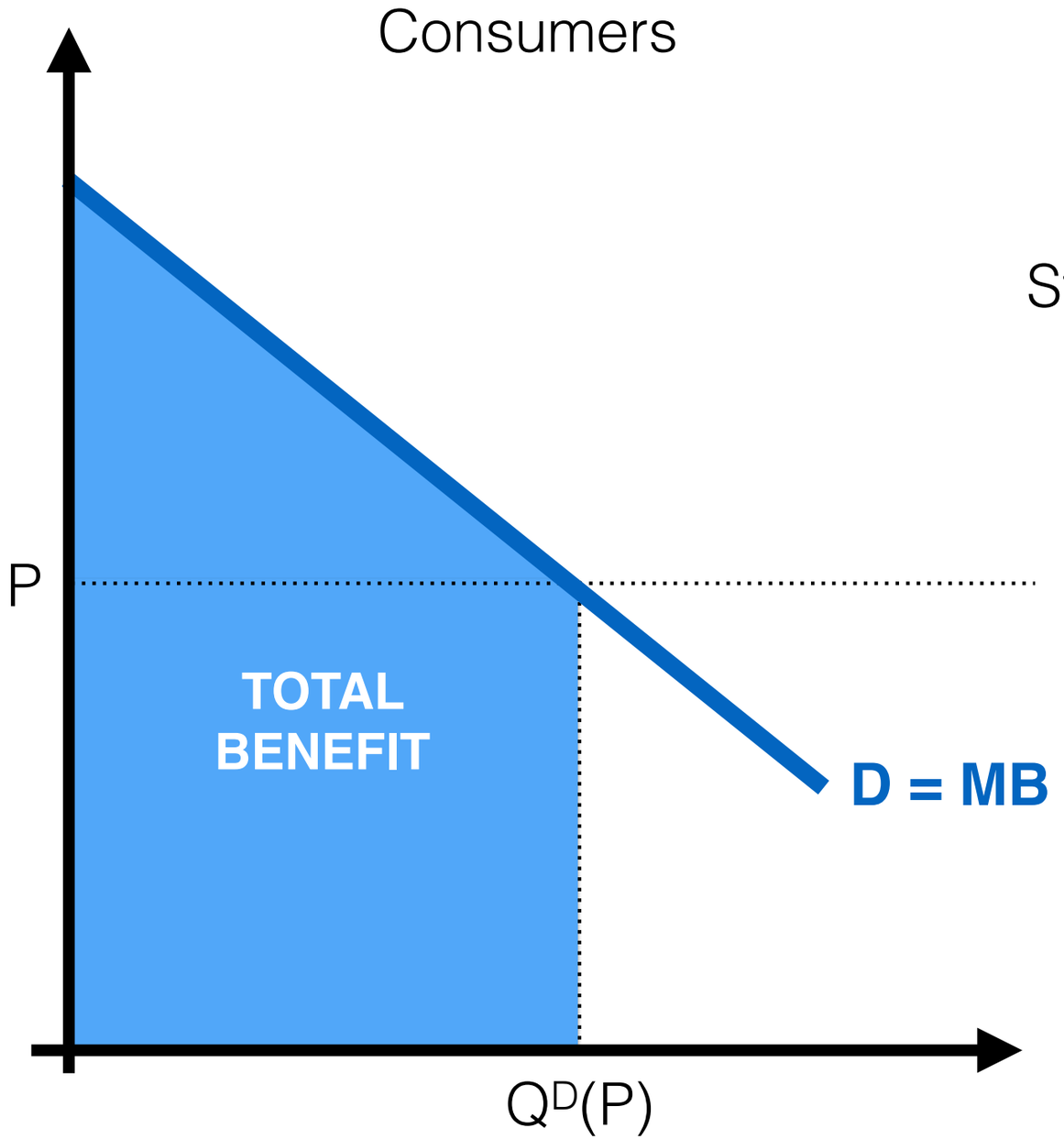

Consumers
Producers
MC
P
MB
$Q^D(P)$
$Q^S(P)$


Consumers
Producers
MC
P
TOTAL
BENEFIT
MB
$Q^D(P)$
$Q^S(P)$

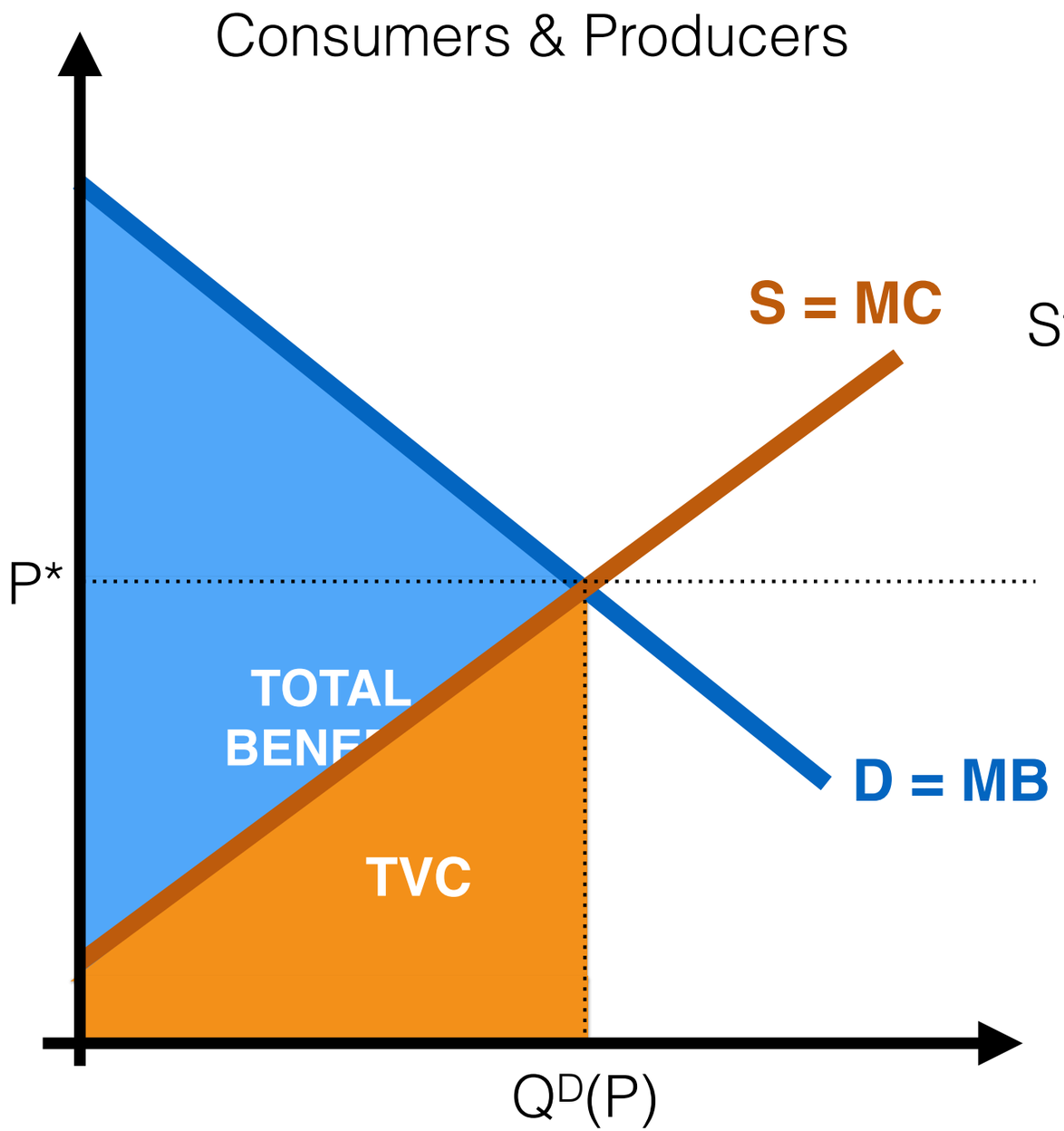

Consumers
Producers
MC
P
TOTAL
BENEFIT
MB
TOTAL
(VARIABLE)
COST
$Q^D(P)$
$Q^S(P)$


Consumers
Producers
TE = P x Q^D(P)
TR = P x Q^S(P)
MC
P
TOTAL BENEFIT
MB
TOTAL (VARIABLE) COST
Q^D(P)
Q^S(P)


Consumers
Producers
TE = P x Q^D(P)
TR = P x Q^S(P)
MC
CS
= TB -
TE
P
MB
PS =
TR -
TVC
Q^D(P)
Q^S(P)

