Introduction to practical Cost-Benefit Analysis

Dr Leo Dobes

Leo.Dobes@anu.edu.au

phone: 0417 462 153

Moral or Prudential Algebra

"In the Affair of so much Importance to you, wherein you ask my Advice, I cannot for want of sufficient Premises, advise you *what* to determine, but if you please I will tell you *how*.

…… divide half a Sheet of Paper by a Line into two Columns; writing over the one Pro, and over the other *Con*. Then, during three or four days consideration, I put down under the different Heads short Hints of the different Motives … for or against the Measure. When I have thus got them all together in one View, I endeavour to estimate their respective Weights; and where I find two, one on each side, that seem equal, I strike them both out. If I find a Reason *pro* equal to some two Reasons *con*, I strike out the three. If I judge some two Reasons *con*, equal to some three Reasons *pro*, I strike out the five; and thus proceeding I find at length where the Balance lies; and … come to a Determination accordingly.

And, tho' the Weight of Reasons cannot be taken with the Precision of Algebraic Quantities, yet … I have found great Advantage from this kind of Equation, in what may be called *Moral or Prudential Algebra*."

Benjamin Franklin to Joseph Priestley, 19 September 1772

the Franklin approach

- **Reflects basic cost-benefit approach**
- **Key: systematic listing of all factors**
  - ➢ **avoids bias of selectivity because can't have all factors in mind at the same time**
- **Listing of factors in favour and against**
  - ➢ **avoids 'first conclusion' bias**
- **"three or four days consideration"**
  - ➢ **time to think of options and complexity**
- **Assignment of implicit values to factors**

exercise : speed limit

What are the major costs and benefits of reducing the traffic speed limit from 60 km per hour to 50 km per hour in urban areas?

what is CBA?

- **simple principle: compare costs with benefits**
- **Pareto efficiency: no alternative allocation can make at least one person better off with no-one worse off**
  - **Hicks/Kaldor: if winners 'could' compensate losers (potential Pareto efficiency)**
- **include all costs and benefits**
  - **even where no market exists**
  - **e.g. externalities like environmental effects**
- **"social CBA": effect on society as a whole**
  - **distinguishes CBA from all other evaluation methods**
- **but need to compare costs/benefits on a common basis: commensurability**

cost-benefit analysis

- **no 'cookbook' or recipe**
  - **every problem is different**

- **but there are some 'principles':**
- **'whole of society' perspective**
- **<u>not</u> government budget or financial analysis**
  - i.e. include all social (resource) costs and benefits
- **adjust costs and benefits for timing differences**
- **adjust for uncertainty in costs and benefits**

benefits, costs, transfers

- *Benefits*: willingness to pay for resources
  - reflects value judgement of consumer sovereignty
  - maximum amount of other goods and services the consumer is willing to forgo
  - Willingness to Pay ≈ Willingness to Accept
- *Costs*: opportunity costs of production and consumption opportunities forgone by the community when resources are used
- *Social = Private + Public*
- *Transfer payments*: neither benefit nor cost to society as a whole

transfer payments

- **Transfer of claims over real resources without receiving goods or services in return**
- **National perspective: no change in society's welfare (neither benefit nor cost)**
  - **- like pocket money within a family**
- **Like charitable donations, taxes, robbery??, unemployment benefits, tariffs, insurance premiums (but insurance admin is a cost)**
- **But assumes equal marginal utility of income**

shadow prices

- **shadow prices are opportunity costs.**
- not to be confused with shadow prices in linear programming

- **They are calculated in CBA for those goods and services that do not have a market price**

- **CBA frequently requires estimates of the cost of unemployed labour, land, materials, environmental factors and machines**

CBA vs financial analysis: e.g. dam

Category	CBA	Financial
Costs (selected)	•Labour, fuel, materials (opportunity cost) •Externalities: fish, ducks, trees •Farm equipment •Possible tax deadweight loss •Economic depreciation	•Labour, fuel, materials (market price) •Taxes •Interest •Insurance •Accounting depreciation
Benefits (selected)	•Erosion control •Waterskiing •Crop production	•Profit from sale of water, waterskiing fees, etc

10

key steps in CBA

1. Identify and specify objectives and policy considerations
2. Determine 'standing'
3. Identify and catalogue impact of the project or policy, and its alternatives (including the status quo 'base case')
4. Predict impacts of policy alternatives over the project life cycle
5. Estimate the economic value of the costs and benefits
6. Estimate the Net Present Value of the costs and benefits
7. Allow for uncertainty
8. Conduct sensitivity analysis
9. Undertake distributional analysis to assist decision-makers
10. Make a recommendation

1. identify and specify objectives and policy considerations

- **Sketch diagram**
  - helps clarify and confirm issue at hand
- **Specify in writing objective of analysis**
  - and check with decision-maker
- **Alternative projects, with and without basecase**
- **Constraints**
  - examples: inland rail, rainwater tank prohibition, US irrigation project and corn production controls
- **Identify interest groups**
  - to ensure relevance and facilitate identification of key factors in the analysis (a cross-check)
  - allow estimation of distributional impacts
  - but interest groups are <u>not</u> 'society as a whole'

2. determine 'standing'

- 'Standing': whose
benefits and costs should be counted?
- *jurisdiction*: global? national? regional? local?
- *membership*: animals (eg Spain)? plants? nationals only? immigrants? future generations? those with legally defined rights (but slaves? blacks under apartheid? Jews in Nazi Germany?)?
- *socially unacceptable preferences*: criminals? foreign cultures? paedophiles?

3. identify and catalogue impact of the project or policy, and its alternatives

- **consult all stakeholders, especially technical experts: identify all likely ramifications**
- **translate general effects (eg 'community capacity building') into specific effects (eg improved skills)**
- **include multiple impacts: eg flooding damages houses, benefits duck hunters; Brisbane floods benefit cattle in the "corner country"**
- **select only impacts that affect individuals with standing**
- **eliminate impacts with no causal relationship**
- **specify measurement unit (beware surrogates: 'arrests' may not reflect 'crime')**

4. predict impacts of all alternatives over their project life cycles

- **Quantify and project impacts (eg hours saved per motorist per trip) for each future year**

But beware:

- **Compensating behaviour (eg homeostasis of driving risk in treated Black Spots, rainwater tanks can just mean greener lawns not less water usage)**
- **Substitution effects (eg compulsory bike helmets may reduce head injuries; or they signal perceived danger so parents drive obese children to school)**
- **Omissions (eg forget silting of dam, rainwater tanks reduce stream flow)**
- **Lack of knowledge (eg loss of a few frogs may in fact represent greater loss of whole eco-system)**
- **Optimism bias (Flyvberg: traffic forecasts inaccurate)**

5. estimate economic value of costs and benefits

<u>Cost</u>   = opportunity cost

<u>Benefit</u>

- Consumer surplus = Willingness to Pay (WTP) minus market price

- Producer Surplus = market prices minus opportunity cost of resources

<u>Net benefit</u> = benefits – costs

- Compare 'base case' and 'project case'

opportunity cost

- **Value in next best alternative use: what net benefit society must forgo by not using that alternative**
- **Use to which it *would* be put (i.e. subject to political or physical constraints on usage), not just any possible use**
- **Legal: eg robbing a bank is not next best alternative**
- **Past (sunk) costs not relevant: only present and future costs**
- **Benefits gained from a project are not relevant to opportunity cost as the next best alternative**
- **Only one (the next best alternative); not the sum of all other possible alternatives**
- **If no distortions, market price = opportunity cost**

exercise: opportunity cost

- I have an apple and an orange and offer you a choice of one or the other. If you were to choose the apple, what is the benefit? What is the opportunity cost? What if you wish to choose the orange?

- What if the apple has been stolen ?

- What if the apple is the 'apple of eternal life' and can be sold easily and immediately for $10 billion?

- If I have two identical apples and you wish to choose one, what would be the opportunity cost to you?

- You now have the apple and it is yours. I still have my orange. What is the opportunity cost to you?

- Before coming to this seminar, what else could have chosen to do? What was your opportunity cost? What is it now?

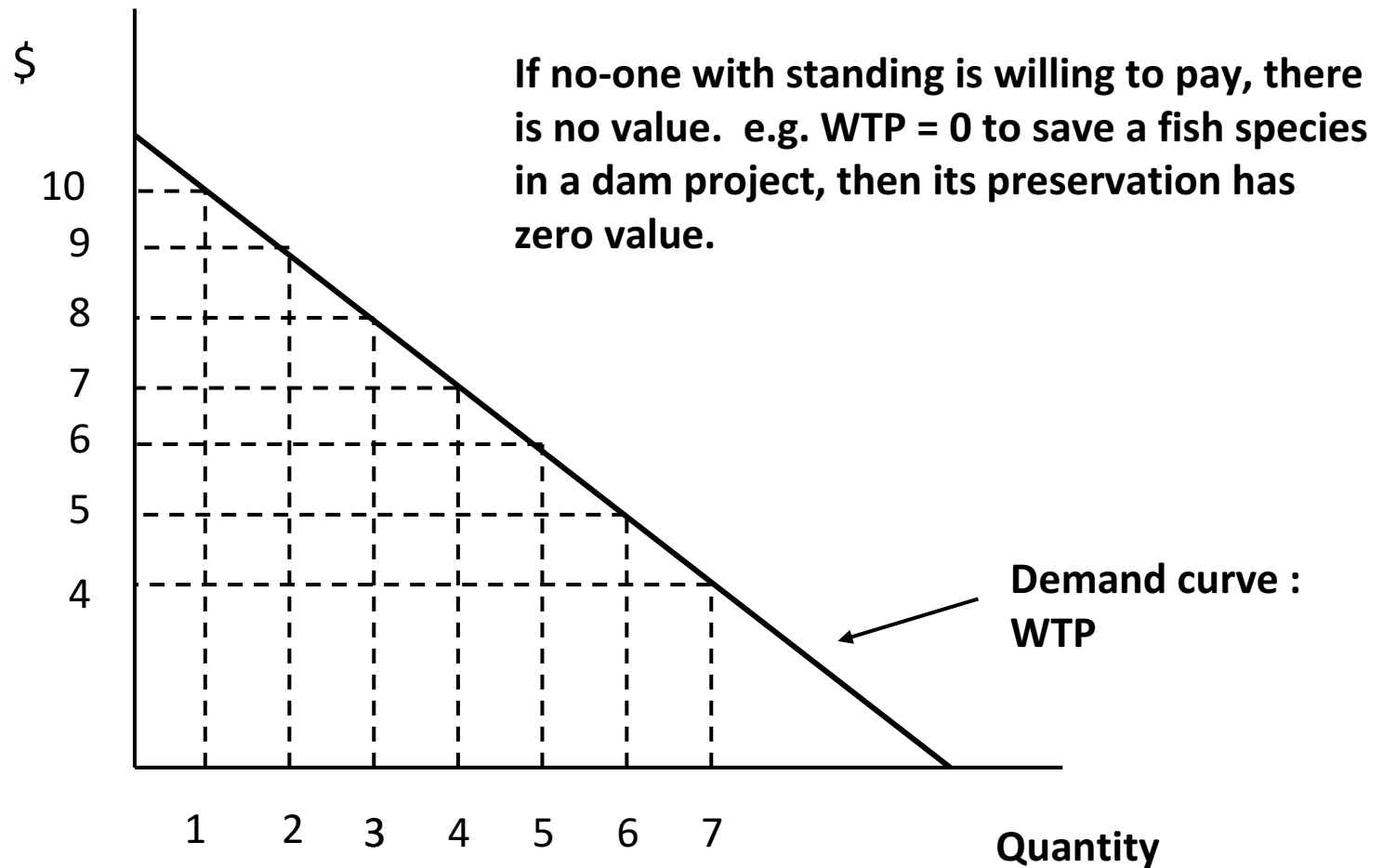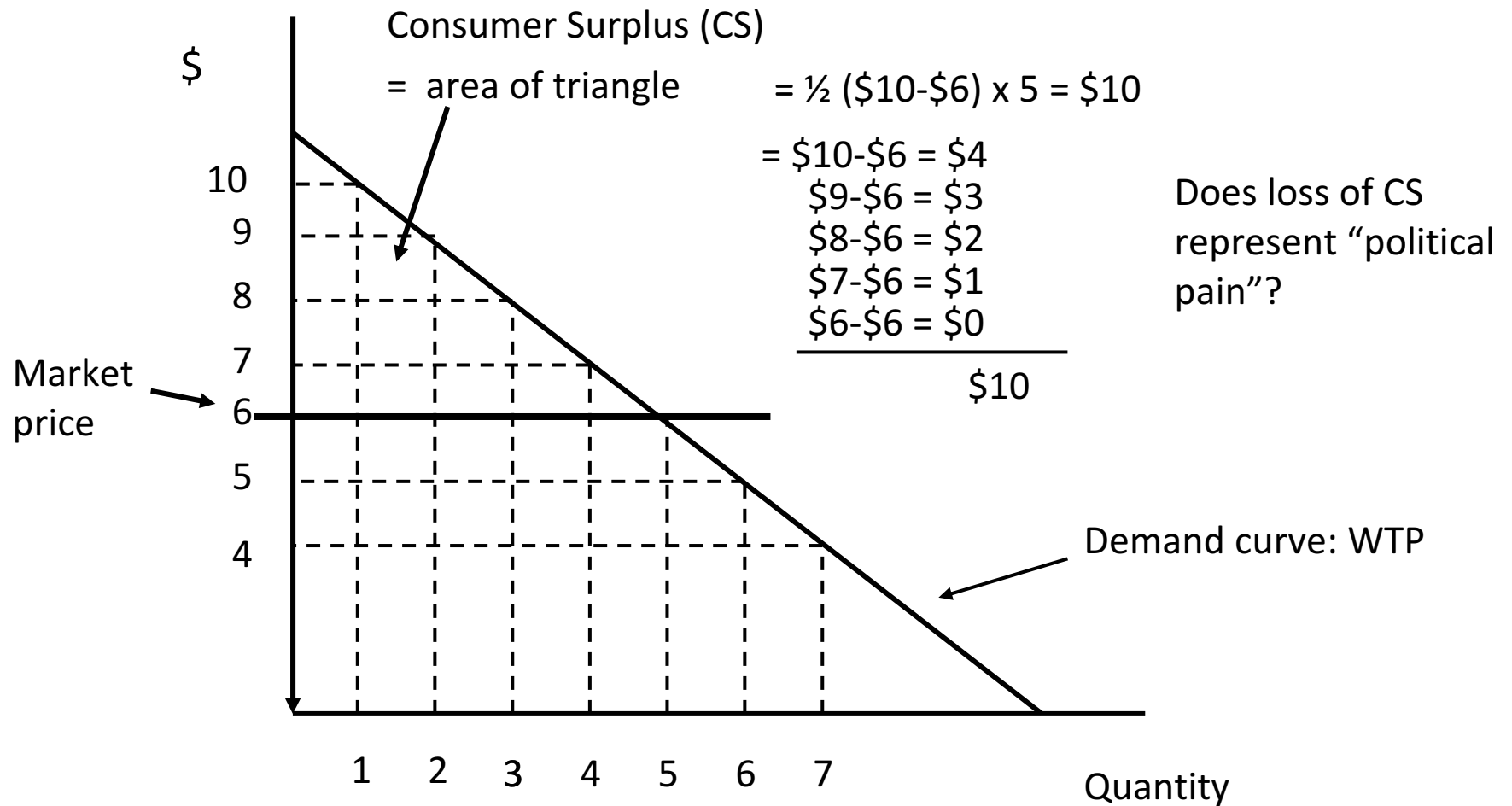# exercise: building a sports stadium

