BUSINESS ECONOMICS

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Chapter 3:

DEMAND & CONSUMER BEHAVIOR

- Required: ***Business Economics and Managerial Decision Making***, C.4-6
- Recommend: ***Economics for Business and Management***, C.2

STRUCTURE

1. Demand analysis
2. Demand function estimation
3. Consumer behavior

1.Demand analysis

1.1 Market demand

1.2 Revenue

1.3 Elasticity

1.1 Market demand

Summation?

$$Q_x = f(P_x, P_y, A_x, Y, T, O)$$

Q_x : quantity demanded of good X

P_x : price of good X

P_y : price of good Y

A_x: advertising expenditure

Y: real disposable income

T: consumer tastes

O: other factors

1.1 Market demand

For simplicity:

$$Q_x = f(P_x)$$

→ Inverse demand function?

i.e. Linear demand f.: $Q_x = a + bP_x$

→ Q (P=0)

→ P (Q=0)

→ Slope $\Delta Q_x / \Delta P_x$

1.2 Revenue

TR? AR? MR?

i.e. $Q_x = a + bP_x$

→A linear MR curve

→ A MR curve: slope is twice that of the demand curve

→TR is maximized where MR is 0

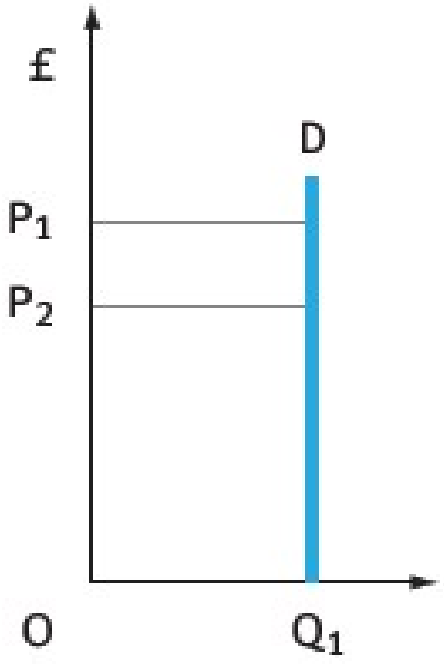
1.3 Elasticity

Responsiveness to changes

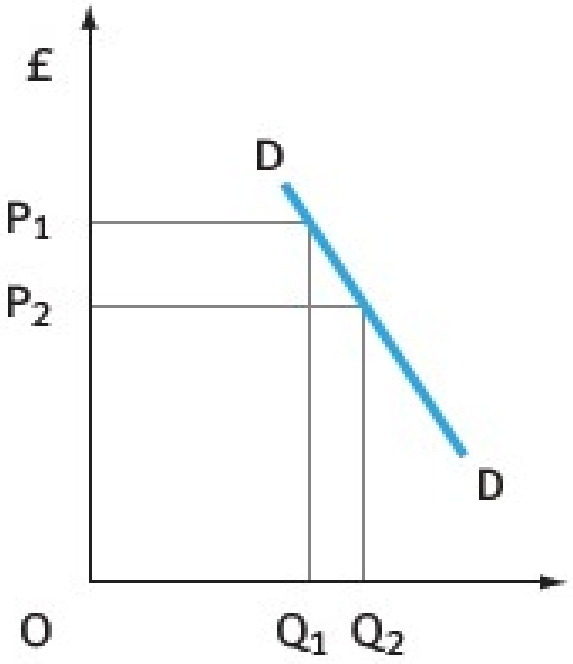
1.3.1. Own price elasticity

a. Formula: $$\varepsilon = \frac{\Delta Q_x / Q_x}{\Delta P_x / P_x}$$

- Sign? (0) Law of demand?
- Magnitude? (1)



(a)



