Concepts Covered

maximisation (& minimisation)
prices, CPI, inflation, purchasing power
demand & supply
market equilibrium, gluts, excess demand
elasticity (elastic v. inelastic, perfectly or not)

normal v. inferior goods
substitutes v. complements (gross v. true) (perfect or not)
own-price elasticity of demand
cross-price elasticity of demand
income elasticity of demand
income-expansion curve
price effect & income effect of a price change
gains to trade and efficient allocations & the contract curve
positive marginal utility v. negative (goods v. “bads”)
bliss point & satiation

optimum level of output (profit-maximising)
Profit = Total Revenue – Total Cost (including opp. cost of capital
necessary condit. for profit-maximising output: $MR(y^*) = MC(y^*$
sufficient condition: falling marginal profit
plus: no negative profit
costs: total, fixed, variable, average, marginal, opportunity
at minimum AC, MC = AC
revenue: market power, MR < AR = P
price-taking firm (no market power)
for a price-taking firm: $AR = D = P = MR$
and π max: $P = MC(y^*)$
break-even output y' and price P'
supply curve: $y = 0$ until $P > P'$, then up the $MC(y)$ curve

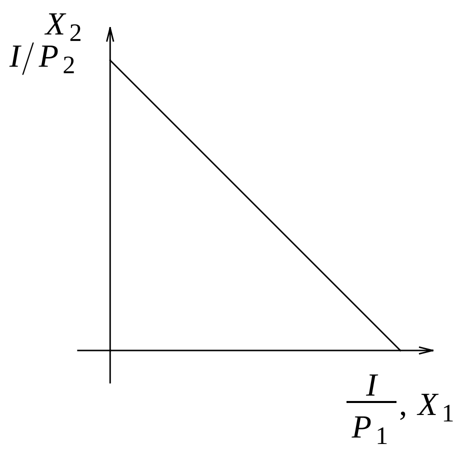
long-run condition: $\pi \geq 0$
short-run condition: $AR \geq AVC$
the production function and factor inputs: capital, labour, land
efficient operation
π max: value of the marg prod of input i = its price w_i
isoquants and substitution of input factors
returns to scale and AC
cost min: marg cost of producing addit unit is equal across inputs
cost min: output from $1 spent on an input is equal across inputs

1. THE CONSUMER

1a. ***The Feasible Set*** (FS)

$$\sum P_i X_i \quad \le I$$

total expenditure ≤ income



1b. ***Preferences***, Utility Function

$U(\mathbf{X}) \equiv U(x_1, x_2, x_3, \cdots)$

maximize utility s.t. budget

convex-to-origin indifference curves

along an indifference curve: U constant

$$\text{decreasing MRS} = -\frac{dX_2}{dX_1}\bigg|_{\overline{U}} = -\text{ slope of } \textit{indifference curve}$$

Axioms

1c. ***The Chosen Set***

To maximise utility: slope of the indifference curve
= slope of the budget line
(willingness to substitute = ability to substitute)

i.e., MRSC, marginal rate of substitution of consumption = MRSE, marginal rate of substitution in exchange = MRST, marginal rate of substitution in trade

$$\therefore -\text{MRS} = -\frac{P_1}{P_2} \text{ the slope of the budget line}$$

$$\therefore \text{MRS} = \frac{MU_1}{MU_2} = \frac{P_1}{P_2}$$

$$\therefore \frac{MU_1}{P_1} = \frac{MU_2}{P_2} = \cdots$$

(The marginal utility per dollar spent on each good is equal across all goods in the bundle.)

$$\text{max. } U(X_1, X_2)$$

$$\text{s.t. } P_1 X_1 + P_2 X_2 = I$$

$$\rightarrow X_1 = X_1^* \ (P_1, P_2, \ldots, I)$$

$\rightarrow$ the demand function for good 1.

Comparative Statics:

η_1^P	η_2^P	ε
own-price elasticity of demand	cross-price elasticity of demand	income elasticity of demand

Law of demand, substitutes, complements, “normal”, inferior goods.

1d. ***Comparative Statics***

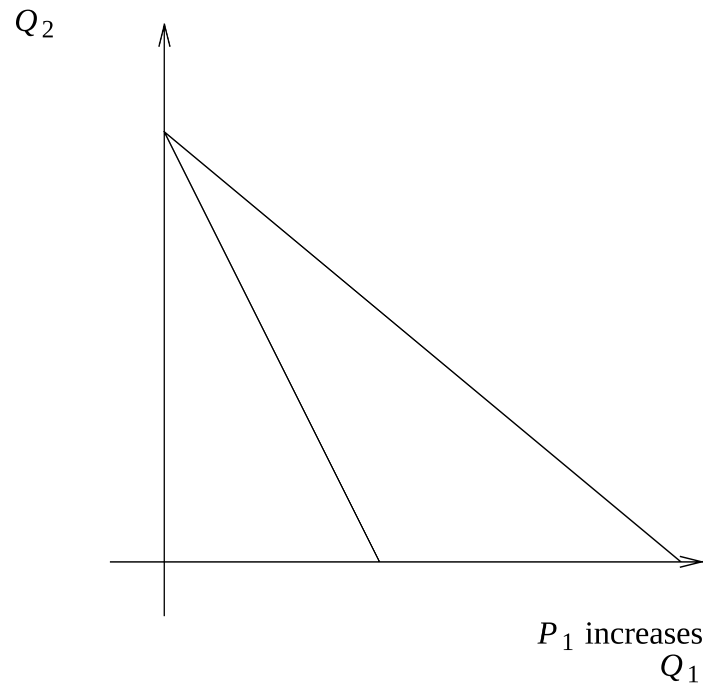
How does demand X_1^* alter with a price change?

