
Health Economics and Financing

Workshop reminder

- Group X = Cote *et al.* A pharmacy-based health promotion programme in hypertension. *Pharmacoecon*, 2003; 21: 415-428.
- Group Y = Scuffham & Chaplin. An economic evaluation of fluvastatin used for the prevention of cardiac events following successful first percutaneous coronary intervention in the UK. *Pharmacoecon*, 2004; 22: 525-535.
- **Workshop 1 – checklist items 1, 2, 3 and 4-6 (re: costs)**
- **Workshop 2 – checklist items 4-6 (re: benefits) and 7,8,9,10**
- **Read paper and checklist prior to workshop**

Lecture 2 recap

- The ‘why and what’ of economic evaluation
- How it relates to other forms of evaluation
- Types of economic evaluation – CMA, CEA, CUA, CBA

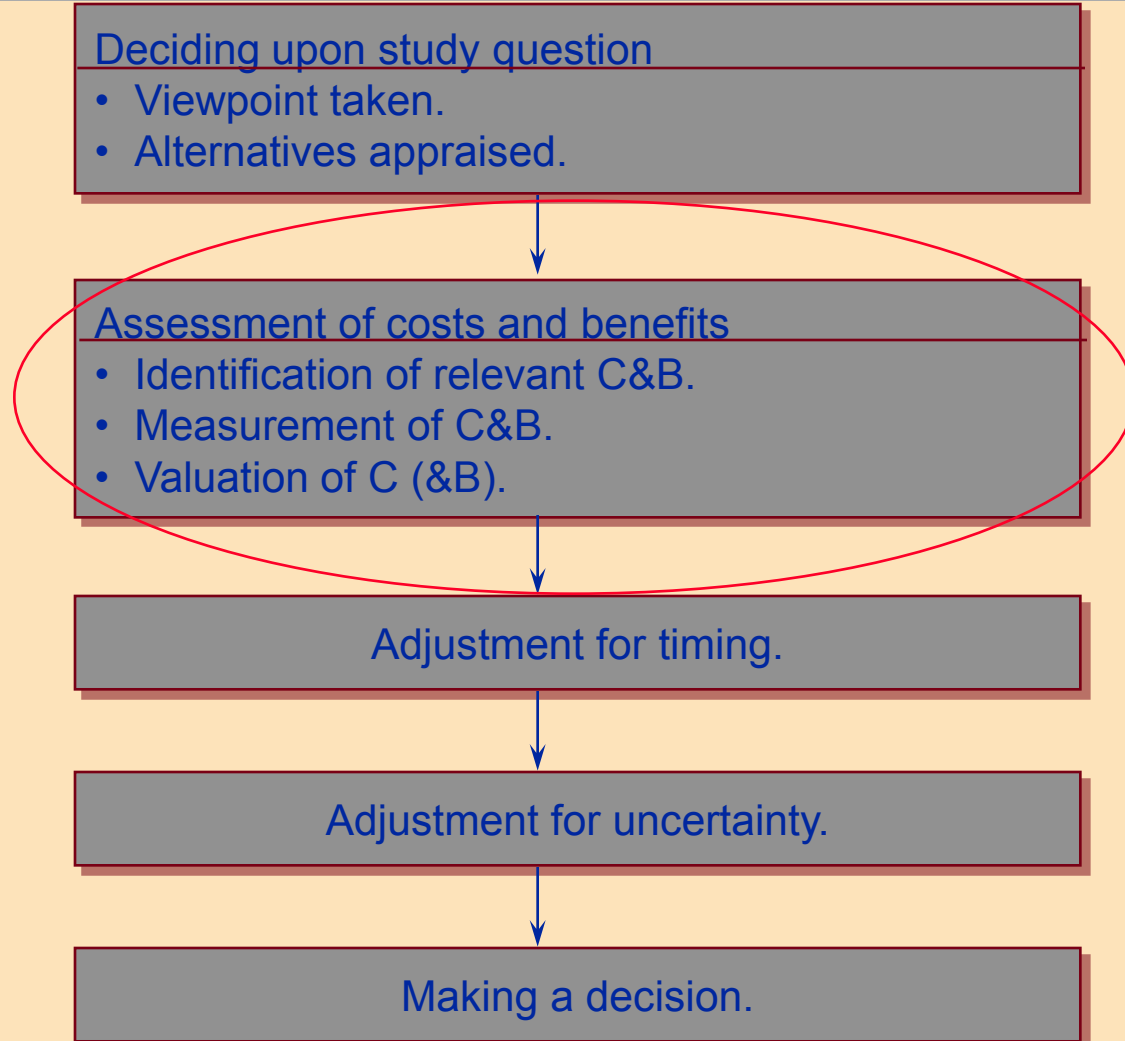
Types of economic evaluation

<i>Type of Analysis</i>	<i>Costs</i>	<i>Consequences</i>	<i>Result</i>
Cost Minimisation	Money	Identical in all respects.	Least cost alternative.
Cost Effectiveness	Money	Different magnitude of a common measure eg., LY's gained, blood pressure reduction.	Cost per unit of consequence eg. cost per LY gained.
Cost Utility	Money	Single or multiple effects not necessarily common. Valued as "utility" eg. QALY	Cost per unit of consequence eg. cost per QALY.