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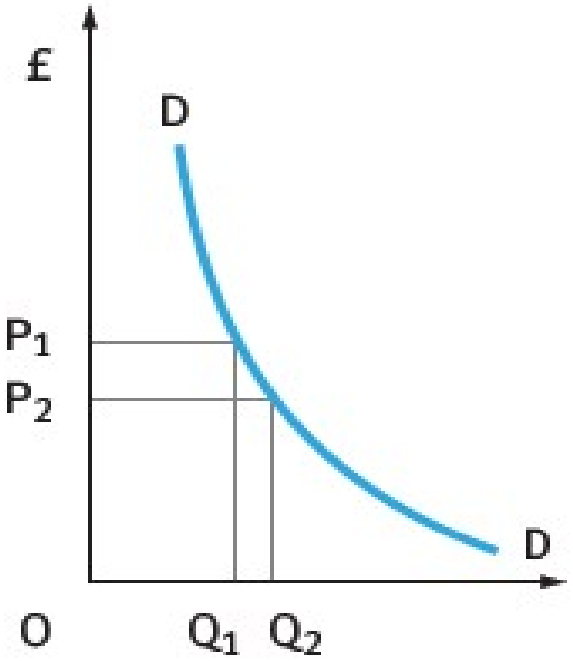

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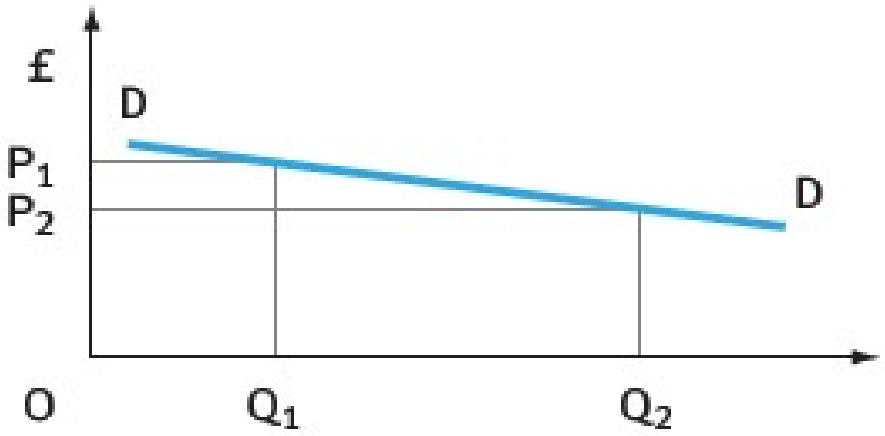