Source: Arthur Boppre, Wikipedia

1. **What were the social costs and social benefits of building the Estádio do Maracanã?**

2. **What are the social costs and social benefits of renovating it for FIFA 2014 and the 2016 Summer Olympics?**

Willingness to Pay (WTP)
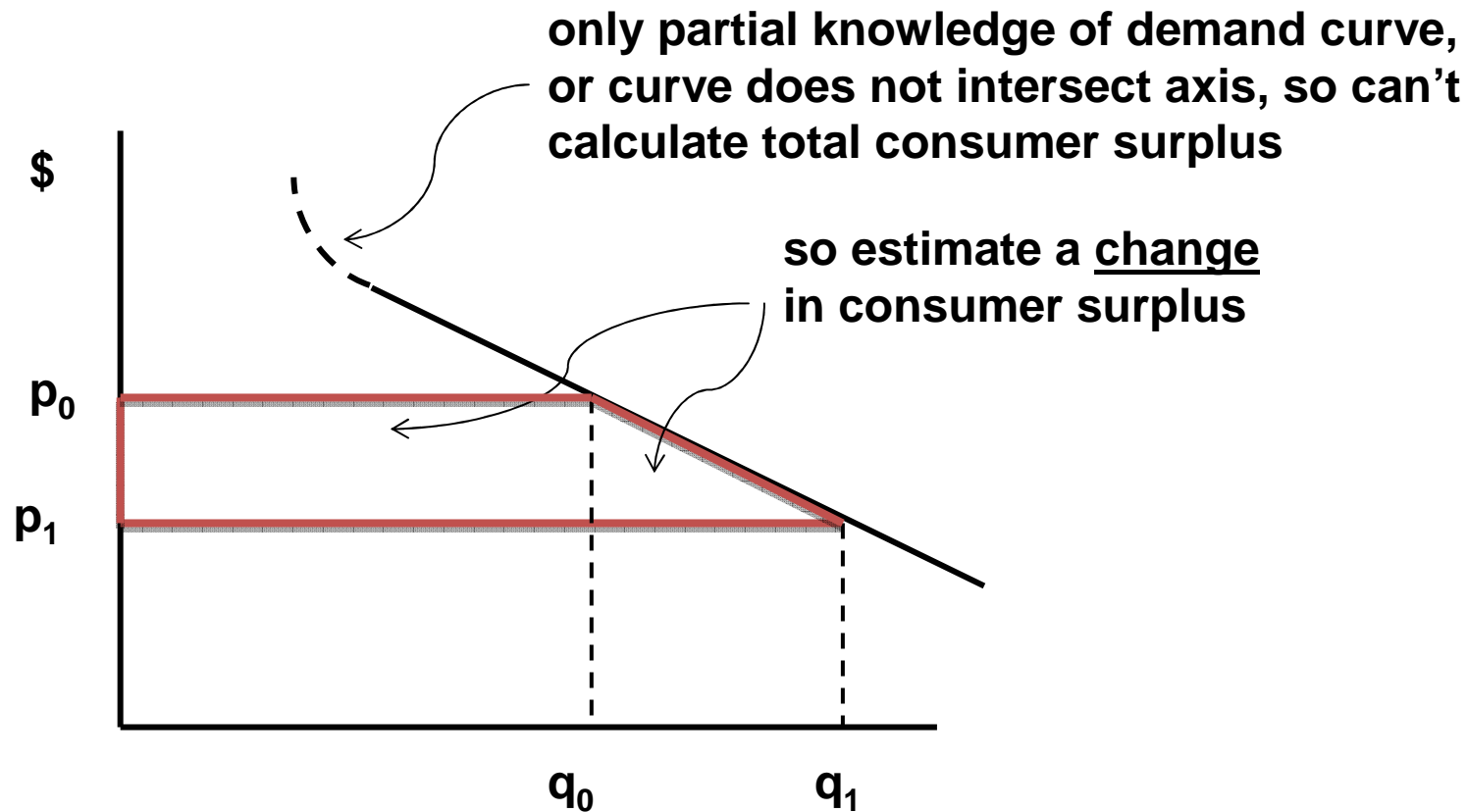
$

If no-one with standing is willing to pay, there is no value. e.g. WTP = 0 to save a fish species in a dam project, then its preservation has zero value.

10
9
8
7
6
5
4

Demand curve :
WTP

1   2   3   4   5   6   7   Quantity

WTP and Consumer Surplus

Consumer Surplus (CS)

= area of triangle   = ½ ($10-$6) x 5 = $10

 = $10-$6 = $4

 $9-$6 = $3

 $8-$6 = $2

 $7-$6 = $1

 $6-$6 = $0

 $10

Does loss of CS represent "political pain"?

$

10
9
8
7
6 ← Market price
5
4

Demand curve: WTP

1   2   3   4   5   6   7   Quantity

change in consumer surplus

only partial knowledge of demand curve, or curve does not intersect axis, so can't calculate total consumer surplus

so estimate a __change__ in consumer surplus
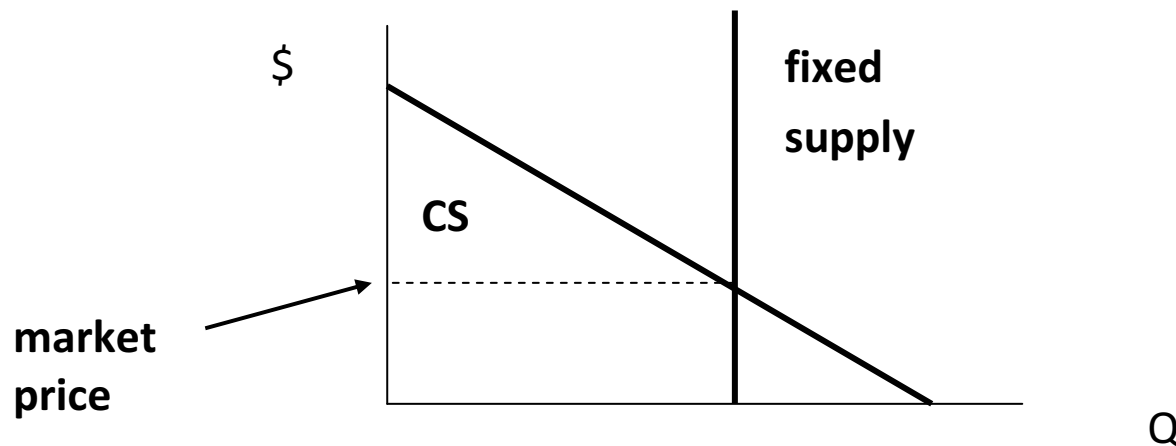
$\$$

p_0

p_1

q_0 q_1

p_0 , q_0 : counterfactual or 'status quo' or 'base case'

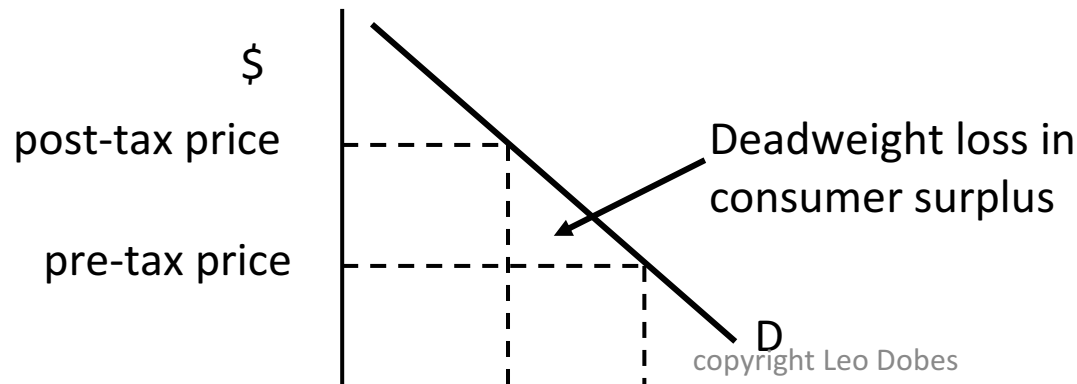p_1 , q_1 : new project or situation, if cost or price falls

" ...just terms ..."

