



Assessing value for money: principles, methods and issues

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1. The role of value for money arguments in purchasing decisions

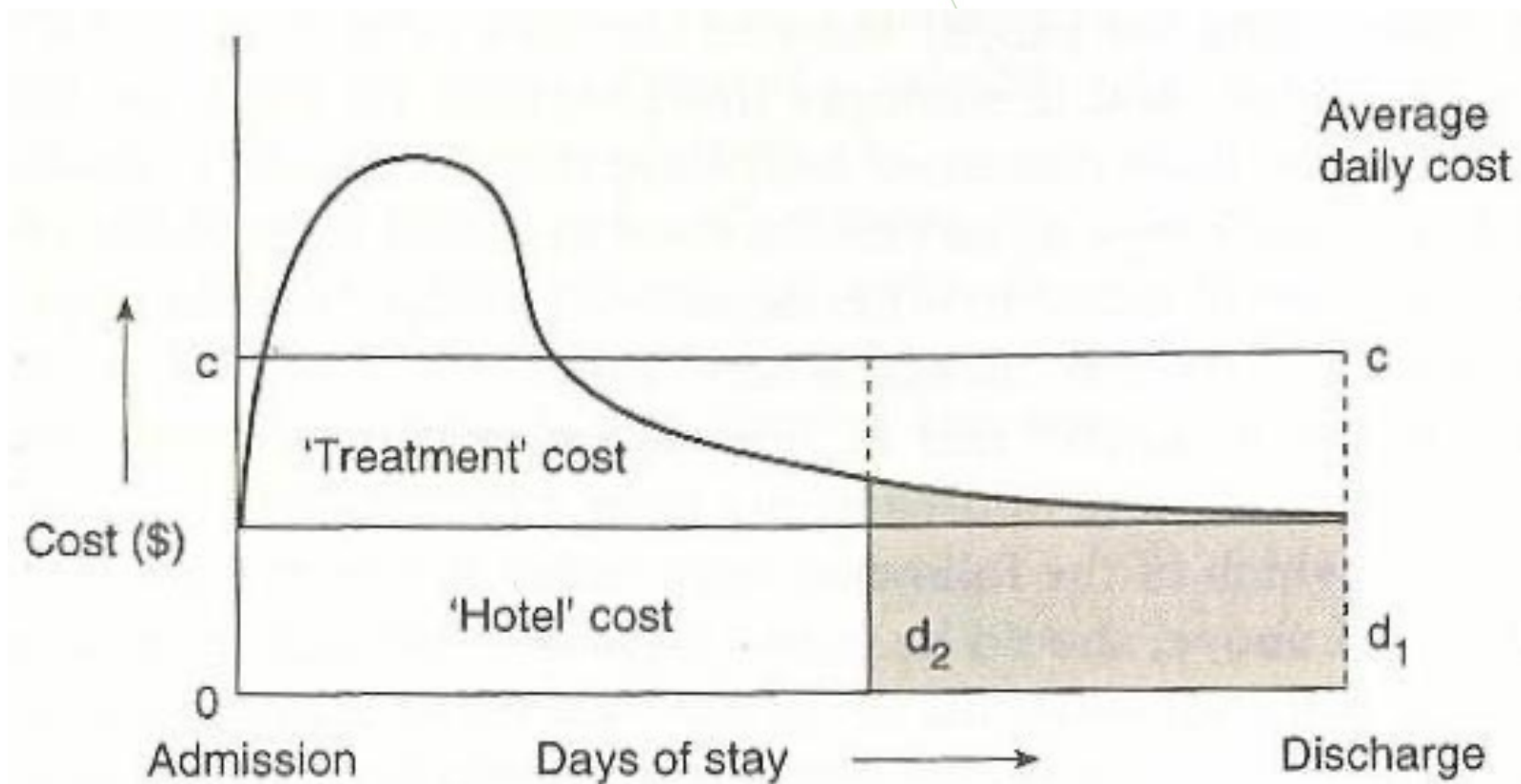
- NHS (and private) health care providers make strategic decisions based largely on the business case
 - HRG tariff price vs. average cost
 - Risk assessment
- The demand for providers' services is determined by PCT spending decisions
 - Exercising some degree of discretion,
 - Within the constraints of their funding and various requirements and obligations
 - PCT decision making will increasingly be informed by value for money considerations
 - As are decisions by, for example, NICE
 - Reflects a growing emphasis, in NHS policy, on outcomes (rather than activity)