Cost Benefit	Money	As for CUA but valued in money.	Net £ cost: benefit ratio.

Lecture 2 recap

- The ‘why and what’ of economic evaluation
- How it relates to other forms of evaluation
- Types of economic evaluation – CMA, CEA, CUA, CBA
- Stages in an economic evaluation

Stages in economic evaluation



Lecture 2 recap

- The ‘why and what’ of economic evaluation
- How it relates to other forms of evaluation
- Types of economic evaluation – CMA, CEA, CUA, CBA
- Stages in an economic evaluation
- ‘Drummond’ checklist for appraisal
 - Items 1, 2 and 3 of checklist

‘Drummond’ checklist

1. Was a well-defined question posed in answerable form?
2. Was a comprehensive description of alternatives given?
3. Was there evidence that effectiveness had been established?
4. **Were all the important and relevant costs and consequences for each alternative identified?**
5. **Were costs and consequences measured accurately/appropriately?**
6. **Were costs and consequences valued credibly?**
7. **Were costs and consequences adjusted for differential timing?**
8. **Was an incremental analysis performed?**
9. Was allowance made for uncertainty?
10. Did presentation/discussion of results include all issues of concern?

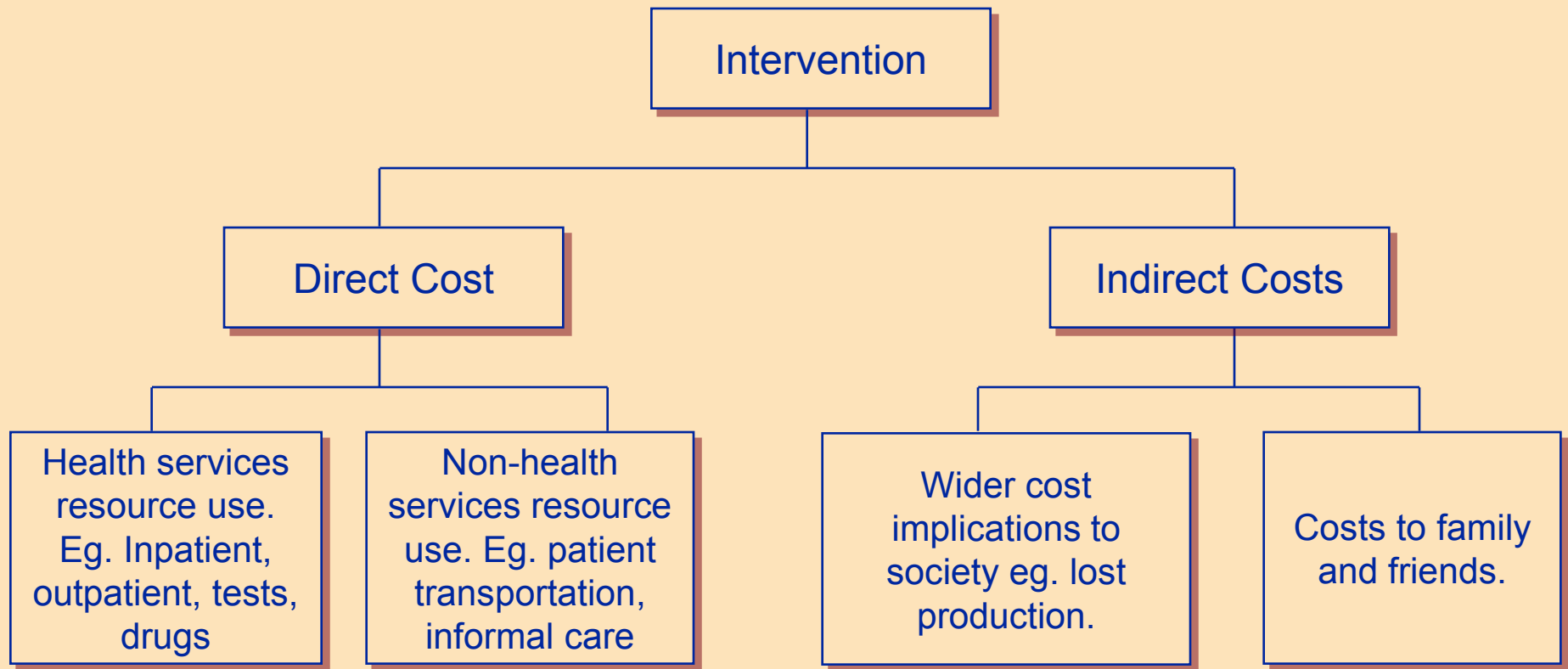
Lecture 3: Pharmaco-economic evaluation – resources and costs