- **Brazilian Constitution, article 182 states:**

"... (3) Expropriation of urban property is made against prior and fair compensation in cash."
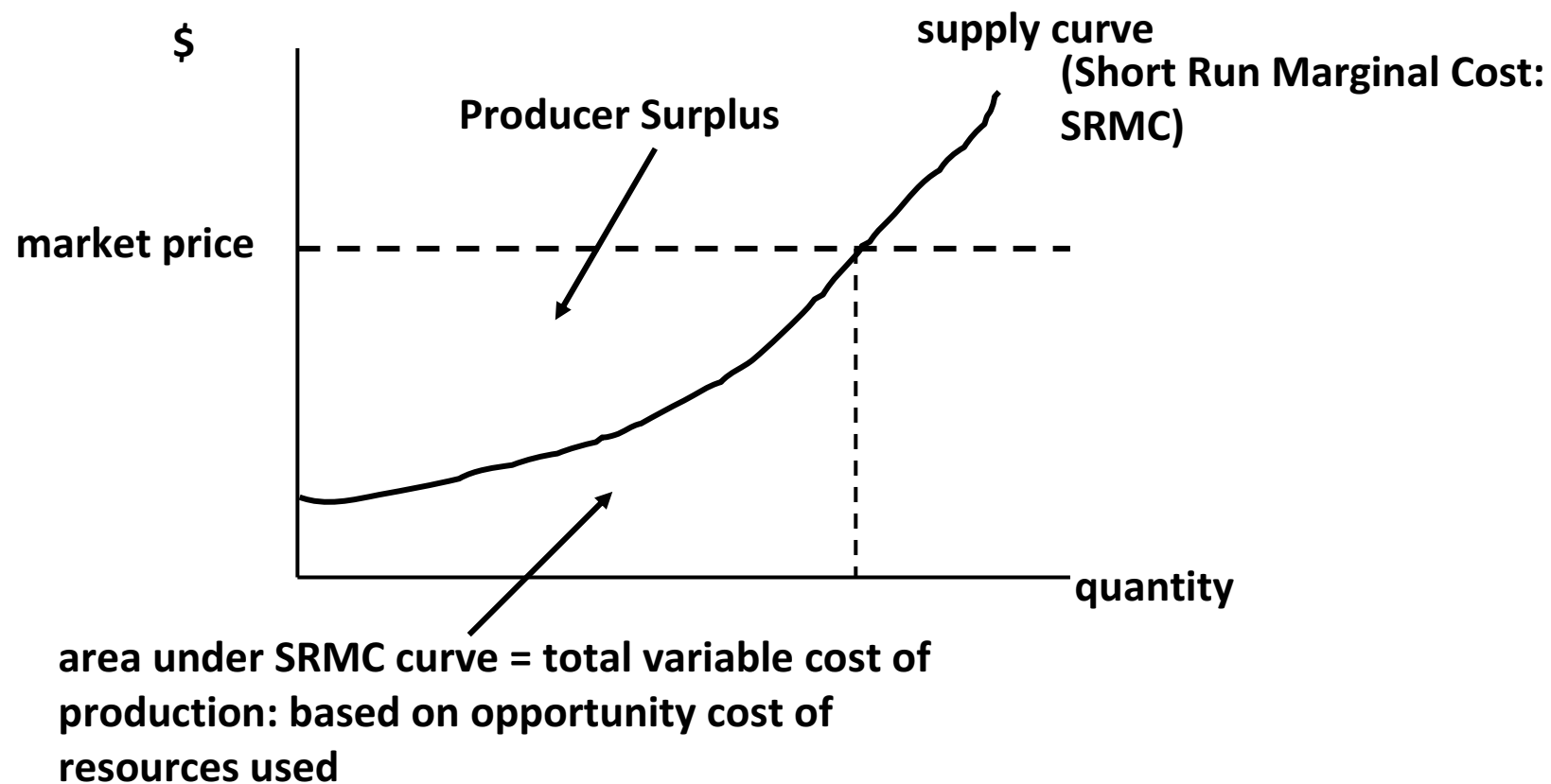
- **does this include Consumer Surplus?**

Marginal Excess Tax Burden

- **Govts may fund projects through taxes**
- **Taxes (eg excise) reduce production, resulting in deadweight loss of consumer surplus**
  - **opportunity cost of forgone activity**
- **Arguable that the consumer and producer surplus loss should be counted as a project cost.**
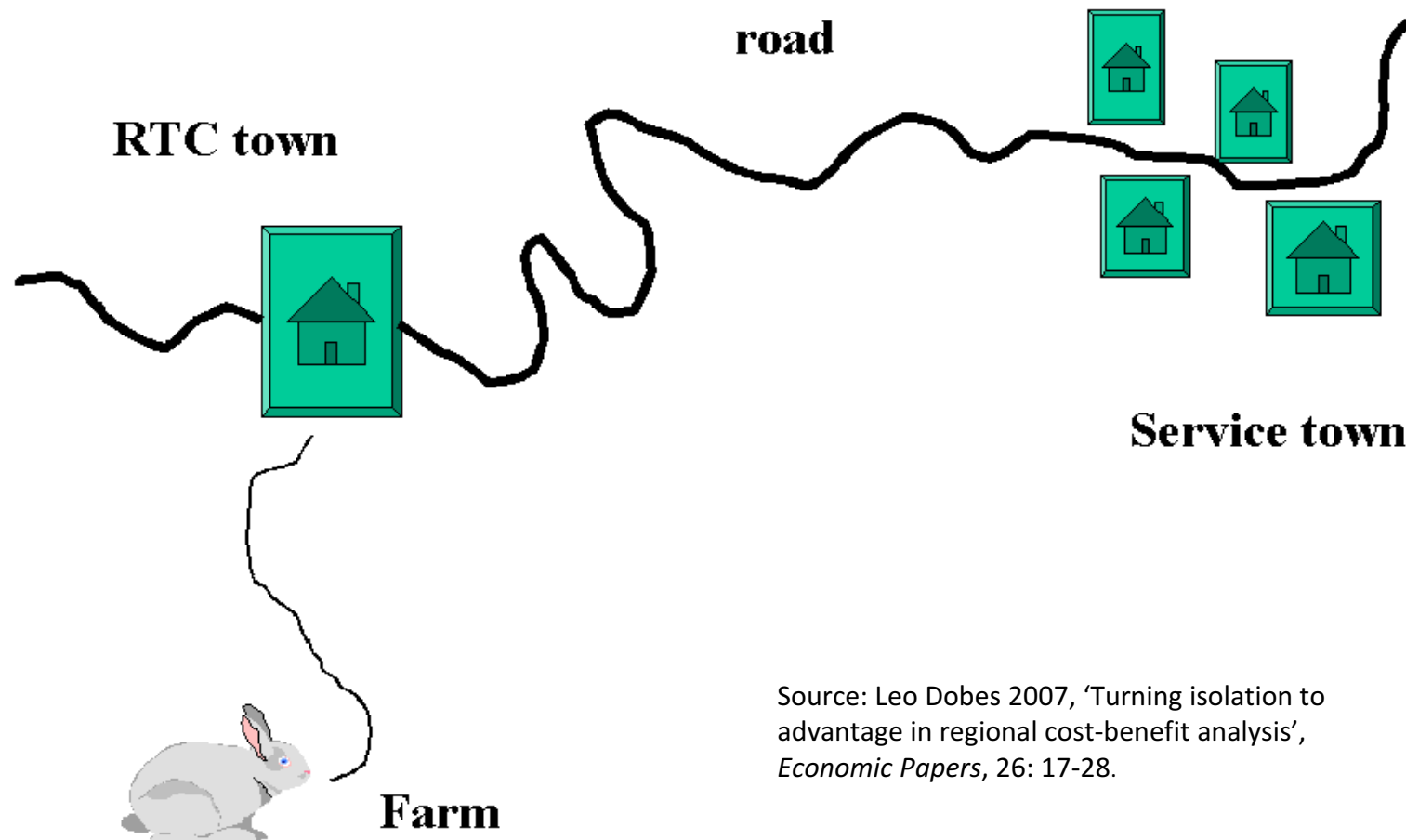- **Not normally included in Australia. Why not?**

$

post-tax price

pre-tax price

Deadweight loss in consumer surplus

D

Producer Surplus (PS)

supply curve
(Short Run Marginal Cost: SRMC)

$

Producer Surplus

market price

quantity

area under SRMC curve = total variable cost of production: based on opportunity cost of resources used
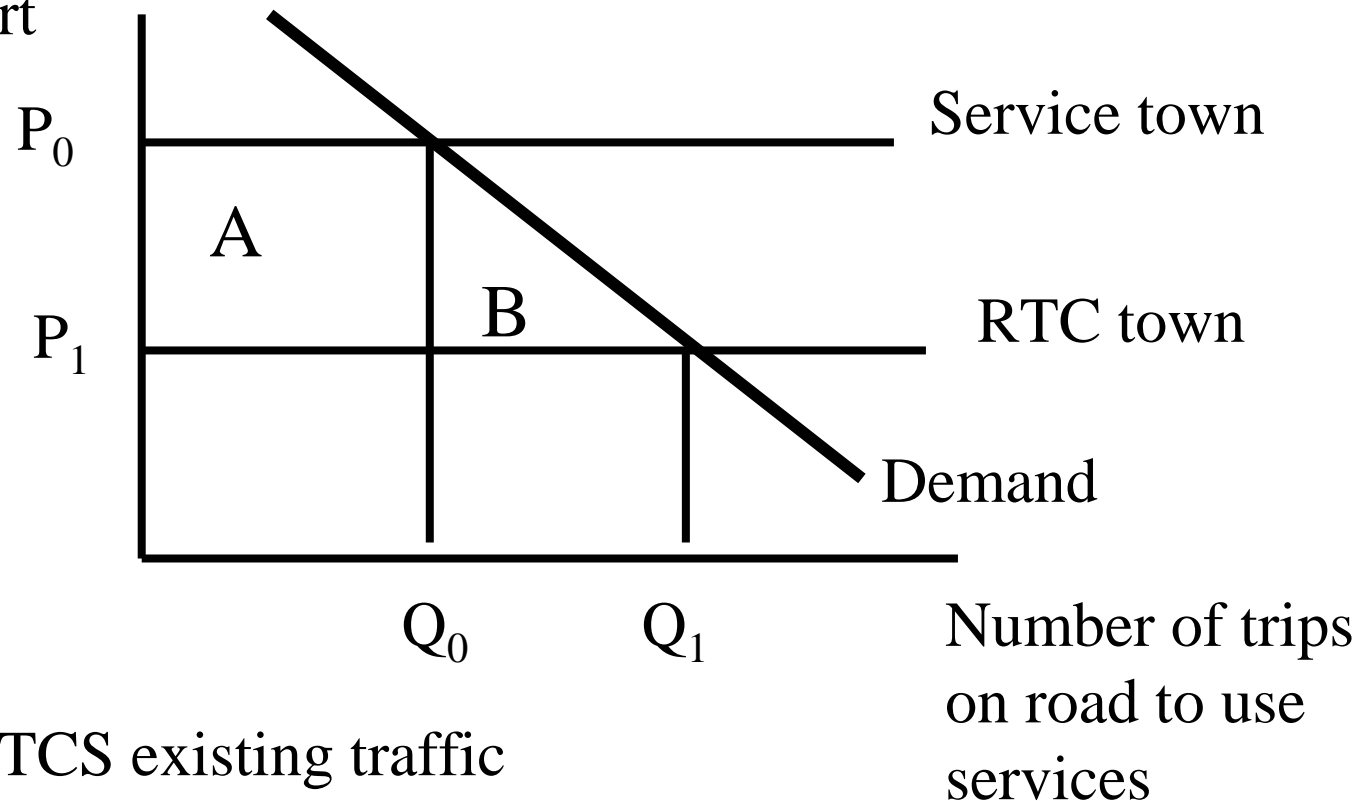
Example of CBA: Rural Transaction Centres

Rural Transaction Centres (RTC)

Source: Leo Dobes 2007, 'Turning isolation to advantage in regional cost-benefit analysis', *Economic Papers*, 26: 17-28.