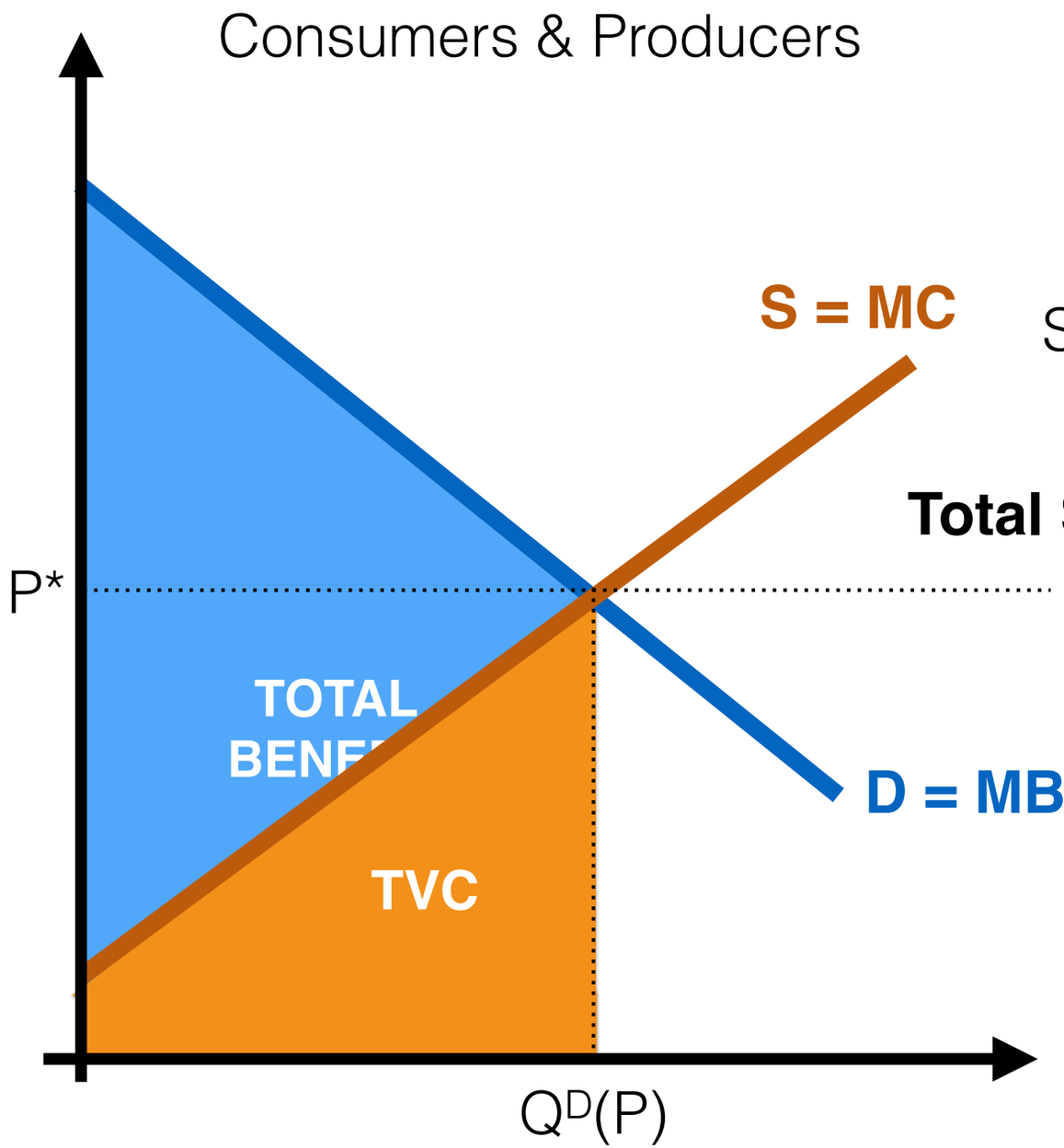


Start with the total benefit to consumers…



Start with the total benefit to consumers…

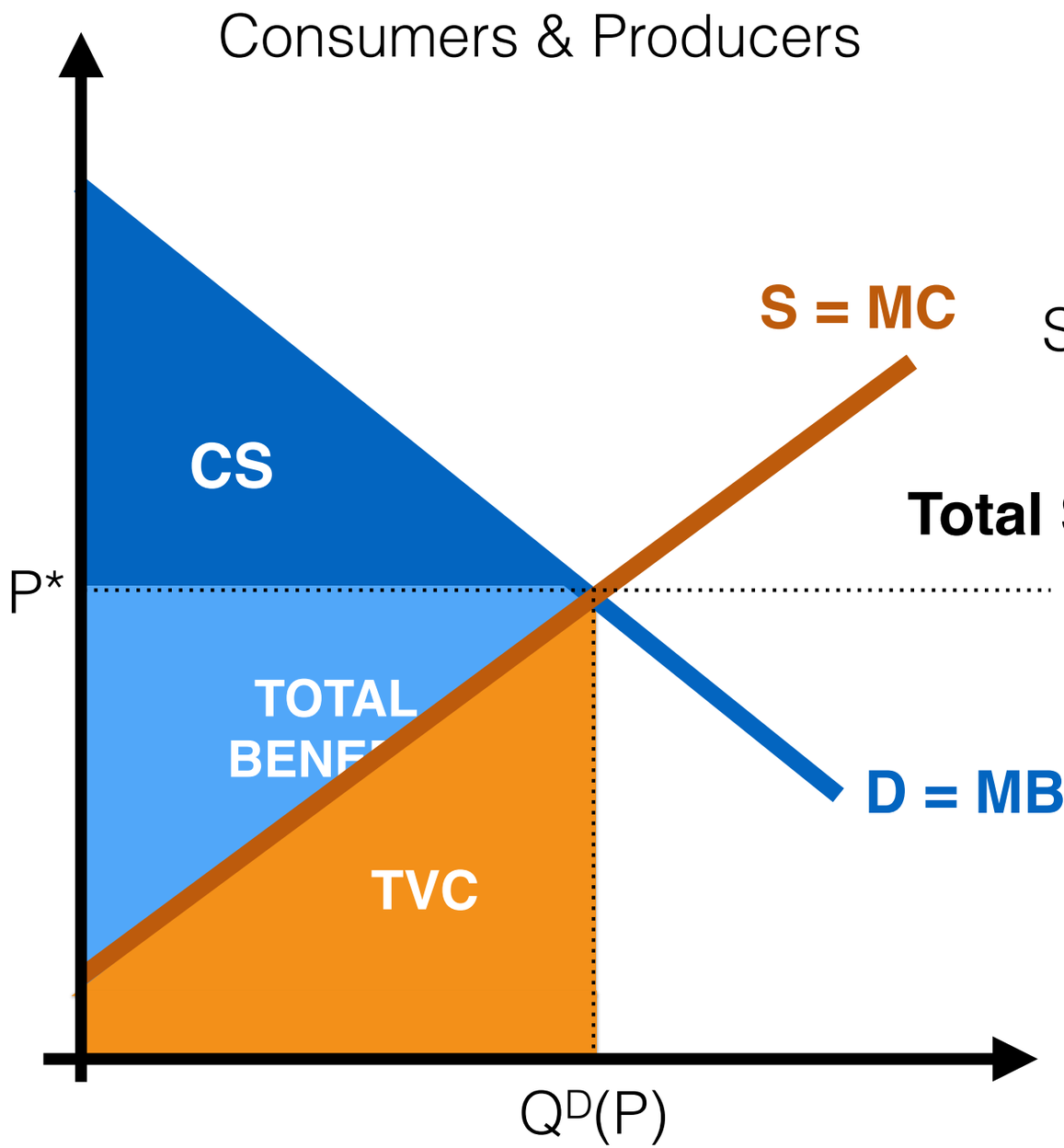
add the total (variable) cost to firms…



Start with the total benefit to consumers…

add the total (variable) cost to firms…

Total Surplus is the total benefit minus the TVC.