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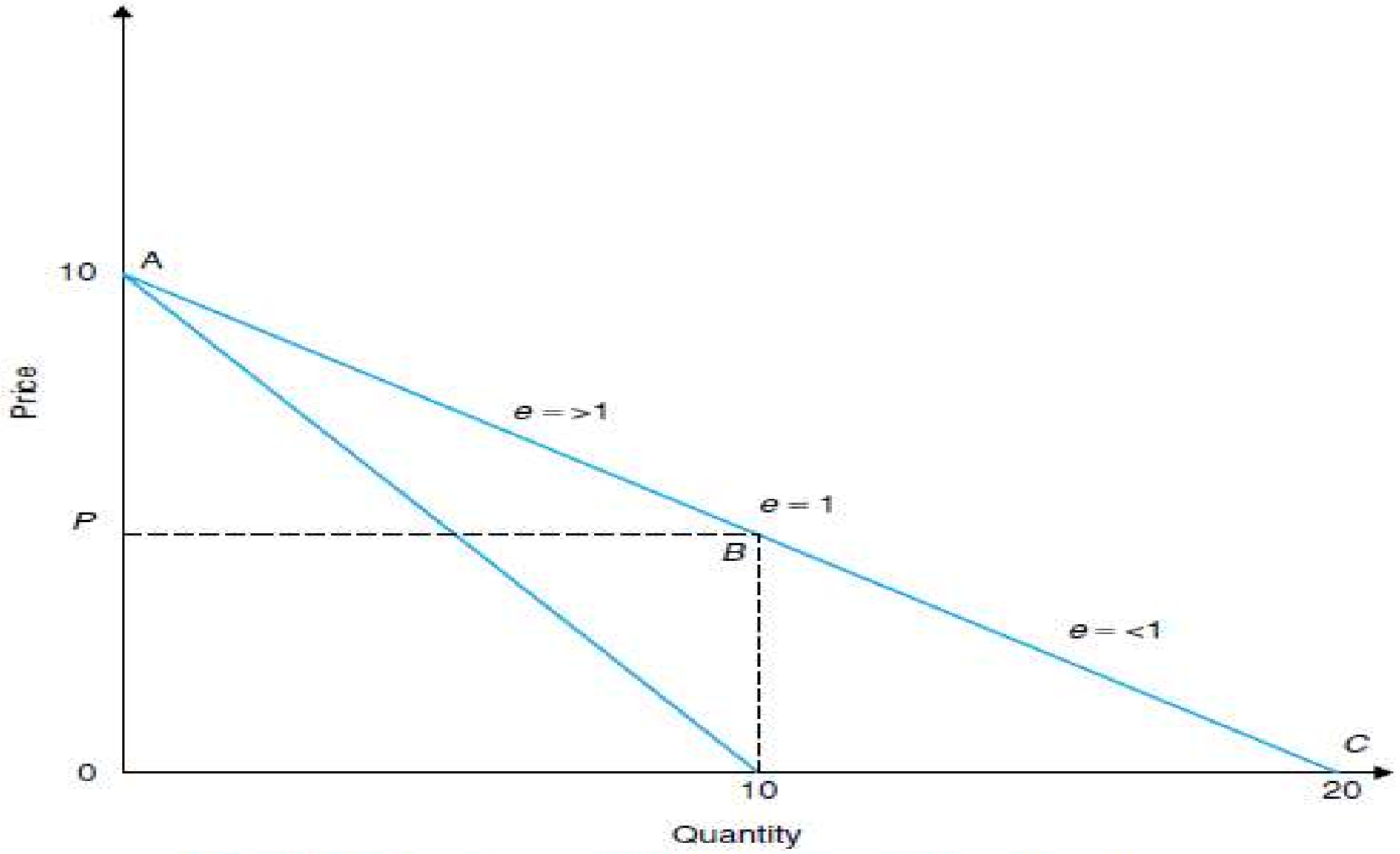


Figure 5.2 Linear demand and marginal revenue curve

TR? MR?

1.3 Elasticity

$$Q_x = a + bP_x$$

$$\varepsilon = f(a, Q_x) = \frac{a}{Q_x} - 1$$

$$MR = f(\varepsilon, P_x) = P_x\left(1 + \frac{1}{\varepsilon}\right)$$

ε	*MR (0)*	*Change in TR (as P falls)*
Inelastic		
Elastic		

1.3 Elasticity

b. Factors affecting :

Price effect = substitution effect + income effect

- Substitution effect: Closer substitute → more or less elastic?
- Income effect: Large proportion of income → more or less elastic?
- Time: Longer period → more or less elastic?

1.3 Elasticity

c. Arc elasticity :

Non-linear, large change in price….

$$\varepsilon = \frac{\Delta Q/(\frac{Q_1 + Q_2}{2})}{\Delta P/(\frac{P_1 + P_2}{2})}$$

1.3 Elasticity

1.3.2. Cross-price elasticity

Formula:

$$\varepsilon_C = \frac{\Delta Q_x / Q_x}{\Delta P_y / P_y}$$

Substitute or complementary?