2. Principles

- Economic assessments of value for money have two distinctive characteristics:
 - Opportunity costs
 - A focus on marginal analysis
- Focussing on ***changes*** in costs (and benefits) ***at the margin*** gives important insights that can be obscured by average or total costs (and benefits)

3. Insights from Marginal Analysis

Example 1: Cost savings from early discharge



4. A decision making exercise

The Government says that it will earmark a sum for the prevention of two diseases (Disease A and Disease B) that are prevalent in your PCT. These diseases are sometimes fatal, but can be prevented by suitable procedures.

You are asked to advise on how to spend the money to maximise the number of premature deaths averted.

**The Government hints that the sum will be £1 million.
You ask public health experts, who tell you that the
number of premature deaths averted by spending
£1 million would be:**

49 for disease A *or* 101 for disease B

What would you advise?

The Government now tells you that, at the insistence of the Treasury, the sum will actually be £500,000. Again you ask public health experts, who tell you that the number of premature deaths averted by spending £500,000 would be

39 for disease A *or* 81 for disease B

What would you now advise?

Government documents on this decision, including your advice, are leaked before a crucial by-election in your region.

The Government announces publicly that they will, after all, make £1 million available.

What would you now advise?

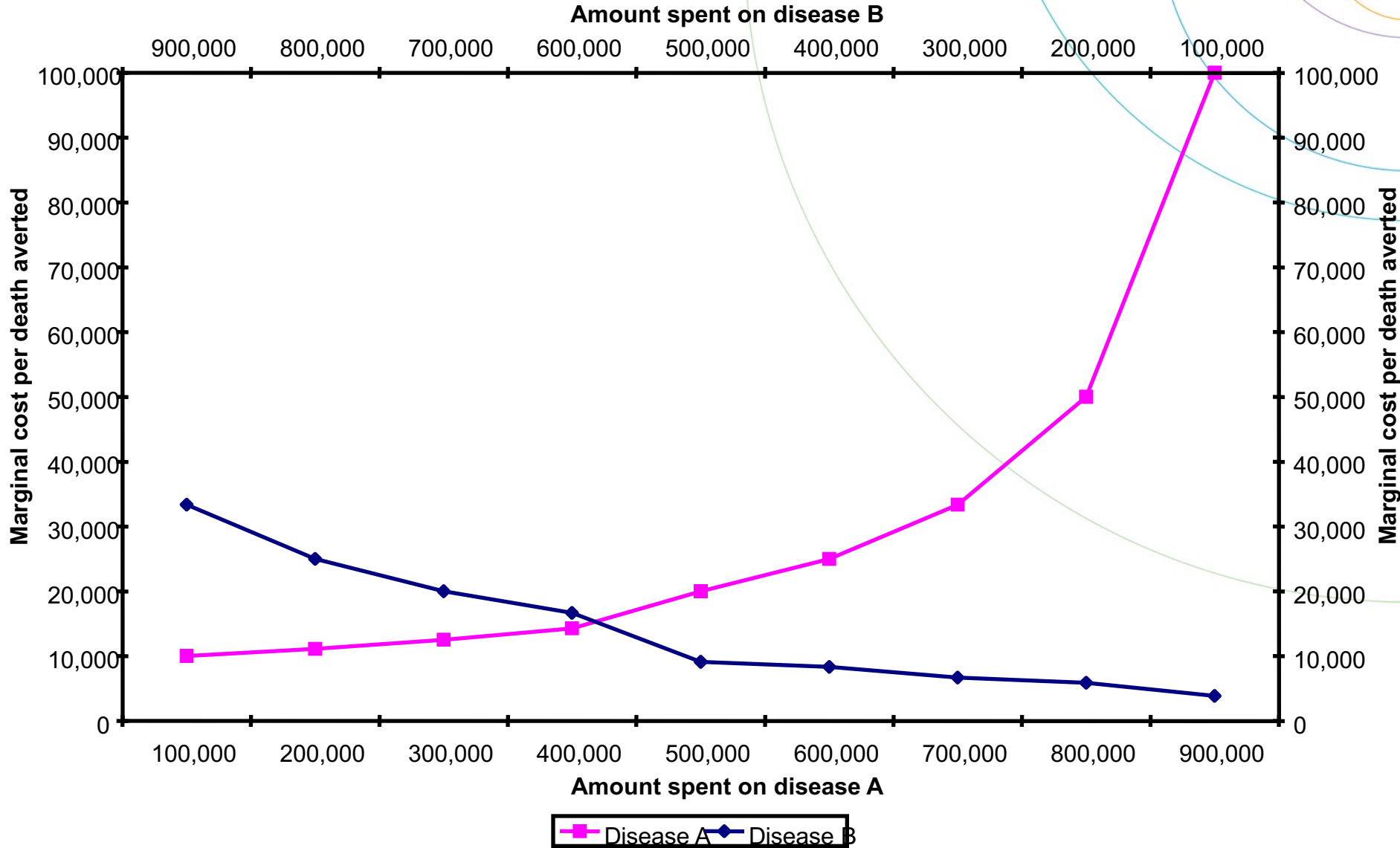
	Deaths averted			Average Cost	
	A	B	Total	A	B
£1 m	49	101	101	£20,408	£9,901
£0.5 m	39	81	81	£12,821	£6,173
£1m	39	81	120	£12,821	£6,173