- Identification (checklist 4)
 - Indirect costs
- Measurement (checklist 5)
 - Fixed, variable and total cost
 - Average, marginal and incremental cost (checklist 8)
 - Discounting (checklist 7)
- Valuation (checklist 6)
 - Cost versus price
 - Inflation
 - Sources of unit cost data

Resource use measurement and costing: overview of process

1. Identification:
 - Viewpoint/perspective.
 - Resources with an opportunity cost.
2. Measurement:
 - Measure in natural physical units (eg. hours of labour time).
3. Valuation:
 - Market prices (eg. wage rates) used unless strong belief they do not reflect opportunity cost (eg volunteers).
4. Calculation:
 - Multiply unit of measurement by unit cost (eg 2 hours of time at £5 per hour = £10 labour cost).

1. Identification



- Which to include depends on perspective taken

‘Indirect’ cost

- Human capital approach (Rice and Cooper, 1967)
 - Gross wage as value of working and leisure time
- Friction cost approach (Koopmanschap et al, 1992/3/5)
 - Labour markets usually exhibit involuntary unemployment
 - Value of productivity changes therefore accrue during short period of adjustment – the ‘friction period’
- Example: 1996 costs of premature mortality in Canada
 - \$105 million using human capital method
 - \$1.53 million using friction cost method
- Criticisms of *either* method
 - Introduce bias as both based no wage rate (non-earners?)
 - Double counting if QALYs are outcome measure