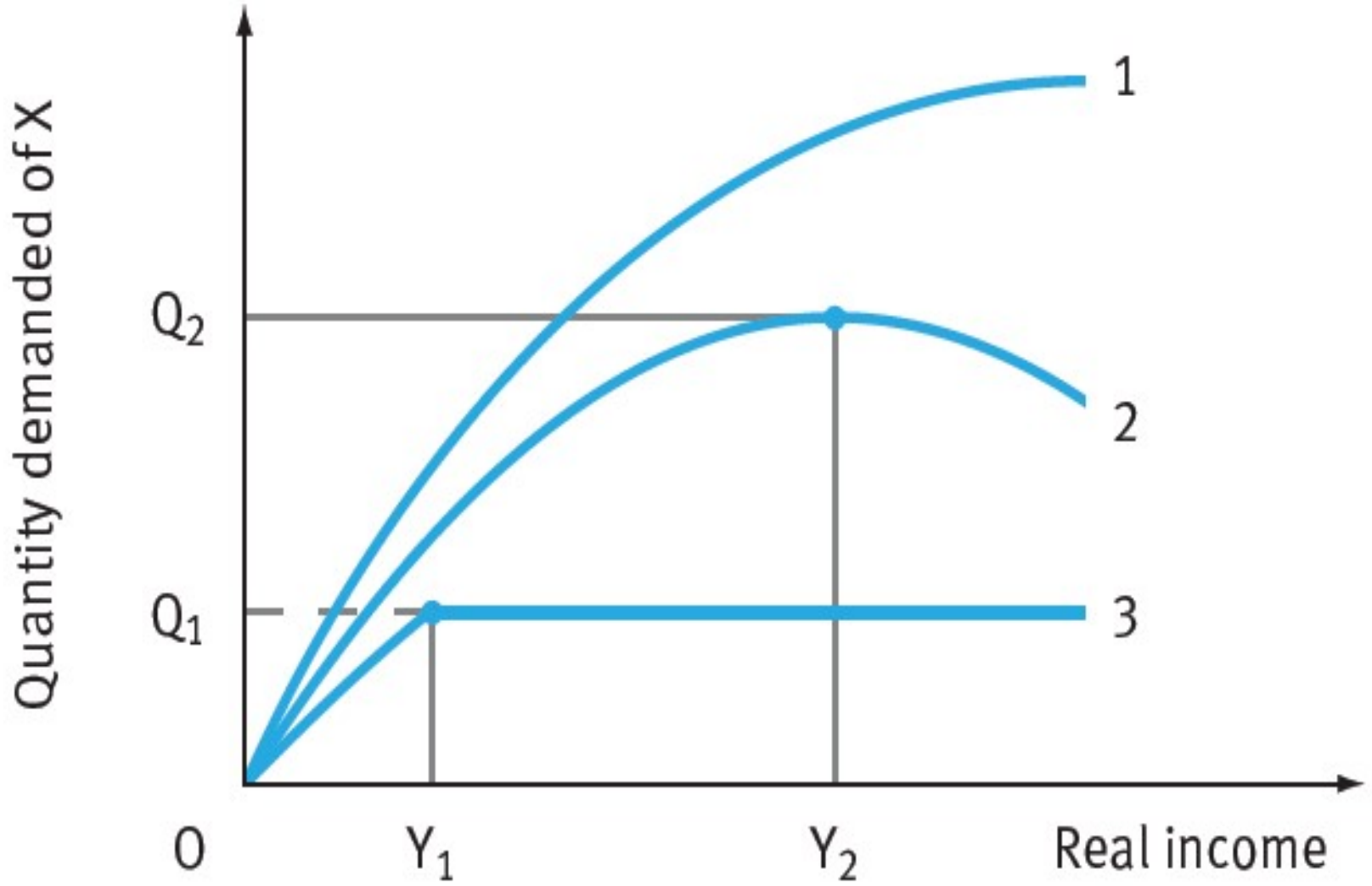
1.3 Elasticity

1.3.2. Income elasticity

Formula: $$\varepsilon_I = \frac{\Delta Q_x / Q_x}{\Delta I / I}$$

Normal or inferior?