	Disease A		Disease B	
Total cost (£)	Deaths averted	Cost per death averted	Deaths averted	Cost per death averted
100 000	10	10 000	26	3 846
200 000	19	10 526	43	4 651
300 000	27	11 111	58	5 172
400 000	34	11 765	70	5 714
500 000	39	12 821	81	6 173
600 000	43	13 953	87	6 897
700 000	46	15 217	92	7 609
800 000	48	16 667	96	8 333
900 000	49	18 367	99	9 091
1 000 000	49	20 408	101	9 901

Cost		A			B		
Total	Marginal	Total	Marginal	MC	Total	Marginal	MC
£0.5m	£0.5m	39	39	£12,821	81	81	£6,173
£1m	£0.5m	49	10	£50,000	101	20	£25,000

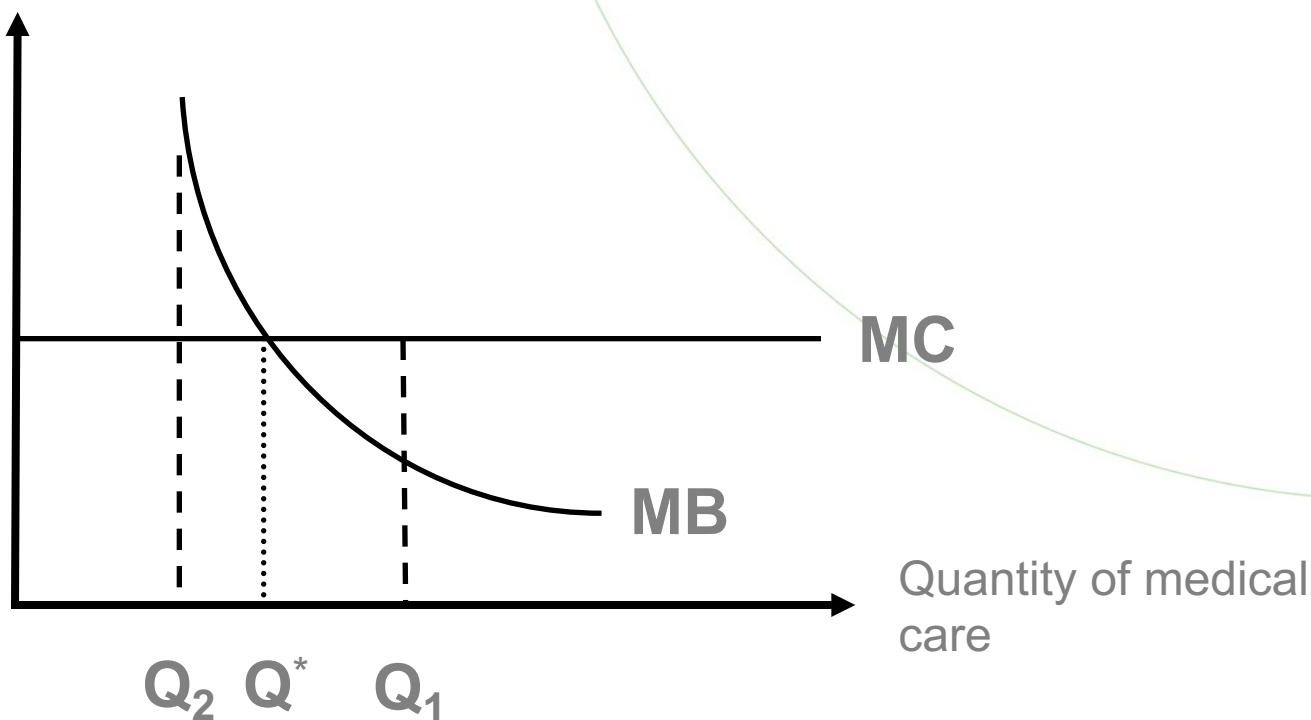
MC = Marginal cost per death averted

Total cost (£)	Disease A		Disease B	
	Deaths averted	Marginal cost per death averted	Deaths averted	Marginal cost per death averted
100 000	10	10 000	26	3 846
200 000	19	11 111	43	5 882
300 000	27	12 500	58	6 667
400 000	34	14 286	70	8 333
500 000	39	20 000	81	9 091
600 000	43	25 000	87	16 667
700 000	46	33 333	92	20 000
800 000	48	50 000	96	25 000
900 000	49	100 000	99	33 333
1 000 000	49	∞	101	50 000



5. Optimisation rules: the equimarginal principle

Marginal Benefit,
Marginal Cost £



- The optimum quantity is Q^* where $MB = MC$
 - At Q_1 , $MC > MB$
 - At Q_2 , $MB > MC$

6. Principal Methods

Economic evaluation is:

‘The **comparative** analysis of alternative courses of action in terms of both their **costs and consequences**’

- Cost minimisation (CM)
- Cost-benefit analysis (CBA)
- Cost-effectiveness analysis (CEA)
- Cost-consequences analysis (CCA)
- Cost-utility analysis (CUA)

Method	How are benefits measured?	How are results expressed?	What is the decision making rule?
Cost minimisation	Proven equal	£	Choose that which costs least