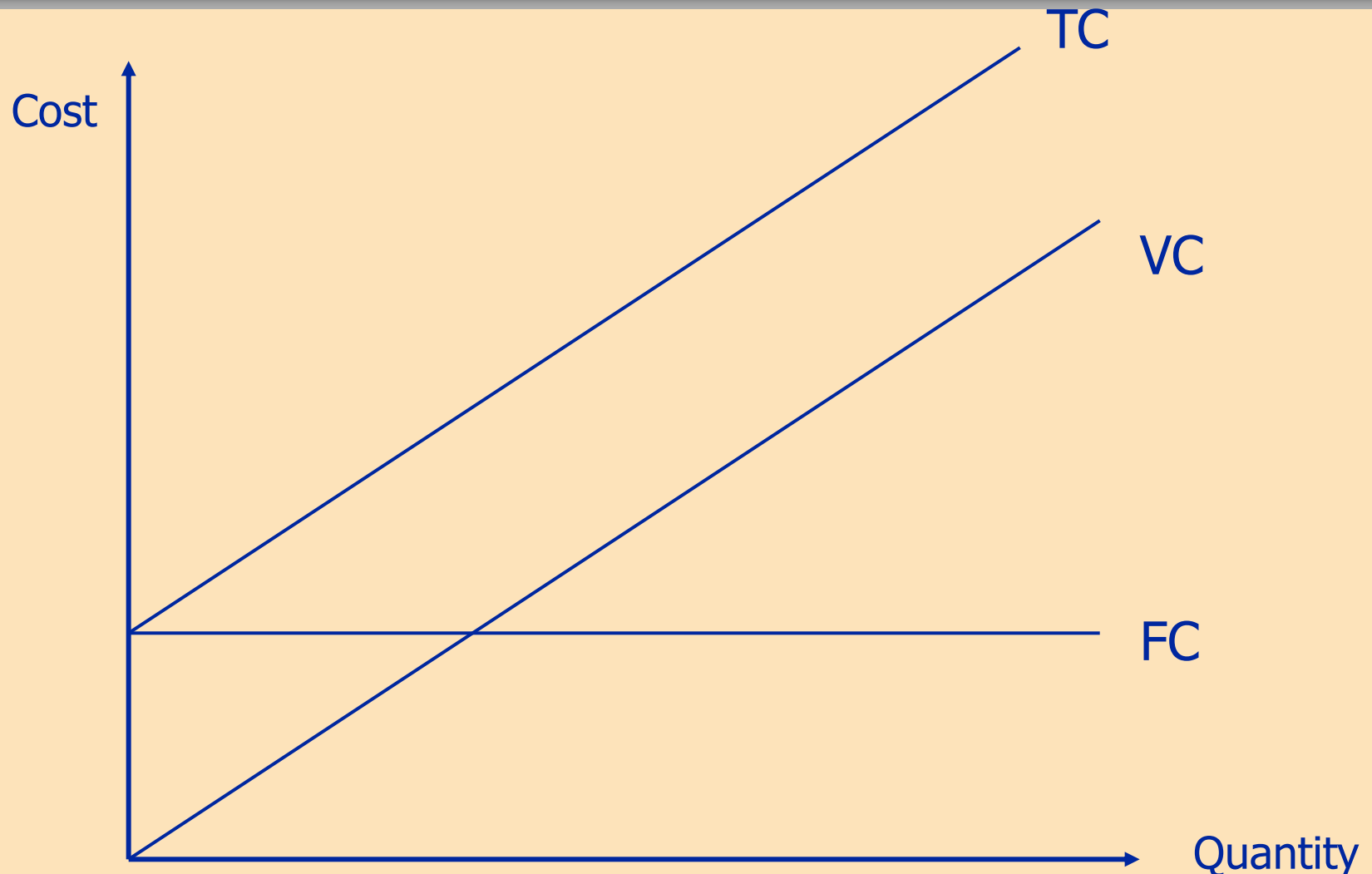
2. *Measurement of resource use*

- Need to quantify resource use in appropriate physical and natural units
 - hours, days, miles, dose etc
- Direct costs are mostly assessed, and categorised as:
 - Capital costs (buildings, equipment)
 - Overheads (jointly used resources, such as heating and lighting, administration and catering)
 - Labour (medical and non-medical staff)
 - Consumables (disposable items, such as drugs, bandages etc)

Fixed, variable and total cost

- Fixed cost (FC)
 - costs that in the short run do not vary with quantity, usually capital, overheads (labour?)
- Variable cost (VC)
 - costs which vary with the level of service, usually consumables (labour?)
- Total cost (TC)
 - all costs incurred while producing a service
 - = $FC + VC$