- Engel curve
- Factors affecting: initial income level, status of the goods (necessities or luxuries), age of the goods…


Quantity demanded of X
Q_2
Q_1
0
Y_1
Y_2
Real income
1
2
3

1.3 Elasticity

1.3.2. Advertising elasticity

Formula:

$$\varepsilon_A = \frac{\Delta Q_x / Q_x}{\Delta A / A}$$

A is informative or persuasive?

2. Demand function estimation

Different methods:

- Interviews and surveys (using questionnaires)
- Consumer experiments
- Market studies
- **Statistical analysis (using regression)**

2. Demand function estimation

Statistical analysis (using regression)

2.1 Setting model:

Linear equation:

$$Q_x = a + b_1 P_x + b_2 P_y + b_3 A_x + b_4 Y + b_5 X_n$$

Log-linear equation:

$$\log Q_x = a + b_1 \log P_x + b_2 \log P_y + b_3 \log A_x + b_4 \log Y + b_5 \log X_n$$

2. Demand function estimation

2.2 Checking results:

a. R^2 and adjusted R^2

(overall explanatory power)

. Too low → misspecification of the model

. Too high → multi-collinearity

2.2 Checking results:

b. F-test: dep. & a group of ind.

H0: no significant statistical rel.

$F > F_b \rightarrow$ reject H0

c. t-test: dep. & an ind.

H0: no significant statistical rel.

$t > t_b \rightarrow$ reject H0

2.2 Checking results:

d. Coefficients:

. *Sign*: if not the expected

→ Omission

→ Identification (simultaneous change between the variable included and the one not included): price and income

. *Statistical significance (standard error)*

95% probability of the actual value falls into (estimated value +/- 2* standard errors)

2.2 Checking results:

e. Auto-correlation:

Error terms: serially correlated

→ Overestimating/underestimating the unexplained variation

→ Durbin-Watson statistic:

Ho: there is auto-correlation

Table 6.2 Estimates of log-linear demand functions for alcoholic drink in the UK

Variable	Beer	Spirits	Wine
Constant	−31418 (11.2225)[a]	−2.2399 (4.9596)[a]	−2.6390 (4.3719)[a]
Real price of good	0.2376 (1.7141)[a]	−1.1802 (4.8437)[a]	−0.6385 (1.7227)[a]
Real price of all other goods	−0.1530 (1.0895)	0.9827 (5.3567)[a]	0.6714 (2.1715)[a]
Real income	0.8018 (6.7752)[a]	1.6677 (8.9848)[a]	2.5045 (11.6745)[a]
Real per capita advertising	0.0742 (2.6327)[A]	−0.0142 (0.3770)	−0.0865 (1.3869)
Adjusted R^2	0.950	0.975	0.963
Durbin–Watson Statistic	1.716	2.048	2.109
Standard error ($\times 10^3$)	0.5068	0.4376	0.3070

Note *t*-ratios in parentheses
[a] Statistically significant at the 5% level

Source Parts of table 1 from Duffy (1983).

3. Consumer behavior

- ***Maximize utility*** **with budget constraint**
- *Characteristic approach*

  (show the proliferation of similar but different goods based on their characteristics)
- *Behavioral approach*

  (make use of rules of thumb and routines → imperfect information)