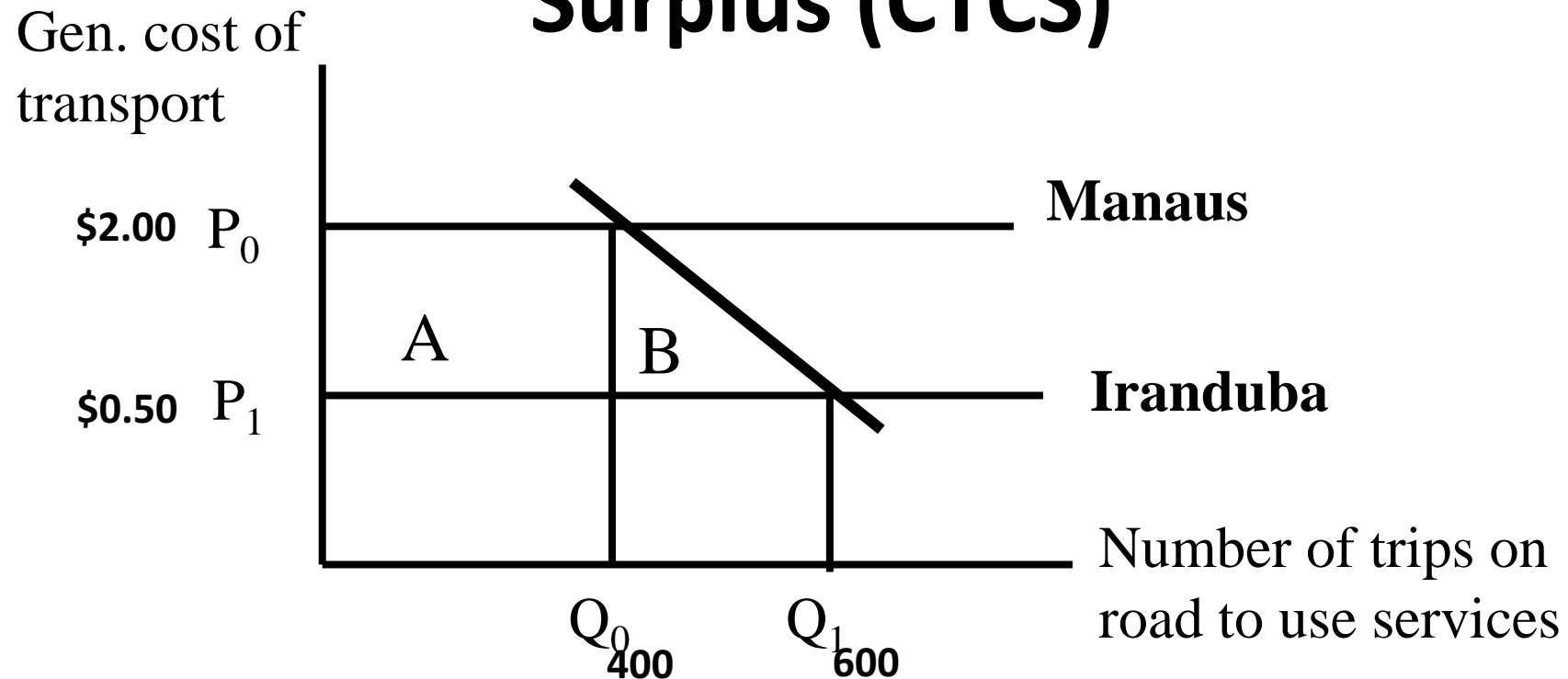# Change in Transport Consumer Surplus (CTCS)

Gen. cost of transport

P_0

P_1

A

B

Service town

RTC town

Demand

Q_0 Q_1

Number of trips on road to use services

A = CTCS existing traffic
B = CTCS induced traffic
Gen. cost = VOC, av.travel time, externalities

Change in Transport Consumer Surplus (CTCS)

Gen. cost of transport

$2.00 P_0

$0.50 P_1

A

B

Manaus

Iranduba

Number of trips on road to use services

Q_0 400 Q_1 600

Exercise: the cost of travel to Iranduba for a farmer is 50 cents (mainly time) and it is visited once a week by 600 people. About 400 people used to travel to Manaus once a week at a cost of $2 in time, petrol, wear and tear on vehicles, etc. Estimate the change in consumer surplus for one year. Then estimate the change in surplus for 20 years if the discount rate is 5% p.a.

Valuation in practice

Lack of market values is a major problem

  - distortions due to taxation, imperfect competition, subsidies, labour policies, foreign exchange constraints, etc.

Revealed Preference

- use observed market values
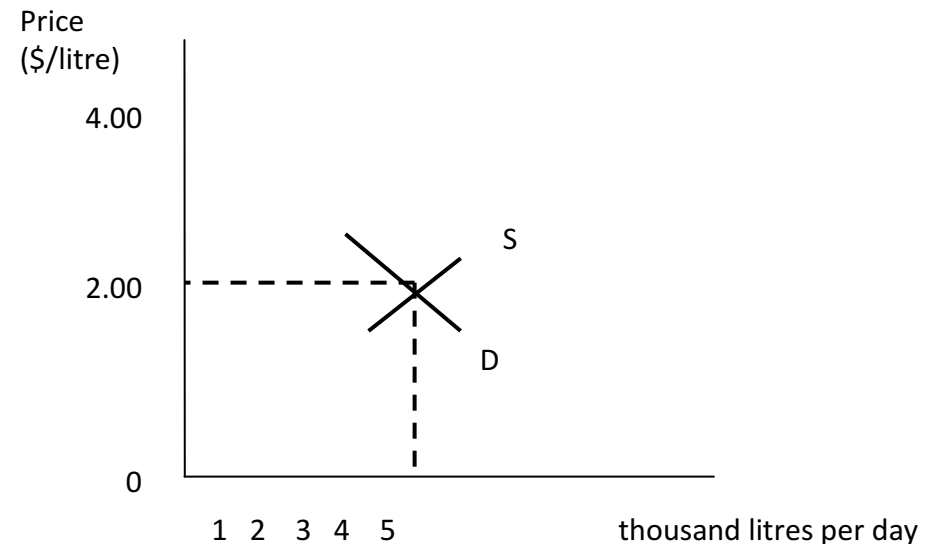
- or proxies

Stated Preference

- where observable market data not available

- primarily surveys

Revealed Preference : estimate the demand curve

- **Multiple regression**
  $q = \alpha_0 - \alpha_1 p + \alpha_2 Y + \alpha_3 T + \varepsilon$
  where q = ice creams, p = price, Y = income,
  T = temperature

- **Extrapolate points**

- **Elasticity estimates**
  $\varepsilon_d = -\alpha_1 p/q$, where $q = \alpha_0 - \alpha_1 p$ and we know p,q

- **calculate change in consumer surplus from demand curve**

exercise: milk

.

How would one calculate consumer and producer surplus if our knowledge of the market for coffee were as shown?

Price ($/litre)

4.00

2.00

S

D

0

1 2 3 4 5   thousand litres per day

Revealed Preference : market analogy method for value of travel time

- **Wage rates provide a proxy measure**
- **Business travel (eg truck drivers, business travellers)**
  - include all benefits such as superannuation plus wage
  - include taxes (income, payroll, etc) because the value of time is the total that the employer is willing to pay for output of employee
- **Non-business travel (commuters, tourists, unemployed, retirees, etc)**
  - value of consumption forgone = wage minus taxes (ie net of taxes)
- **Small time savings versus large ones treated the same in cost-benefit analysis**
- **Schedules and time saved (early arrival problem)**
- **Does value of time depend on income?**
- **Could also compare fares on different modes: Sydney ferry to Manly vs hydrofoil**

Revealed Preference : hedonic price method

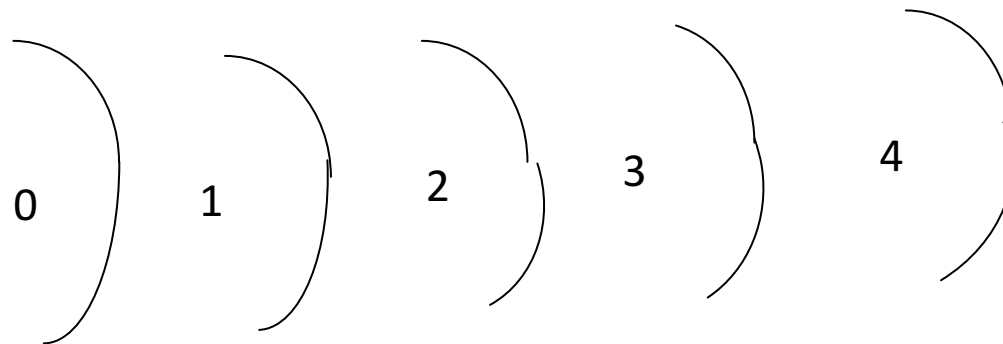$$P = \beta_0 CBD^{\beta_1} size^{\beta_2} view^{\beta_3} e^{\varepsilon}$$

where P is price of house

so value of view is $\partial P/\partial(view)$.

Revealed Preference: zonal travel cost method

- **Iguaçu National Park is visited by people from many parts of Brazil and from other countries**

- **what are the travel costs?**

- **what are the 'entry' costs?**

0   1   2   3   4

Revealed Preference : defensive expenditure method

- eg cost of cleaning windows in polluted town
- Limitations:
  - may not remedy entire damage (eg dirty shirts)
  - some people would have cleaned windows anyway
  - hard to measure if cleaned by households

'damage costs avoided' approach

- e.g. objective: reduce dengue incidence
- saves costs: hospital, medical, lost earnings by infected patient, patient pain, discomfort
  - but conceptually incorrect
- benefit = Δ consumer surplus
  - for a specific good
  - e.g. generalised cost for 'transport'
- possible approach: cost mosquito eradication
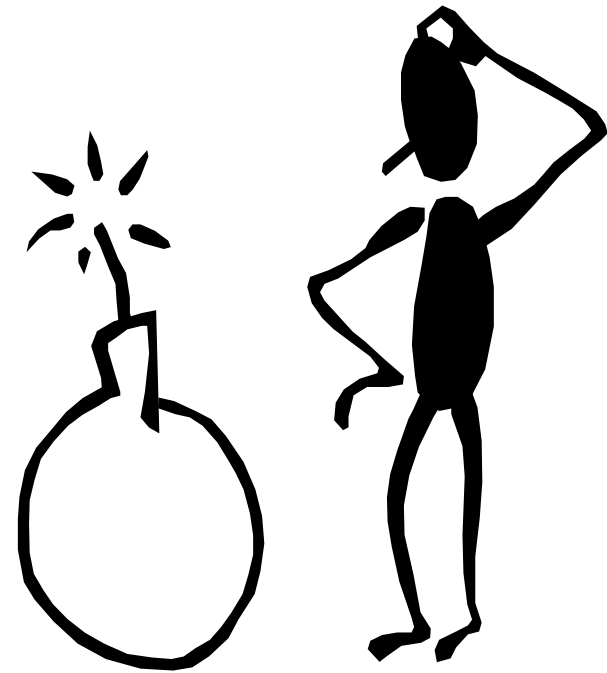 - but only a proxy; not WTP to avoid dengue
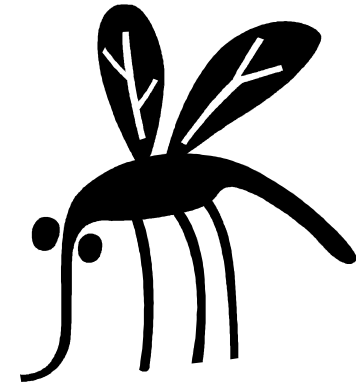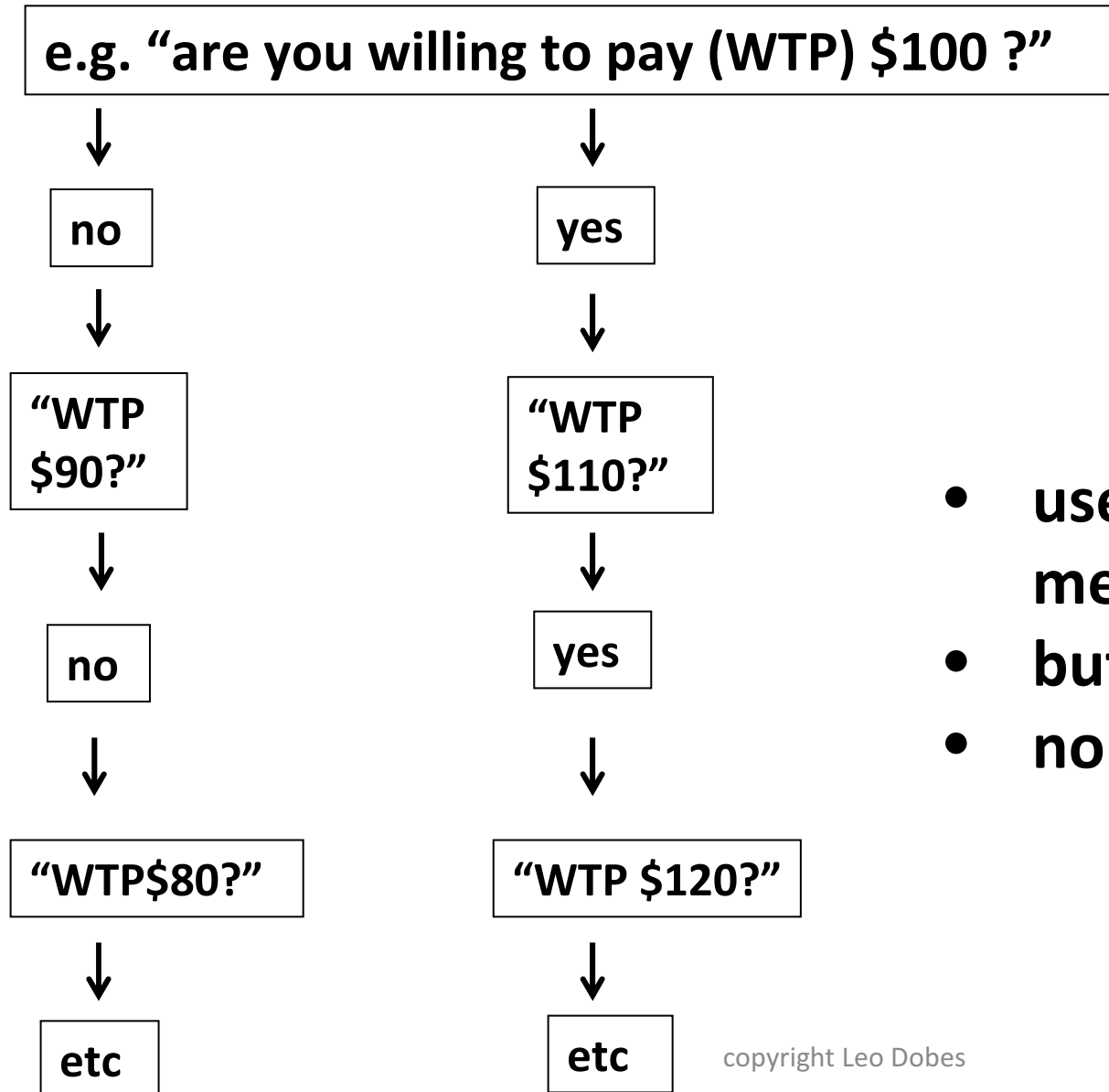
Stated Preference: CVM