Cost Benefit Analysis	£	Net present value (NPV) in £ Benefit cost ratio	NPV > 0 B:C ratio > 1
Cost Effectiveness Analysis	Natural units, e.g. pain free days life years gained	Cost effectiveness ratio (CER)= $\Delta\text{Costs}/\Delta\text{outcome}$	That with the lowest CER is best value for money*
Cost Consequences Analysis	In a variety of different natural units.	CERs for each alternative measure of effectiveness	That with the lowest CER is best value for money*
Cost Utility Analysis	Quality Adjusted Life Years (QALYs)	Cost effectiveness ratio= $\Delta\text{Costs}/\Delta\text{QALYs}$	That with the lowest CER is best value for money*

* and those with a CER lower than society's 'threshold' CER are desirable

7. Quality adjusted Life Years

- A measure of outcome which incorporates both quality and length of life.
- Can capture changes in quality of life, length of life or both
- Facilitates comparisons between health care services with very different effects upon health
- Estimating QALYs, *changes* in QALYs and *cost per QALY gained*

8. What are costs and benefits estimated against?

The 'counterfactual' is:

- The position against which costs and consequences are compared
- The position to which costs and consequences are incremental (or marginal)

Relevant counterfactuals might include:

- Best practice
- Current practice (the status quo)
- 'Do nothing' (e.g. best supportive care)

The importance of the choice of comparator

Table 1. cost effectiveness analysis including Drug B

Intervention	QALYs	Δ QALYs	Cost (£000)	Δ cost	Cost/QALY gained
Palliative care	0.4	0.4	1	1	2.5
Drug A	0.6	0.2	2	1	5
Drug B	0.7	0.1	10	8	80
Drug C	0.8	0.1	13	3	30