Fixed, variable and total cost



Average versus marginal cost

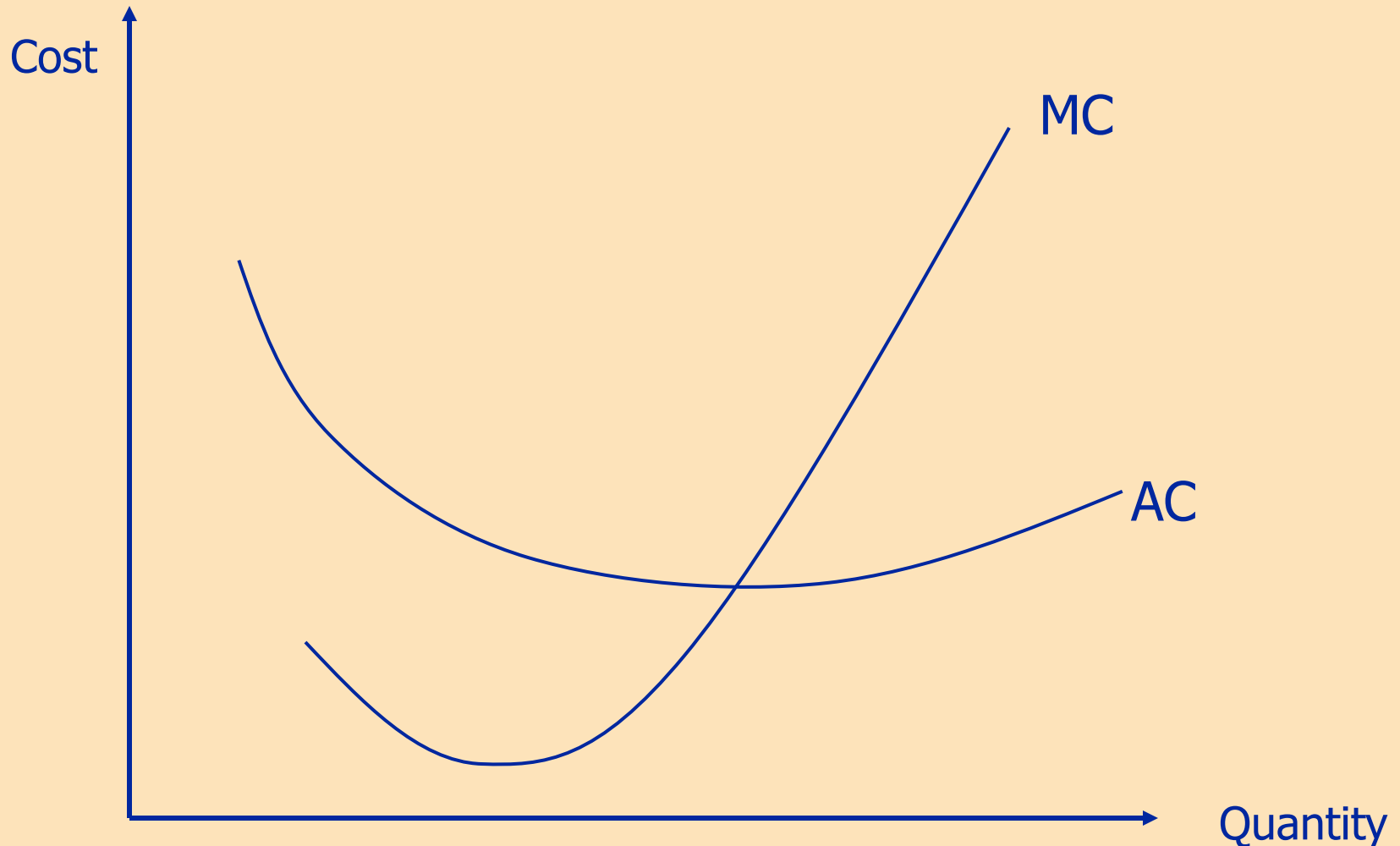
■ Average cost

- cost per unit of output $= \frac{TC}{Q}$
- Influenced by fixed cost

■ Marginal cost

- cost of producing an extra unit $= \frac{\Delta TC}{\Delta Q}$
- Influenced by variable cost

Average and marginal cost curves



Importance of marginal cost

Table 1: Number of cases detected & costs of screening with sequential guaiac tests

Number of tests	Total cases detected	Total costs (£)	Average cost per case detected (£)
1	65.9496	77,511	1,175
2	71.4424	107,690	1,507
3	71.9003	130,199	1,811
4	71.9385	148,116	2,059
5	71.9417	163,141	2,268
6	71.9420	176,331	2,451

(For a population of 10,000, costs include stool tests and barium-enema examinations on those found positive)