- **Contingent Valuation Method (CVM) aims to elicit Willingness To Pay (eg existence value)**

- **Specify payment vehicle (eg tax, levy)**

- **Surveys used:**
  - ❖ **Open ended questions: context bias, hypothetical**
  - ❖ **Closed-ended iterative bidding: start value bias**
  - ❖ **Dichotomous choice (referendum method): like market (buy/not buy), but need large sample**
  - ❖ **Contingent ranking of choices: order of presentation of choices bias**

problems with CVM

- **Exxon Valdez**
- **Usual survey problems, especially hypotheticality and neutrality (eg environment)**
- **Embedding effects**
- **Order effects**
- **Starting point bias**
- **WTA > WTP**
- **Strategic responses**

closed-ended iterative bidding

e.g. "are you willing to pay (WTP) $100 ?"

no ← → yes

"WTP $90?" → "WTP $110?"

no → yes

"WTP$80?" → "WTP $120?"

etc → etc

- **used to be popular method**
- **but 'starting point bias'**
- **no longer favoured**

dichotomous (binary) choice

prob (WTP = $30) = 0.75

area under curve = total WTP

prob (0.5) = median

Fraction Answering "yes" (vertical axis: 1.00, 0.75, 0.50, 0.25, 0)

Curve fitted to the histogram

$X (horizontal axis: 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100)
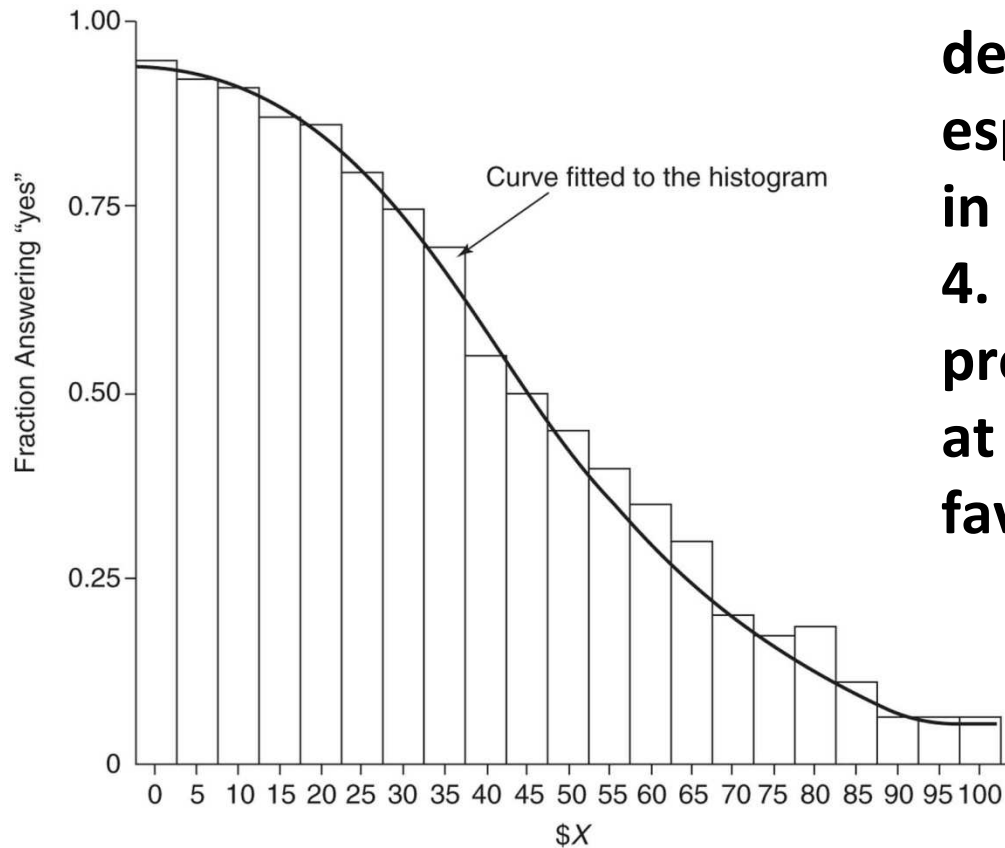
1. select sub-groups: e.g. 0-10; 11-20; 21-30 etc
2. each sub-group asked same question but with different price
3. use focus groups to first determine the range of prices, especially choke point (max. WTP in open-ended questions)
4. incentive compatibility: e.g. project will not go ahead unless at least half respondents are in favour

stated preference: choice experiments

- **define and present good as 'bundle' of attributes (analogous to hedonic pricing)**
  - including price or cost
- **respondents choose between bundles**
- **use econometric methods to estimate probabilities of choosing bundles**
- **provides implicit prices (WTP) for marginal change in each attribute**
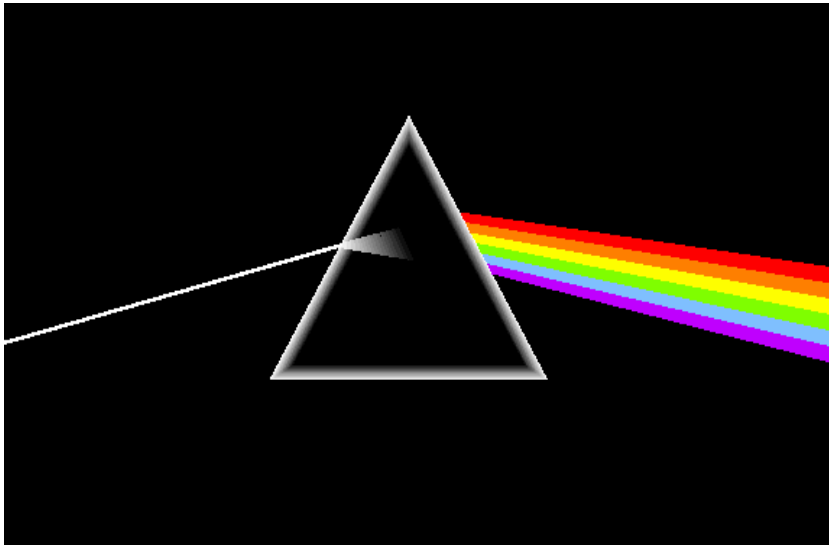
a good or service can have a range of intrinsic qualities or characteristics

price

size

taste

colour
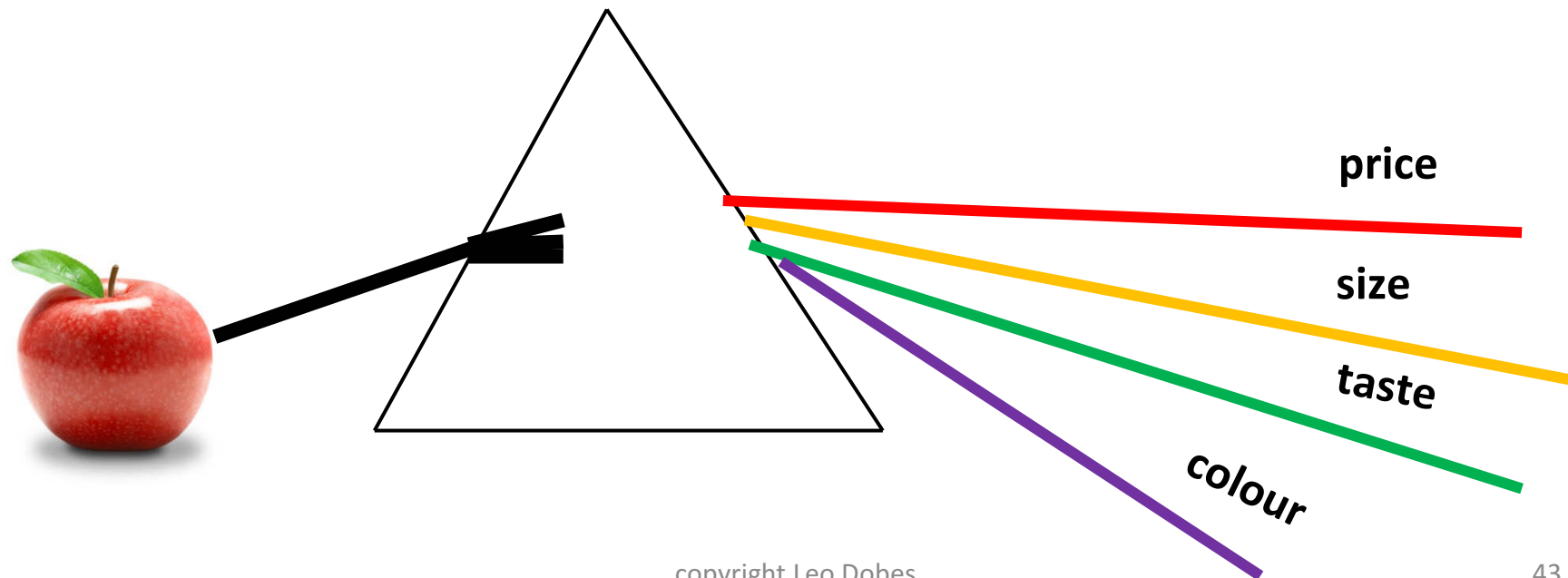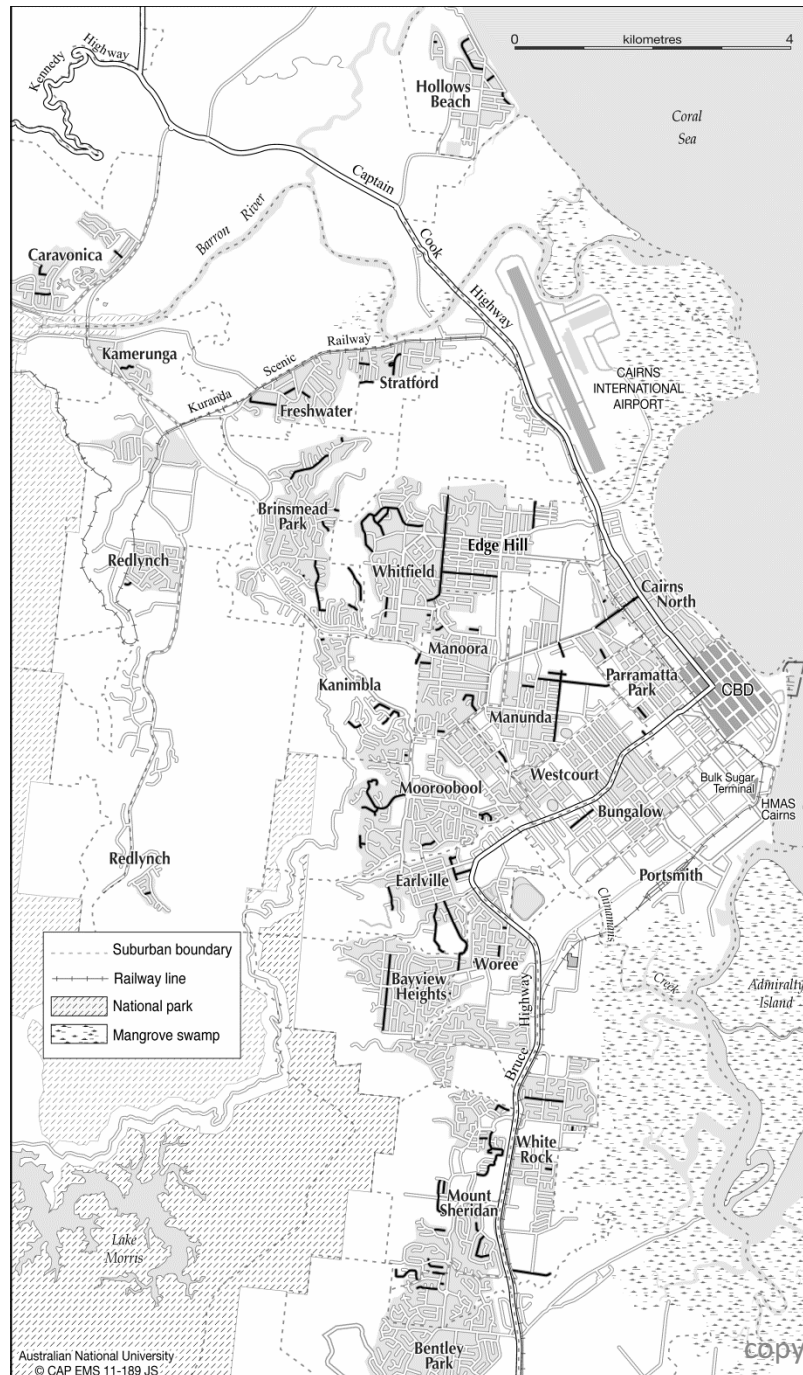
streets selected randomly from UBD Cairns Street Directory