Table 2: Cost effectiveness analysis excluding Drug B

Intervention	QALYs	Δ QALYs	Cost (£000)	Δ cost	Cost/QALY gained
Palliative care	0.4	0.4	1	1	2.5
Drug A	0.6	0.2	2	1	5
Drug C	0.8	0.2	13	11	55

Using Drug B as the comparator means attributing spurious cost effectiveness to Drug C

9. How is quality of life measured?

Measuring health on a generic HR-QoL instrument: the EQ-5D

By placing a tick in one box in each group, please indicate which statement best describes your health today.

Mobility

Have no problems in walking about

Have some problems in walking about

I am confined to bed

Self-Care

Have no problems with self-care

Have some problems washing or dressing myself

I am unable to wash or dress myself

Usual Activities

Have no problems with performing my usual activities

Have some problems with performing my usual activities

I am unable to perform my usual activities

Pain/Discomfort

Have no pain or discomfort

Have moderate pain or discomfort

Have extreme pain or discomfort

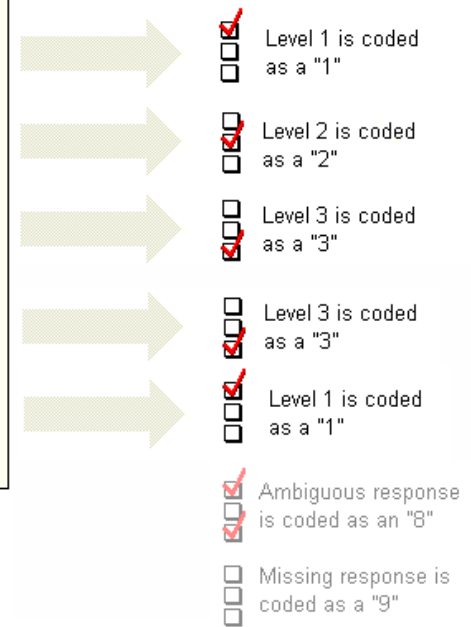
Anxiety/Depression

I am not anxious or depressed

I am moderately anxious or depressed

I am extremely anxious or depressed

Levels of a perceived problem are coded as follows:



The health state is derived from the descriptive system.

health state	1	2	3	3	1
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To score a health state you simply read off the corresponding value from a value set.

score	0.07
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A value set:

1	2	3	2	3	0.09
1	2	3	3	1	0.07
1	2	3	3	2	0.00

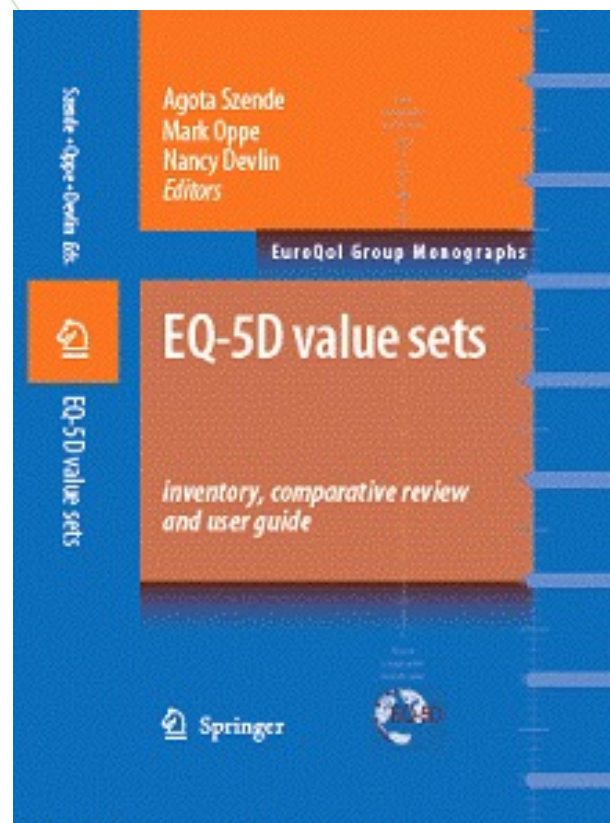
10. How is quality of life valued?