$$\frac{\partial X_1^*}{\partial P_1} \ ?$$

Two effects of a price change:

substitution effect		< 0 always
income effect	< 0	“normal” goods (defn)
	> 0	“inferior” goods (defn)

demand function for goods



1e. ***The Slutsky equation***

Price effect = Substitution effect + Income effect

— looks at the substitution and the income effects of a price change

Own-Price:

$$\frac{\partial X_1^*}{\partial P_1} = \frac{\partial X_1}{\partial P_1}\bigg|_{\bar{U}} - X_1^* \frac{\partial X_1^*}{\partial I}$$

$$\text{or} \quad \eta_P = \underset{< 0}{\eta_P^{\bar{U}}} - \underset{\frac{X_1 P_1}{I}}{f_1} \times \varepsilon$$

The Law of Demand

normal good → ε > 0

inferior good → ε < 0

Cross-Price:

gross substitutes → $\frac{\partial X_i}{\partial P_j}$ > 0

gross complements → $\frac{\partial X_i}{\partial P_j}$ < 0

unrelated goods → $\frac{\partial X_i}{\partial P_j}$ = 0

$\eta_{P_j}^{x_i}$

Gross measures (LHS) include a measured income effect, as well as a pure price (substitution) effect.

Slutsky equation with elasticities:

$$\eta_P = \eta_P^{\bar{U}} - f \times \varepsilon \qquad \text{own-price}$$

$$\eta_{P_y}^x = \eta_{P_y}^{\bar{U}} - \frac{P_y \times y}{I}\, \varepsilon^x \qquad \text{cross-price}$$

$\eta_{P_y}^{\bar{U}}$: x, y substitutes > 0; x, y complements < 0

ε^x: x inferior good < 0; x normal good > 0

2. THE FIRM

Aim: maximize the profit π subject to the cost function $TC(y)$.

2a. max $\pi = TR - TC$

$$= P \times y - TC(y)$$

$$\frac{d\pi}{dy} = 0 \Rightarrow MR(y^*) = MC(y^*)$$ (1st Order Necessary Condition)

Sufficient: $M\pi$ falling and $\pi > 0$

Three conditions:
- (i) marginal revenue = marginal cost
- (ii) average revenue > average cost ($\pi > 0$)
- (iii) falling marginal profit

Market power: downwards sloping demand curve

Marginal revenue $MR = P\,(1 + \frac{1}{\eta^P}) \le$ AR = P

since η^P is negative form the Law of Demand

No market power: horizontal demand curve, $|\eta^P| = \infty$

and Marginal Revenue = Price, $MR = P$, so

the three conditions become:

$$MC(y^*) = P$$

$P > AC$, or $\pi > 0$

rising $MC(y)$

2b. $\max_{z_i} \pi = P \times y - \sum w_i \times z_i$

subject to $y \le F(z_1, \ldots, z_n)$ production function

$$\rightarrow P = \frac{w_i}{MP_i}$$ for all i (1st Order Cond.)

or Value of the marginal product of an input equals the marginal cost (w_i) of that input.

$$P \times MP_i = w_i$$

We can break this into two problems:

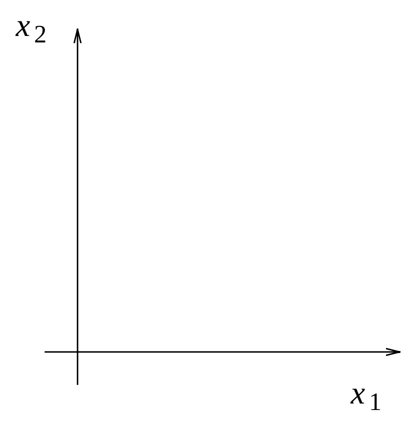
(i) min $TC = \sum w_i \times z_i$

s.t. $\bar{y} = F(z_1 \ldots z_n)$

$\rightarrow TC(\bar{y})$ & $z_1^* \ldots z_n^*(\bar{y})$

(ii) $\max_{\bar{y}} \pi = TR - TC(\bar{y})$

$\rightarrow \bar{y}^*$



budget line

$$\text{slope} = -\frac{P_1}{P_2}$$