provision of post-cyclone emergency services in Cairns : choice modelling survey in 2011

Approximately how many years have you lived in Cairns? (number)

Were you born in Australia?
(Please indicate with cross or tick)   YES [ ]   NO [ ]

How many children (under 15 years of age) live in your household?   (number)

How many adults (15 years and over) live in your household?   (number)

How many pets do you normally keep in your household?

Please enter <u>number</u>   DOG(S) [ ]   CAT(S) [ ]   OTHER [ ]
(e.g. 0, 1, 2, 3, …)

Do you think that your house or flat would suffer   YES [ ]   NO [ ]
major damage during a Category 5 cyclone,
close to the 'eye'?   MAYBE [ ]   DON'T KNOW [ ]

Have you ever experienced a severe cyclone anywhere?   YES [ ]   NO [ ]

Were you in Cairns during Cyclone Yasi in February 2011?   YES [ ]   NO [ ]

Did you or any of your household members shelter in the   YES [ ]   NO [ ]
Earlville Stocklands shopping centre during Cyclone Yasi?

Have you ever lived in a communal evacuation centre   YES [ ]   NO [ ]
<u>after</u> a cyclone?

Has your house or flat ever been flooded, cut off by   YES [ ]   NO [ ]
floodwaters, or lost gas, electricity, water or sewerage?

some introductory questions

to obtain information : provide objective information before main choice questions to avoid later bias

Part 2:   PROVISION OF EMERGENCY SERVICES AFTER A CYCLONE

In the past

- After a cyclone, Cairns City Council has opened 'Evacuation Centres' in public buildings such as schools, for those who have nowhere else to go. It has not been possible to take pets to Evacuation Centres.

- Government, commercial and volunteer organisations have re-connected sewerage, water, electricity and gas, cleaned up and removed rubbish, distributed donations of clothing and furniture, etc.

The future

If nothing is done over the next 10 to 20 years, the emergency services available to people in Cairns, and in other towns, could be reduced because:

- fewer volunteers are available;

- the number and severity of cyclones may increase due to changing weather patterns;

- the population of Cairns is growing, so available services would have to cover more people.

To avoid this situation

- more equipment could be bought;
- more outside SES volunteers, police and tradespeople could be flown in to help with clean-up, security and reconnection of electricity, etc; and
- evacuation centres could be improved, food storage facilities could be expanded and upgraded, etc.

But this would cost more money. And the budgets of most government agencies are already stretched, so that it may be difficult to maintain or improve levels of service in the future.

Funds could be collected with the electricity bill, just like the old ambulance levy. The money would be deposited into a special Cairns Cyclone Trust Fund, which could only be used only for cyclone relief. A Special Ombudsman would supervise the Fund.

All Cairns households would be required to pay the cyclone levy.

context and scenario information for respondents just before choice questions

The compulsory Cyclone Levy

- would be paid by all Cairns households.

- would be collected with the electricity bill

- money would be put into a Trust Fund, supervised by a special Ombudsman, so that it cannot be used for anything except helping those affected by a cyclone.

Remember that your available income is limited, and you will still need to meet your every day expenses as usual.

advice about payment vehicle

reminder about budget constraint

Current government assistance would not be affected:

- depending on your circumstances, the Centrelink Disaster Recovery payment is $1,000 per eligible adult and $400 per child. Eligibility includes injury, destruction of residence, isolation of 24 hours from (or in) residence, or loss of utilities for at least 48 hours. Your eligibility for the payment is not affected by your income or assets.

- you may also be eligible for government loans or income support after a cyclone

The "volunteer" approach to helping cyclone victims would continue

- Australians have traditionally helped disaster victims largely on a "volunteer" basis. It is not being suggested that this community-based approach should change. Payment would be required in the future to get extra resources if more services are provided.

more context

……. and your opinion definitely counts ……….

- For new emergency services to be put in place, the support of a majority of Cairns residents would be necessary. And everyone living in Cairns would have to pay the levy.

- Your answers are important.

incentive compatibility

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This is the first of 6 questions: we ask you to choose the "bundle" of emergency services that your household would most prefer.
The questions may look the same, but they are actually different.
Bundle A does not involve any new or additional services, and no payment
Bundles B and C involve changes in emergency services and some payment
Please tick the bundle (A, B or C) that your household would most prefer:

status quo bundle

	Bundle A (no new services	Bundle B	Bundle C
Pets	Pets stay at home with owner or friend	Pets stay at home with owner or friend	Pets housed in shelter for 5 days after cyclone
Security	Minimal extra police	Patrols for 3 days after cyclone	Patrols for 3 days after cyclone
Fresh food	Delivered to shops 5-8 days after cyclone	Delivered to shops 3-4 days after cyclone	Delivered to shops 5-8 days after cyclone
Utilities	Gas, water, electricity, sewerage reconnected in 5-8 days	Gas, water, electricity, sewerage reconnected in 5-8 days	Gas, water, electricity, sewerage reconnected in 3-5 days
Cyclone levy	$0 per year	$ 300 a year (about $ 1 a day)	$ 1,000 a year (about $ 3 a day)
My household's most preferred bundle	⬭	⬭	⬭

Now please go on to the next page. It is really important that you select your household's preferred bundle on each of the following pages as well.

Please tick or cross any or all of the following that applies most to you

- I carefully read all the information and questions ☐
- I read most of the information and questions ☐
- I quickly browsed the information and questions ☐
- I did not really read the information and questions ☐

****

Do you think that Australia's weather patterns are changing?

YES ☐   NO ☐   MAYBE ☐   DON'T KNOW ☐

Do you think that cyclones will become more damaging in Cairns in the future?

YES ☐   NO ☐   MAYBE ☐   DON'T KNOW ☐

Do you think that cyclones will happen more often in Cairns in the future?

YES ☐   NO ☐   MAYBE ☐   DON'T KNOW ☐

****

If you agree with any of the following, please tick one or more boxes:

☐   I don't care about emergency services after a cyclone

☐   People should be responsible for looking after themselves

☐   More services should be provided, but I don't have spare money to pay for them

☐   More services should be provided, but I already pay enough in taxes

☐   More services should be provided, but I don't think that I should be the one to pay

☐   More services should be provided, but the "bundles" used above don't make sense

☐   I found making a choice too confusing, so just ticked any box

☐   More services should be provided, but funds collected would not be used correctly

Some other reason (please specify): ………..

questions to test reasons for answers and to check on 'protest' answers

found to be a significant determinant of WTP

	CL		pECM	
Variable	Coefficient[a]	Standard error	Coefficient[a]	Standard error
Pets	-0.07488** (0.0297)	0.03443	-0.06926** (0.0228)	0.03042
Security	-0.00078 (0.9209)	0.00786	0.01580* (0.0632)	0.00850
Food	0.07365** (0.0365)	0.03522	0.08712** (0.0170)	0.03649
Utilities	0.22005*** (<0.0001)	0.03667	0.24923*** (<0.0001)	0.03146
Levy	-0.00096*** (<0.0001)	0.7634D-04	-0.00140*** (<0.0001)	0.6646D-04
Con[b]	-0.55784*** (<0.0001)	0.11331	-1.00674*** (0.0090)	0.38536
Responsibility	-0.20100*** (<0.0001)	0.04590	-0.59887** (0.0344)	0.28305
Damage	0.38667*** (<0.0001)	0.04574	1.05218*** (0.0002)	0.28497
Insurance	-0.30318*** (<0.0001)	0.05370	-0.87661** (0.0163)	0.36500
Sigma[c]			4.62980*** (<0.0001)	0.43721
Model statistics				
n (observations)	2460		2460	
$LL_{\beta(pECM)}$			-1478.82623	
$LL_{\beta(CL)}$	-2110.39894			
$X^2_{,1 \text{ compared to } LL\beta(CL)}$			p<0.0001	
McFadden pseudo ρ^2adj.	0.22		0.45	
AIC[d]	1.72309		1.21043	
AIC[d] finite sample	1.72312		1.21046	
BIC[d]	1.74434		1.23404	
HQIC[d]	1.73081		1.21901	

***=significant at 1% level, **=significant at 5% level, *=significant at 10% level;
[a] p-values in parentheses
[b] Generic constant term included in utility function of change options
[c] Error component included in utility function of 'do nothing' option
[d] Normalised by sample size

modelling results

6. estimate the Net Present Value of the costs and benefits

- Costs and benefits in a project usually occur at different points in time

- People value costs or benefits differently if received now or in the future (time preference)

- To compare costs and benefits, need to use a common time unit (<u>note</u>: discounting has nothing to do with "allowing for inflation")

- Discount all costs and benefits to their Present Value

NPV and BCR

- **NPV > 0 does not necessarily mean that the project should proceed. An alternative may offer higher NPV**

- **BCR > 1 could represent a low NPV, but the ratio of benefits to costs may be high**

- **BCR can be used to rank projects if there is a budget constraint in one period**

- **NPV preferred because not scale dependent**

	Project 1	Project 2	Project 3
Benefits	11	1100	11
Costs	10	1000	9
Benefit cost ratio	1.1	1.1	1.2
Net present value	1	100	2

.... but which discount rate?