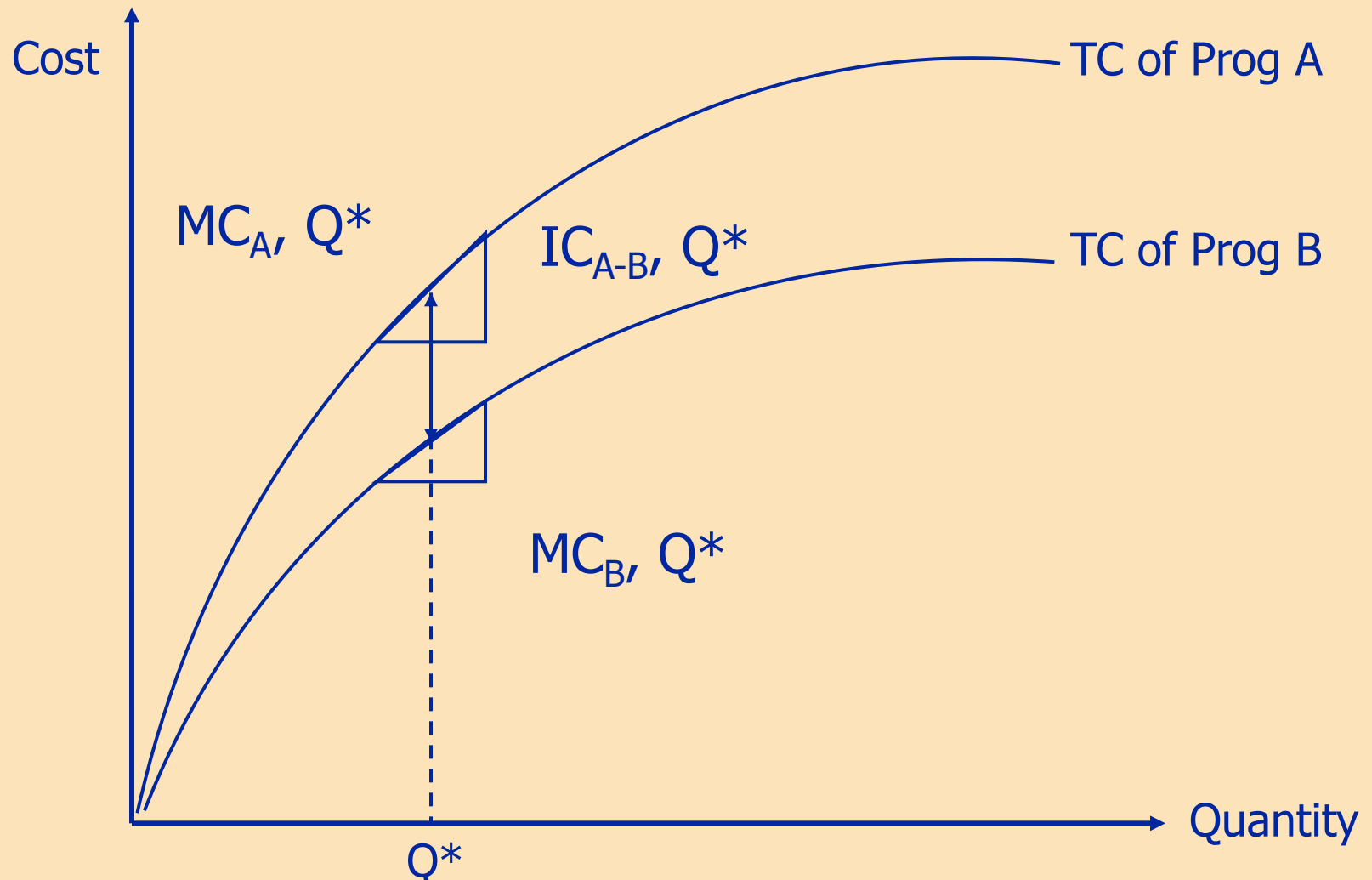
From Neuhauser and Lewicki (1975)

Importance of marginal cost cont...

Table 2: Changes in cases detected and in costs of sequential guaiac tests

Number of tests	Additional cases detected	Additional costs (£)	Marginal cost (additional cost per additional case detected (£))
1	65.9496	77,511	1,175
2	5.4956	30,179	5,492
3	0.4580	22,509	49,150
4	0.0382	17,917	469,534
5	0.0032	15,024	4,724,695
6	0.0003	13,190	47,107,214

Marginal versus incremental cost



Discounting

- Prefer to have benefits now and bear costs in the future – ‘time preference’
- ‘Rate’ of time preference is termed ‘discount rate’
- To allow for differential timing of costs (and benefits) between programmes all future costs (and benefits) should be stated in terms of their present value using discount rate
- Thus, future costs given less weight than present costs

Discounting example

£ cost per person per year

Alternatives	Year 0	Year 1	Year 2	Total £
Surgery	£2,900	0	0	£2,900
Drug	£1,000	£1,000	£1,000	£3,000

Which discount rate?