Maximize utility

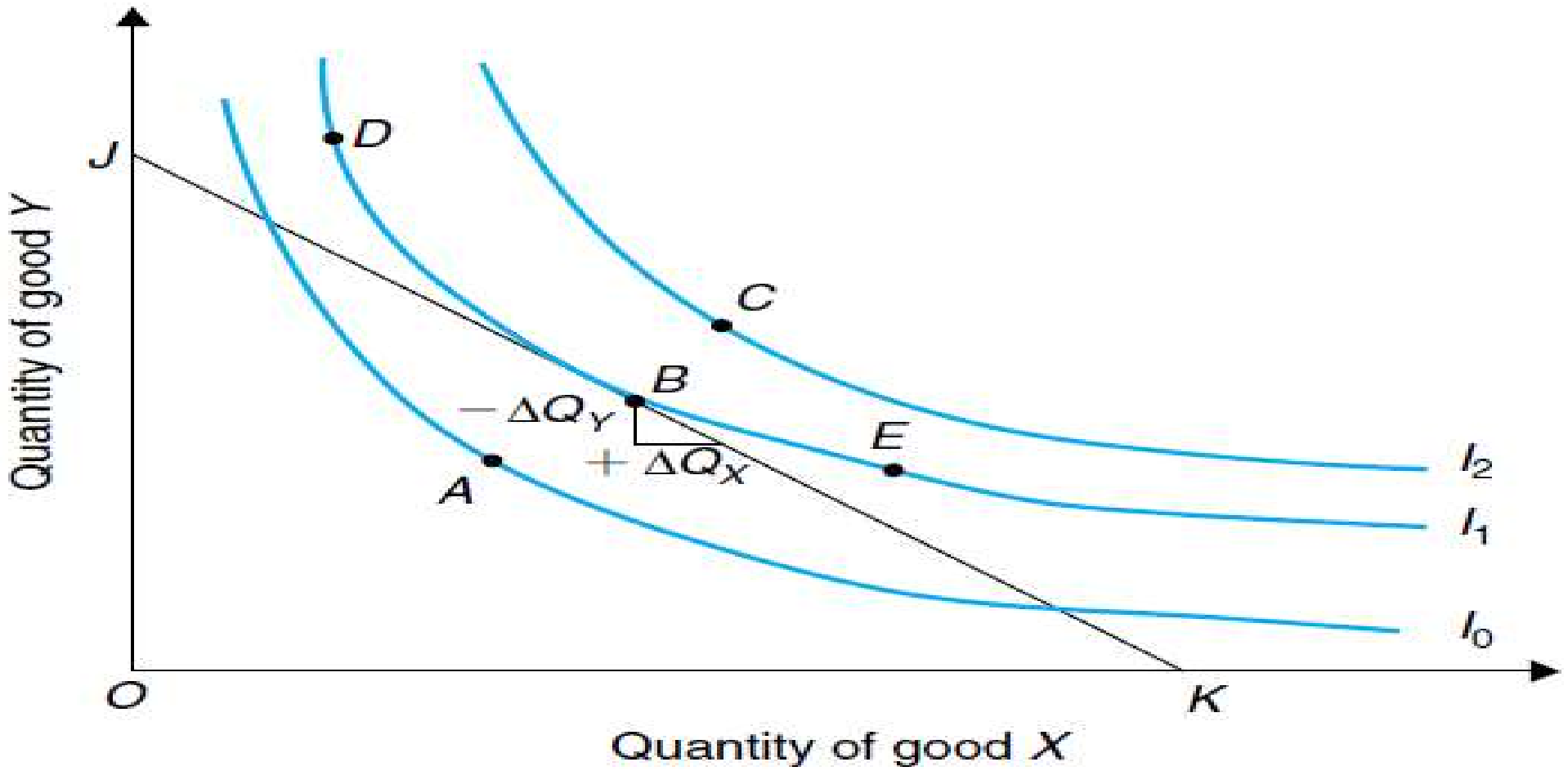
3.1 Indifference curve:

- A level of utility → intersect?
- A set of preferences and choices

  Assume: 2 substitutes (more is better and no durable characteristics)
- Convex to the origin
- Slope downward

→ MRS (Marginal rate of substitution)