- **Social Rate of Time Preference (SRTP)**

- **Marginal Social Opportunity Cost (SOC) of Capital**

- **Weighted Average (Harberger approach)**

- **Shadow Price of Capital**

- **Intergenerational equity**
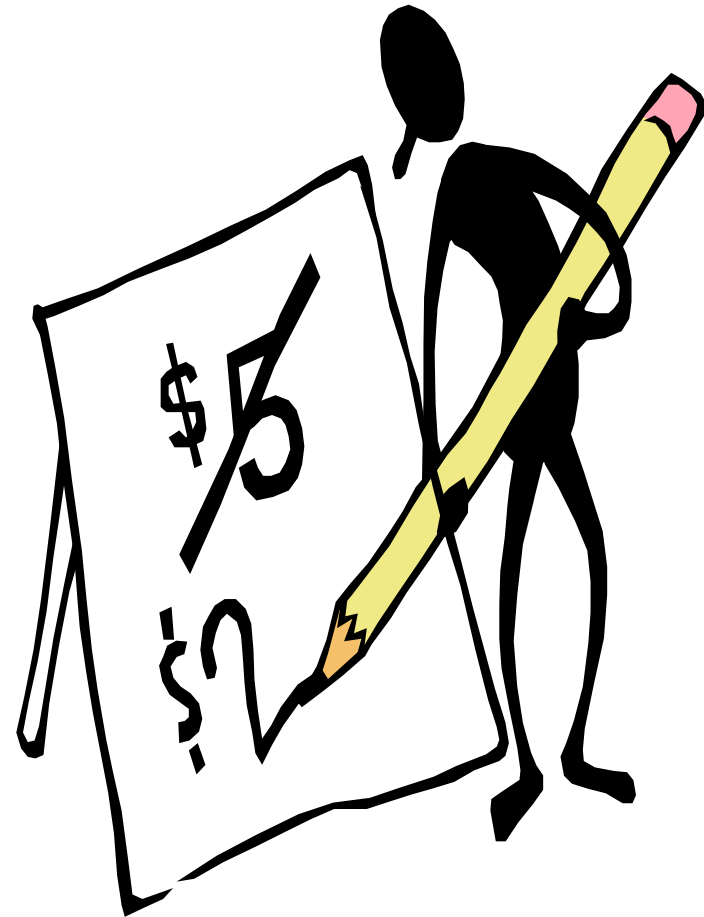
why is Time Preference positive? - the consumer (saver) perspective

- **Expect increased consumption in future**
  - so marginal utility of cons. will diminish
  - so need more consumption in future to compensate for present sacrifice
- **Even if expect future consumption to be unchanged:**
  - impatience, 'myopia', defective 'telescopic faculty'
  - risk of not being alive in future (individual; society as a whole does not die except for mass extermination)
- **SRTP: rate at which society is willing to forgo a unit of current consumption for more future consumption**

why is Time Preference positive?
- the producer (investor) perspective

- Resources can be invested in next best alternative projects in private sector

- So private RoR is the opportunity cost

- So public projects should be discounted using private sector rate of return on investment

- If no market distortions, equivalent to marginal social rate of return on investment (also called marginal social opportunity cost of capital, SOC)

Social Rate of Time Preference (SRTP)

- **Rate at which society is willing to postpone a unit of current consumption in exchange for more future consumption.**
  - society as a whole, not individuals
  - assumes public projects displace consumption, rather than investment
  - assumes streams of costs and benefits are consumption goods
- **Empirical valuation:**
  1. Ramsey formula; or
  2. after-tax low-risk corporate or government bonds

SRTP: Ramsey approach

- **Ramsey 1928, revived in 1990s climate change debates**

- **riskless social discount rate = ρ + θg ; where ρ is pure social time preference; θ is elasticity of marginal utility wrt income (%Δ consumption over %Δ change in income); g is growth of consumption per capita**

- **ρ hard to determine; not observable in market**

- **but Ramsey and others argue on ethical grounds that should assume ρ = 0 (all generations equal)**

- **Arrow agrees but counters that ρ = 0 is 'not morally acceptable' because it demands high savings rates by current generation and all other generations, and does not accord with observed savings rates.**

the intergenerational debate

- **Proponents of intergenerational equity argue for ρ = 0; a purely equity argument**

- **Counter argument: adjusting discount rates is wrong**
  - correct procedure is for current generation to identify its willingness to pay for safety of future generations

- **Stern uses egalitarian ρ = 0.1 only because of risk of human extinction from catastrophic climate change; θ=1 (1% current consumption equals utility of 1% income at any time in the future); g=1.2**

- **Stern ρ = 0.1 often criticised (eg Nordhaus)**

- **Dasgupta criticises unethical θ=1 because huge current generation saving rate favours richer future generation**

- **Time-declining (hyperbolic) discount rates may be used**

government borrowing rates

- **Real after-tax yield on government bonds can measure low-risk return for postponing consumption**

- **Bond yields reflect financing cost and are observable**

- **If long-term project return > LTBR, govt can borrow abroad (so no domestic I or C is crowded out)**

- **Problems include:**
  - **Pareto improvement only if beneficiaries of project alone pay taxes to repay govt overseas loan**
  - **excessive borrowing will affect exchange rate and possibly the country's credit rating (externality of higher cost to other borrowers)**
  - **government bonds exclude return on equities**

marginal social opportunity cost of capital (return on private investment)

- Government and private sector compete for scarce resources; public investment exactly displaces private investment, so should at least earn the same return

- Before tax yield on AAA corporate bonds; real value

- Problems include:
  - there is no single market rate of interest
  - monopoly, market imperfections can distort returns (to above social rates)
  - most tax is income tax, so tax-financed projects are more likely to displace consumption than investment
  - even for AAA, a small default risk premium is included

Weighted Average Cost of Capital

- SOC assumes govt borrowing crowds out private investment
- SRTP assumes taxes crowd out consumption
- Resources can be sourced from C, I or foreign borrowing
- WSOC = α(SOC) + β(SRTP) + (1-α-β)(o/s rate)
  - α is proportion of project resources crowding out private domestic investment
  - β is proportion of resources displacing domestic consumption
- Harberger argues consumption not sensitive to interest rates, so β is small or zero
  - closed economy,   WSOC ≈ SOC
  - open economy,   WSOC ≈ overseas capital market rates
- Problems:
  - WSOC assumes project benefits are consumed immediately even though they could be invested
  - Results in multiple discount rates: governments find it hard to explain why different projects use different discount rates

Shadow Price of Capital

- **Tries to reconcile SOC and SRTP and overcome WACC assumption of benefits all consumed**

- **where project impacts (costs or benefits) affect investment, they are converted to consumption equivalents using shadow price of capital (a parameter > 1) because I creates stream of C**

- **All impacts can then be discounted by conceptually correct consumption-relevant SRTP**

- **Problem: complicated calculation requiring depreciation rate, fraction benefits reinvested, SOC, and SRTP**

example: dam for farm irrigation

assumptions:

- **purpose: irrigation**
  - because CC will reduce rainfall
- **inside the one country**
  - i.e. no international water sharing issues (e.g. Mekong)
- **no legal constraints (e.g. production limits)**
- **no adverse effect on urban water supply**
- **water flows into dam from upstream catchment**
  - even if no local rain
- **government has funds to build, or can borrow**

alternatives to building a dam

- **do nothing (called the 'base case')**
  - all alternatives are compared to the base case
- **charge a (higher) price for water to reflect its true value to farmers**
- **build a desalination plant ($24billion in VIC)**
- **build pipeline from an existing dam in a nearby location**
- **breed adaptable crops**
  - drought tolerant , better roots, need less water

modelling initial costs of dam

- **will more water increase growth, and by how much?**
  - is water the only limiting input?
- **research into geology of dam**
  - Canberra: dam built on fault line
- **research hydrology: will there be sufficient run-off to fill the dam when it rains?**
  - separate modelling required
  - needs lots of historical data

modelling direct costs

- **labour**
  - already employed: diverts from other production
  - unemployed: reduces non-marketed production?
- **materials (e.g. concrete), machines, fuel**
  - are they diverted from other production?
- **inundated land**
  - reduced alternative production (e.g. forestry)?
- **irrigation channels, pumps for farmers, etc**
- **more roads, storage for increased production?**
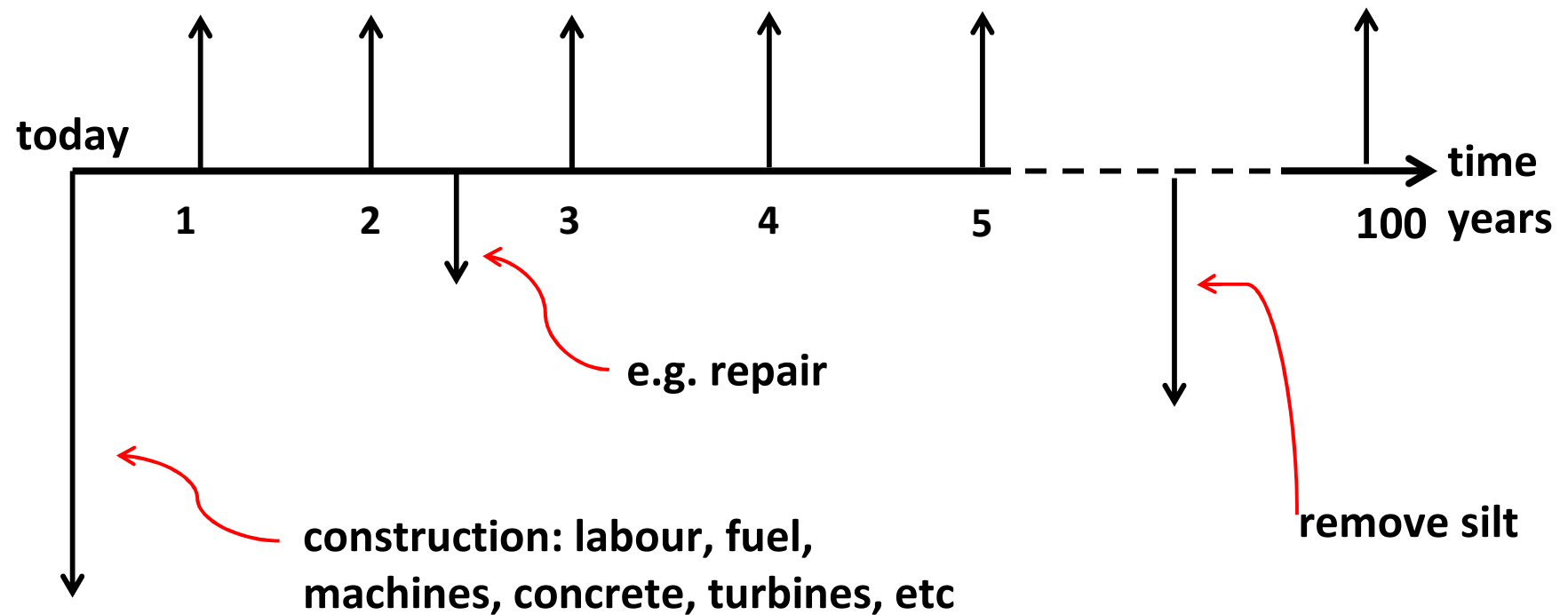- **hydroelectric equipment, cables?**

contingent and intangible costs

- **may need new roads or food storage to handle additional crop output from irrigation**
  - **i.e. can extra output be sold?**
- **dam may stop existing fish species from breeding (e.g. can't travel upstream, dam water too cold)**
- **may need artificial fertiliser if natural silt flood fertilisation stops due to dam**
- **loss of tourism revenue if river dammed?**
- **increased use of insecticide? Health problems?**
- **flooding of trees by dam: loss of replenishable firewood or sale of replanted timber**
- **loss of traditional way of life on river, etc**
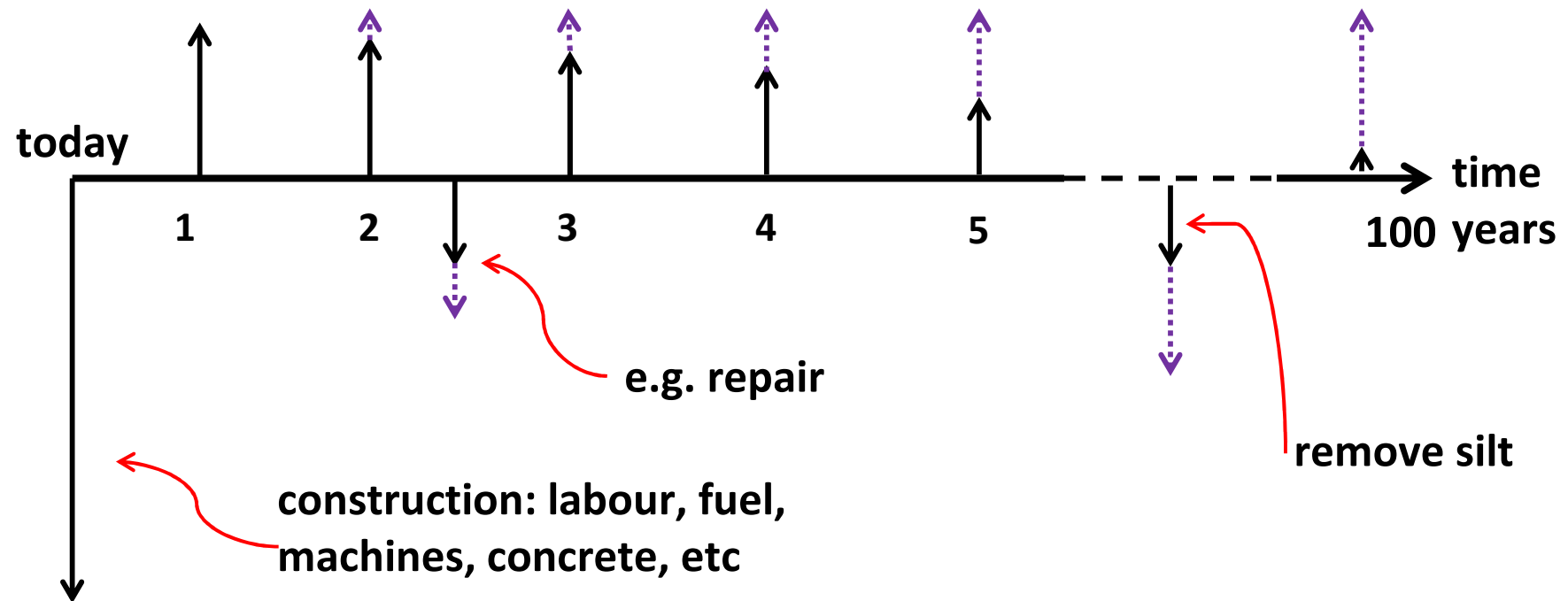
modelling benefits of building a dam