24 Health State preferences of New Zealanders

TABLE A3: TWO TARIFFS OF HEALTH STATE PREFERENCES OF NEW ZEALANDERS

state	n=919 Eq. (1)	n=396 Eq. (2)	differenc e	state	n=919 Eq. (1)	n=396 Eq. (2)	differenc e	state	n=919 Eq. (1)	n=396 Eq. (2)	differenc e
11111	1.000	1.000	0.000	12133	0.251	0.164	0.086	13232	0.239	0.171	0.068
11112	0.662	0.704	-0.042	12211	0.651	0.711	-0.060	13233	0.127	0.079	0.047
11113	0.549	0.395	0.154	12212	0.538	0.619	-0.081	13311	0.527	0.409	0.117
11121	0.670	0.716	-0.046	12213	0.425	0.310	0.115	13312	0.414	0.317	0.096
11122	0.557	0.624	-0.067	12221	0.546	0.631	-0.085	13313	0.301	0.225	0.076
11123	0.445	0.316	0.129	12222	0.433	0.539	-0.106	13321	0.422	0.330	0.092
11131	0.565	0.420	0.146	12223	0.321	0.231	0.090	13322	0.309	0.238	0.072
11132	0.453	0.328	0.125	12231	0.441	0.335	0.106	13323	0.197	0.146	0.051
11133	0.340	0.236	0.104	12232	0.329	0.243	0.086	13331	0.317	0.250	0.067
11211	0.740	0.782	-0.042	12233	0.216	0.151	0.065	13332	0.205	0.158	0.047
11212	0.627	0.690	-0.063	12311	0.616	0.481	0.135	13333	0.092	0.066	0.026
11213	0.515	0.382	0.133	12312	0.503	0.389	0.114	21111	0.672	0.721	-0.049
11221	0.635	0.703	-0.067	12313	0.391	0.297	0.094	21112	0.559	0.629	-0.069
11222	0.523	0.611	-0.088	12321	0.511	0.401	0.110	21113	0.447	0.320	0.127
11223	0.410	0.302	0.108	12322	0.399	0.309	0.090	21121	0.567	0.641	-0.073
11231	0.531	0.406	0.124	12323	0.286	0.217	0.069	21122	0.455	0.549	-0.094
11232	0.418	0.314	0.104	12331	0.407	0.321	0.085	21123	0.342	0.240	0.102
11233	0.305	0.222	0.083	12332	0.294	0.229	0.065	21131	0.463	0.345	0.118
11311	0.705	0.552	0.153	12333	0.181	0.137	0.044	21132	0.350	0.253	0.098
11312	0.593	0.460	0.132	13111	0.596	0.437	0.159	21133	0.237	0.160	0.077
11313	0.480	0.368	0.112	13112	0.483	0.345	0.139	21211	0.637	0.707	-0.070
11321	0.601	0.472	0.128	13113	0.371	0.253	0.118	21212	0.525	0.615	-0.090
11322	0.488	0.380	0.108	13121	0.491	0.357	0.134	21213	0.412	0.306	0.106
11323	0.375	0.288	0.087	13122	0.379	0.265	0.114	21221	0.533	0.627	-0.094
11331	0.496	0.393	0.103	13123	0.266	0.173	0.093	21222	0.420	0.535	-0.115
11332	0.383	0.301	0.083	13131	0.387	0.277	0.110	21223	0.307	0.227	0.081
11333	0.271	0.209	0.062	13132	0.274	0.185	0.089	21231	0.428	0.331	0.097
12111	0.685	0.725	-0.039	13133	0.161	0.093	0.068	21232	0.315	0.239	0.077
12112	0.573	0.633	-0.060	13211	0.561	0.423	0.138	21233	0.203	0.147	0.056
12113	0.460	0.324	0.136	13212	0.449	0.331	0.118	21311	0.603	0.477	0.126
12121	0.581	0.645	-0.064	13213	0.336	0.239	0.097	21312	0.490	0.385	0.105
12122	0.468	0.553	-0.085	13221	0.457	0.343	0.113	21313	0.377	0.293	0.085
12123	0.355	0.244	0.111	13222	0.344	0.251	0.093	21321	0.498	0.397	0.101
12131	0.476	0.348	0.128	13223	0.231	0.159	0.072	21322	0.385	0.305	0.080
12132	0.363	0.256	0.107	13231	0.352	0.264	0.088	21323	0.273	0.213	0.060