- 5%: used by US studies in the 70's and 80's, such that convention emerged
- 3.5%: UK government recommended and used in other areas of public sector
- In general, whatever rate used undertake sensitivity analysis (range often 2%-10%)

Specific use of discounting: capital costs

- Capital costs represent an investment in an asset which is used over time
- Purchased at the beginning of the programme and then depreciates over time
- Two components
 - opportunity cost of initial investment
 - depreciation over time
- In a evaluation, annualise the initial capital outlay over the useful life of the asset
 - calculate the equivalent annual cost

$$K = E \frac{1-(1+r)^{-n}}{r}$$

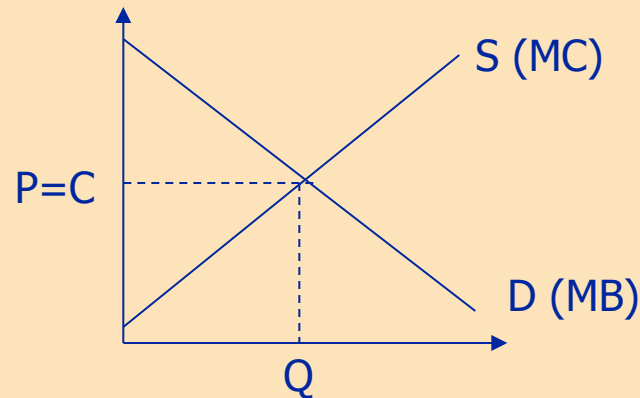
E.g. If cost £1,200 (K), life expectancy 9 years (n), discount rate 6% (r) then E = £176

3. *Valuation*

- Resources should be valued according to their opportunity cost
- In most markets price is a good reflection of opportunity cost but health care provision is rarely subject to market valuations
- Use of prices predominates but should be justified, and alternative ‘shadow’ prices may need to be used

Price $\neq$ cost

- Price = Cost only in a (perfectly) competitive market



- Health care markets are rarely competitive
 - pharmaceuticals subject to bilateral monopolies and discounts
 - labour markets are imperfect
 - cross subsidisation
 - inefficiencies in production

Types of costing

- Valuation is dependent on the form of measurement
- Costing can be performed “top down” or “bottom up”
 - Average per diem, daily cost per patient
 - Disease-specific per diem, average daily cost for treatments within disease areas
 - Case-mix group, cost for each category (e.g. DRGs or HRGs)
 - Micro-costing, cost of each component of resource use
- Choice between these is often dependent on data availability and time constraints

Sources of unit cost data

- Published sources
 - Government (NHS reference costs)
 - previous research
 - provider accounts
 - BNF (British National Formulary)
- Direct valuation (eg patient out-of-pocket expenses – travel, time, OTC, child care)
 - Questionnaires
 - Diaries

NHS ‘reference costs’ (prices)

- Payment by Results (implementation of the national tariff from April 2005)
- Based on hospital returns, within specific HRGs
- Results in published unit costs which are “consistent”
 - day cases, elective and emergency procedures
- 500 surgical procedures, almost 5 million episodes across 249 NHS Trusts
- Limitations
 - excludes atypical episodes
 - costing methods are not standard
 - inconsistent definitions