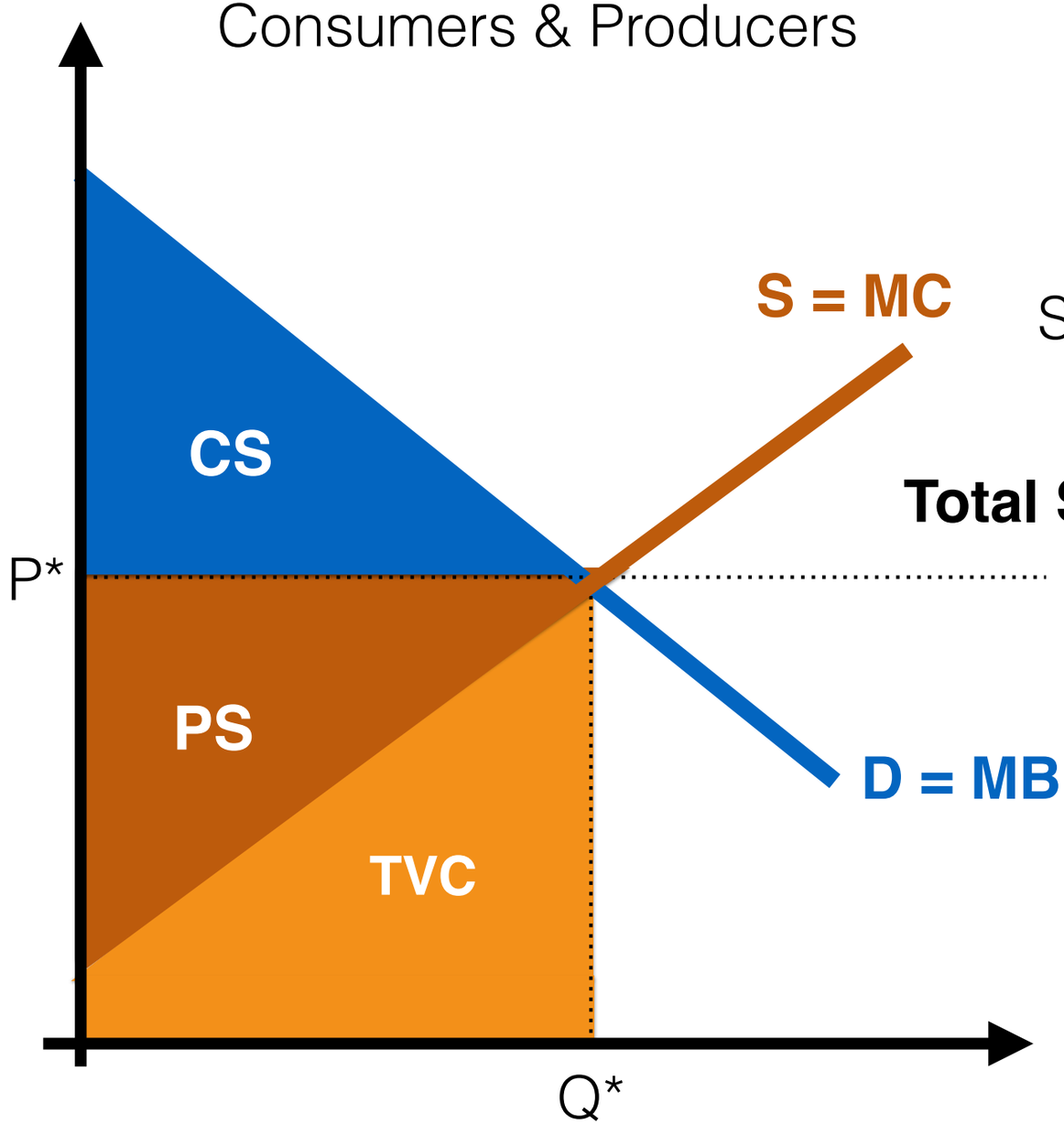
Start with the total benefit to consumers…

add the total (variable) cost to firms…

Total Surplus is the total benefit minus the TVC.

CS is the the portion of total surplus that accrues to consumers

Consumers & Producers



Start with the total benefit to consumers…

add the total (variable) cost to firms…

Total Surplus is the total benefit minus the TVC.

CS is the the portion of total surplus that accrues to consumers

PS is the the portion of total surplus that accrues to producers

Part II
Market Interventions: Taxes and Price Controls

Consumers set

Price Consumers Pay = Marginal Benefit

Firms set

Price Firms Receive = Marginal Cost

If Price Consumers Pay = Price Firms Receive
and Quantity Demanded = Quantity Supplied
then Marginal Benefit = Marginal Cost
and Total Surplus is Maximized

Taxes, Subsidies and Price Controls

- **Taxes** or **subsidies**:
  Price consumers pay different from price firms receive
  Quantity demanded equals quantity supplied

- **Price ceiling** or **price floor**:
  Price consumers pay same as price firms receive
  Quantity demanded (may be) difference