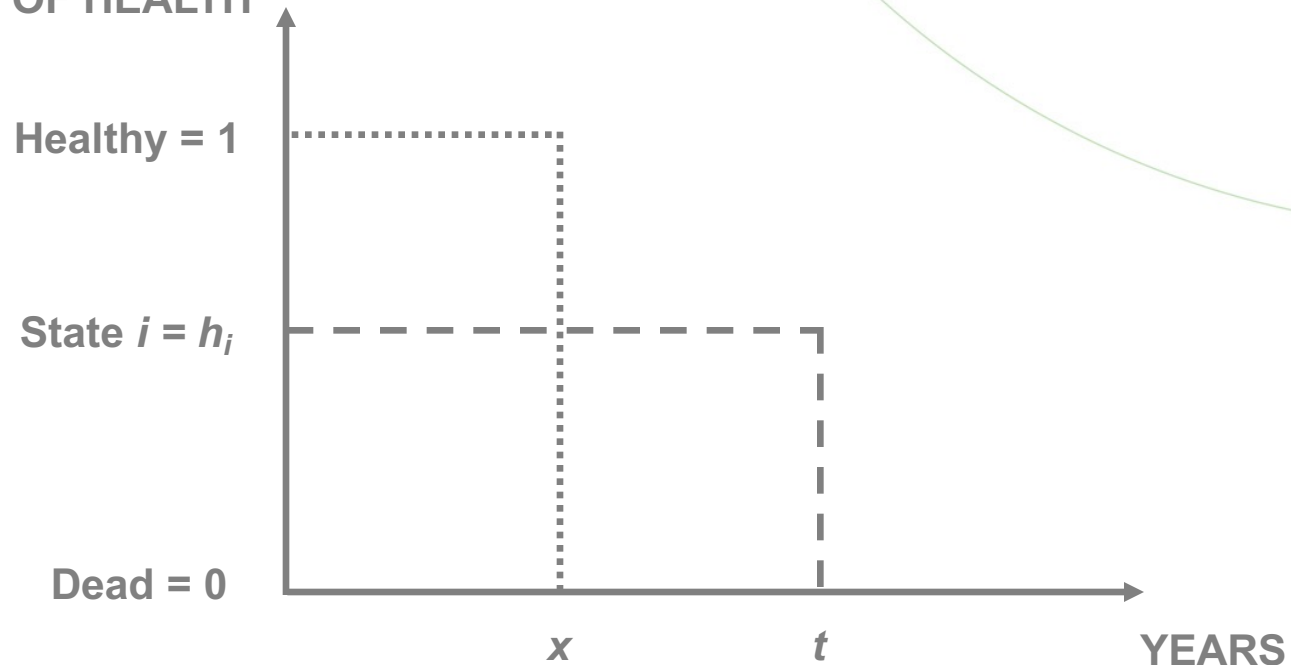
Example of a ‘tariff’ of social values (a value set) for the EQ-5D