Adjustments

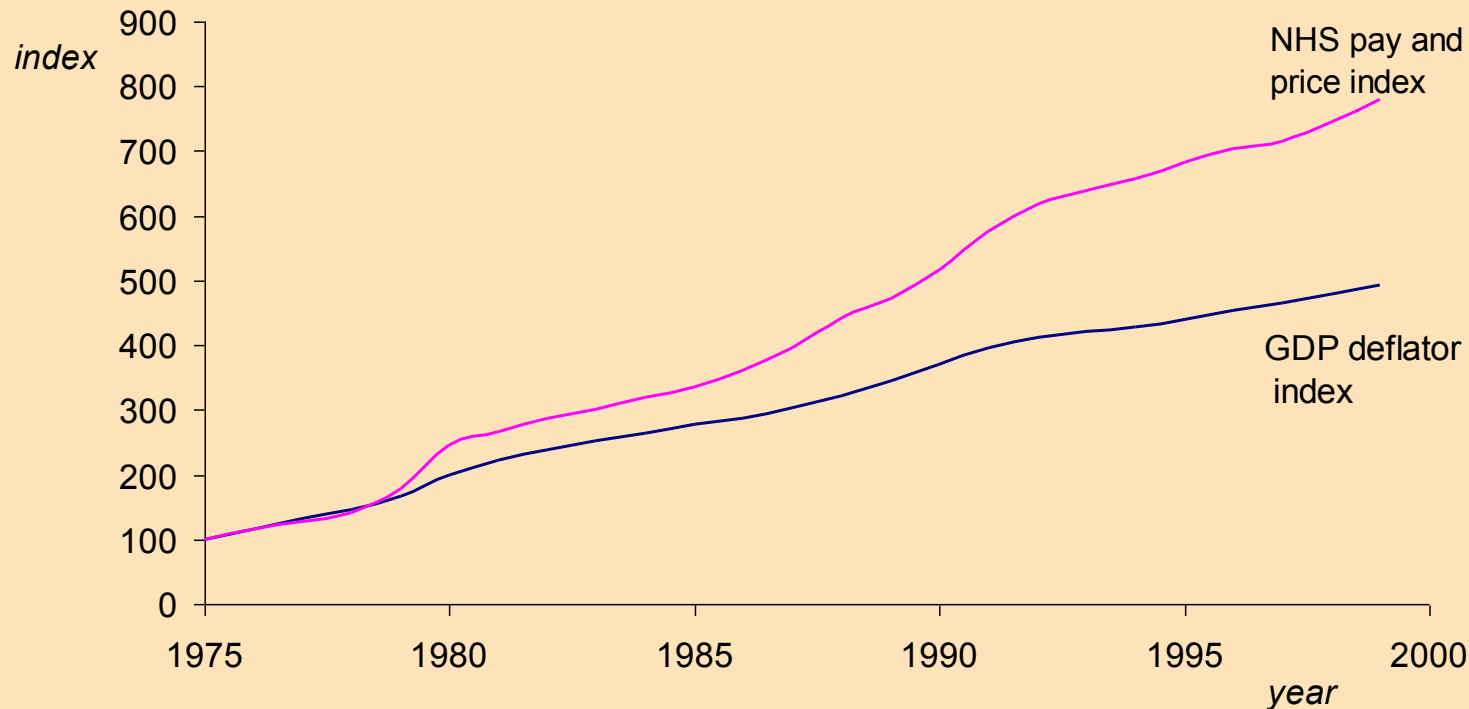
- Unit cost data may need to be adjusted for
 - Price inflation (costs from different years)
 - International currencies (costs from different countries)

Adjusting for price inflation

- Hospital and Community Health Services (HCHS) pay and price index
 - weighted average of Pay Cost Index (PCI) and Health Service Cost Index (HSCI)
- If we know the cost of a hip replacement in 2002/03 was £5,000 but we want it in 1998-99 prices:
$$= \frac{180.4}{206.5} \times £5000$$
$$= £4368$$

HCHS versus general inflation

Comparison of HCHS and general inflation



Adjusting for international currencies

- Purchasing Power Parities (PPPs) and exchange rates are two methods that are used to convert different currencies into a common denominator
- PPPs are more appropriate than exchange rates as these eliminate the difference in price levels between countries
- PPPs are calculated from a common basket of goods

Summary

- Any evaluation **must** distinguish between identification, measurement and valuation of resource use
- Identification
 - perspective is important
 - range of costs justified by perspective
- Measurement
 - need to distinguish between fixed, variable and total cost, and average, marginal costs and incremental cost
 - may need to adjust for differential timing (discounting)
- Valuation
 - method of valuation needs justification (incl. market prices)
 - price does not necessarily equate with cost
 - precision – ‘top down’ versus ‘bottom up’
 - may need to adjust for inflation or currencies