$$MRS = \frac{-\Delta Q_y}{\Delta Q_x} = \frac{-MU_x}{MU_y}$$



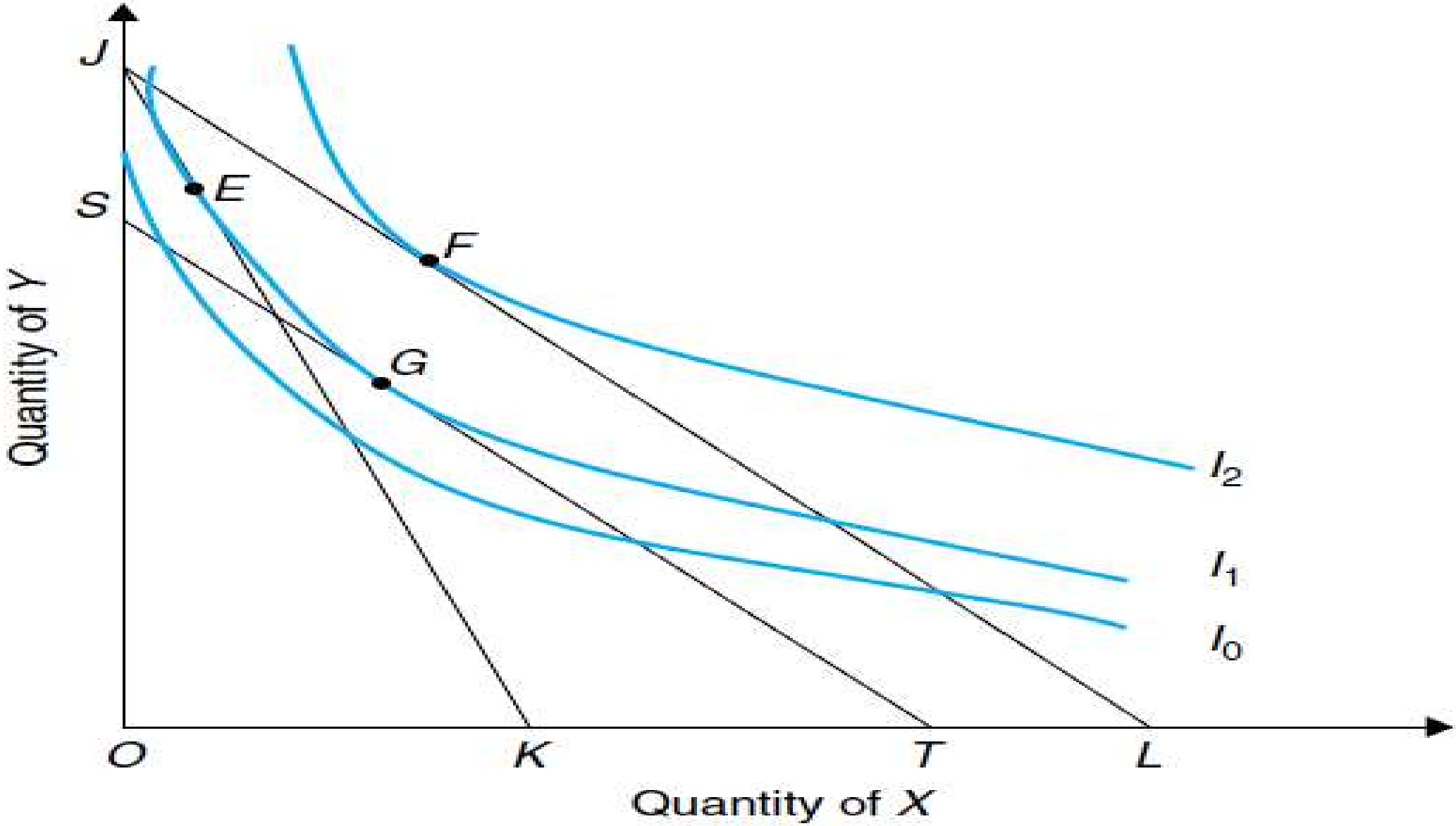
3.2 Budget constraint:

$$M = P_x Q_x + P_y Q_y$$

$$\Rightarrow \mathrm{Q_y} = \frac{M}{P_y} - \frac{P_x}{P_y} Q_x$$

Slope?

3.3 Price effect (= Sub. + Inc.)



3.4 Criticism of indifference curve:

- How to set preferences?
- Static
- The way that consumers make decisions?
- Ordering just based on utility?
- No interactions among individuals
- Private goods