11. Methods for eliciting values: The time trade-off method (TTO)

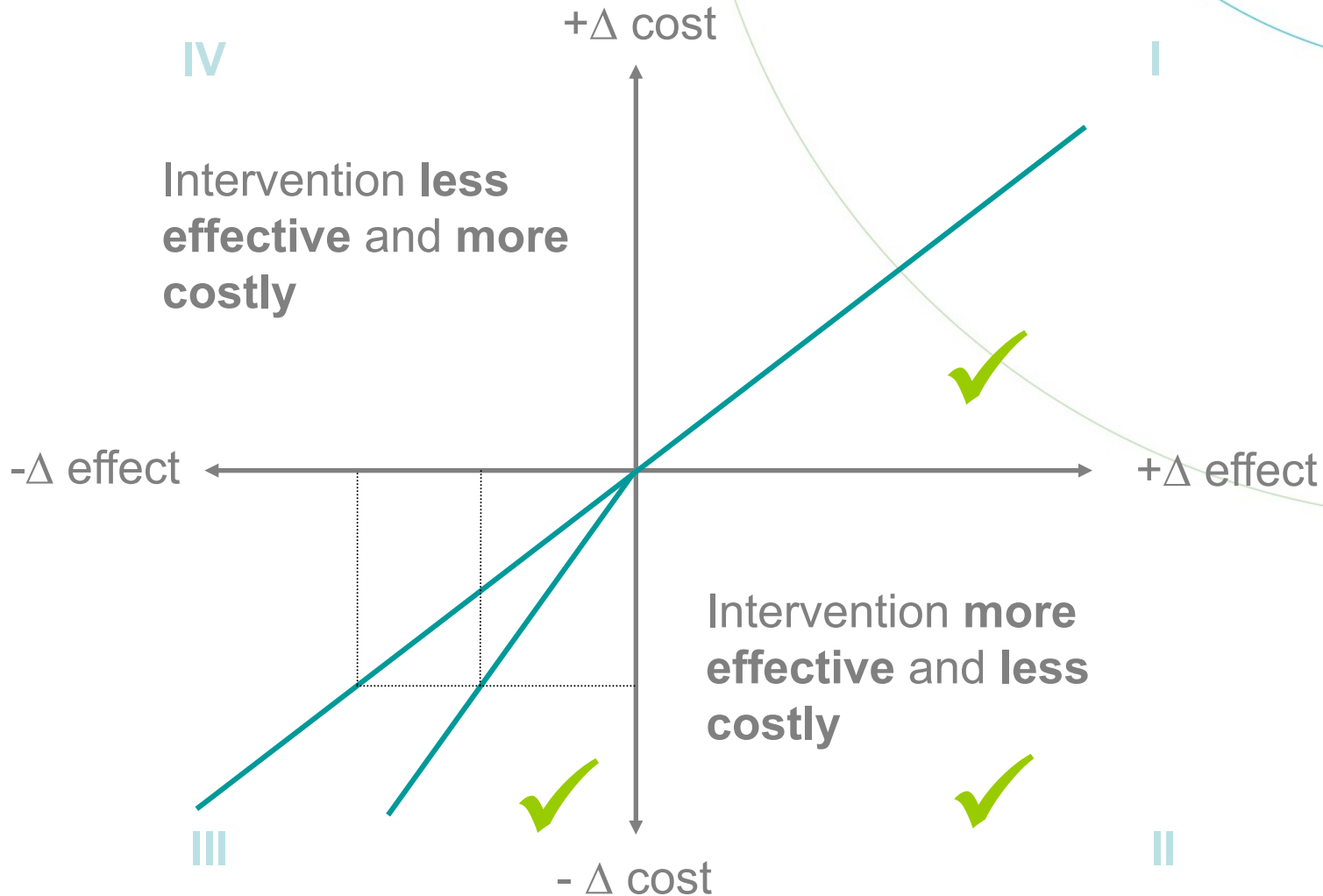
- Offer choice between:
 - x years of full health
 - t years at health state i
- At the point of indifference, the value of health state i is $h_i = x/t$

VALUE OF HEALTH



12. The cost effectiveness plane

Difference in effect and cost of an option relative to its comparator



13. NICE decision making: the £30,000 question

- What is the basis for NICE's cost effectiveness threshold?
- Are NICE recommendations out of keeping with real budget constraints in the NHS?
- What are the opportunity costs of services displaced by new technologies?
- Is NICE efficiency increasing?

14. Investment and disinvestment in the NHS

- The cost effectiveness thresholds in local NHS decision making (The 'Williams Project': Appleby, Devlin, Parkin, Buxton and Chalkidou, 2007)
 - Services 'at the margin' identified: investment, disinvestment, deferred investment
 - Exclude: invest-to-save; decisions which are dominant on CE grounds.
 - CUA performed on remainder
- A preview of results
- Implications for value for money judgements.
- What health services are 'at the margin' in *your* organisation?

15. Outcomes-based management

- BUPA's experience with using the SF-12 to manage the performance of clinical staff/teams
- Use of routine health outcome measures in the NHS (Appleby and Devlin 2004)