- **value of increased crop production**
  - as proxy for willingness to pay for water
  - assuming other factors stay the same (e.g. rainfall, price of crops, etc)
- **hydropower? depends on flow rates**
- **reduced damage from flooding (fences, houses)**
- **reduced erosion from flooding**
- **increased duck population?**
- **new, larger(?) fish species?**
- **other(?): talk to farmers and agricultural and river experts**
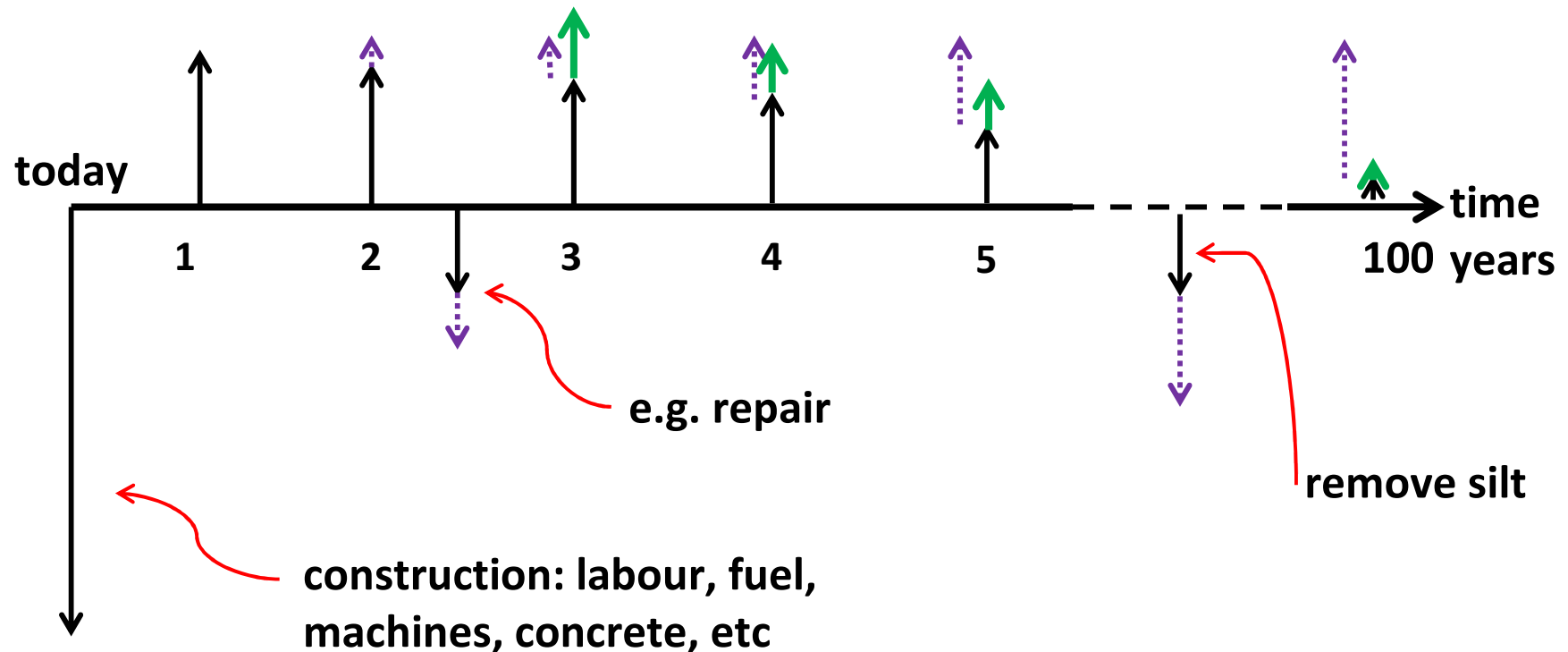
timeline illustration of costs and benefits

today

time

1   2   3   4   5   100 years

e.g. repair

remove silt

construction: labour, fuel, machines, concrete, turbines, etc

adjust for time value: discounting

'present value' of future benefits and costs diminishes over time

today

1   2   3   4   5   time

100 years

e.g. repair

remove silt
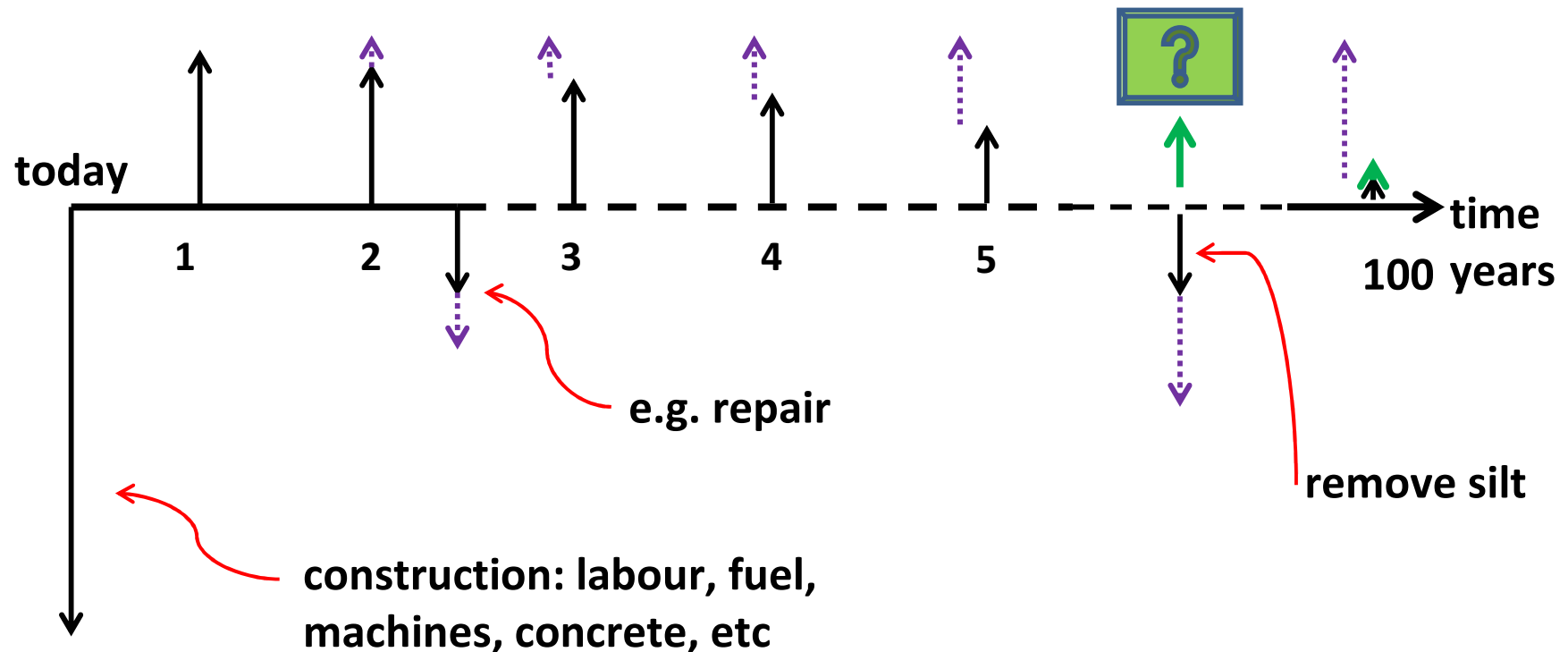
construction: labour, fuel,
machines, concrete, etc

adjust for <u>known</u> climate change

- **assume dam benefits increase ↑ each year because of 10% less local rain due to climate change (once-only increase)**
- **assume increase in benefits starts in year 3**
- **adjustment for time (discounting) of additional benefits**

today

time

1   2   3   4   5   100 years

e.g. repair

remove silt

construction: labour, fuel, machines, concrete, etc

uncertain climate change

- **uncertainty when benefits accrue : timing, frequency of extreme events, intensity of extreme events**
- **so additional climate change benefits from dam unpredictable**
- **but costs still incurred**

today

time

100 years

1   2   3   4   5

e.g. repair

remove silt

construction: labour, fuel, machines, concrete, etc

... here's the problem ...

- **climatic uncertainty: rain or runoff may increase, decrease or stay the same**

- **undue procrastination: farmers suffer due to lack of water. Social cost incurred.**

- **premature profligacy: resources wasted on dam; could have been used for education, health, etc**

- **but this assumes only a binary choice: "build dam" versus "not build dam"**

- **we can take preparatory action but avoid the upfront cost of a full investment today**

'Rumsfeldian' uncertainty

	known consequence or probability	unknown consequences or probability
known event	(II) <u>known knowns</u> e.g. temperature and crop cycles	(I) <u>known unknowns</u> e.g. rising ocean temperature may increase cyclone intensity. But frequency?
unknown event	(III) <u>unknown knowns</u> e.g. Black Swan, Wollemi Pine, intuition, indigenous knowledge of rare pest	(IV) <u>unknown unknowns</u> <u>ex post only</u>. e.g. Melbourne sewer pipes tornadoes??

Knightian risk and uncertainty

risk (?)　　　　uncertainty (?)
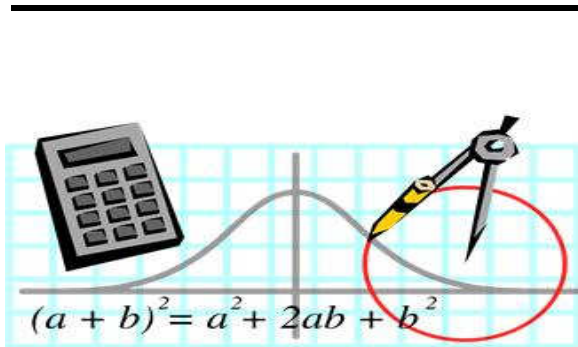
7. allow for risk

- **Do not "load" discount rate**
- **A number of approaches are possible:**
  - **Expected Values**
  - **Decision-trees (dendograms)**
  - **Monte Carlo simulation**
  - **Real options**
- **However use of probabilities cannot represent "deep uncertainty" or "unknown unknowns" because knowledge of probability implies some degree of certainty in knowledge**

dealing with risk: Expected Values

- **Attach probabilities to benefits and costs**
  - use risk-free discount rate
- **Obtain Expected Values for costs and benefits**
- **Expected Value is sum of probability adjusted benefits and costs**
- **EV(B-C) = $p_i(B_i - C_i) + \ldots + p_n(B_n - C_n)$**
  - e.g. 80% probability of $10 benefit and 20% probability of $30 benefit
  - Expected Value = 0.8($10) + 0.2($30) = $14
  - but this is just an average. Neither $10 nor $30 occurs

- **Can also illustrate with decision trees**

decision-tree analysis
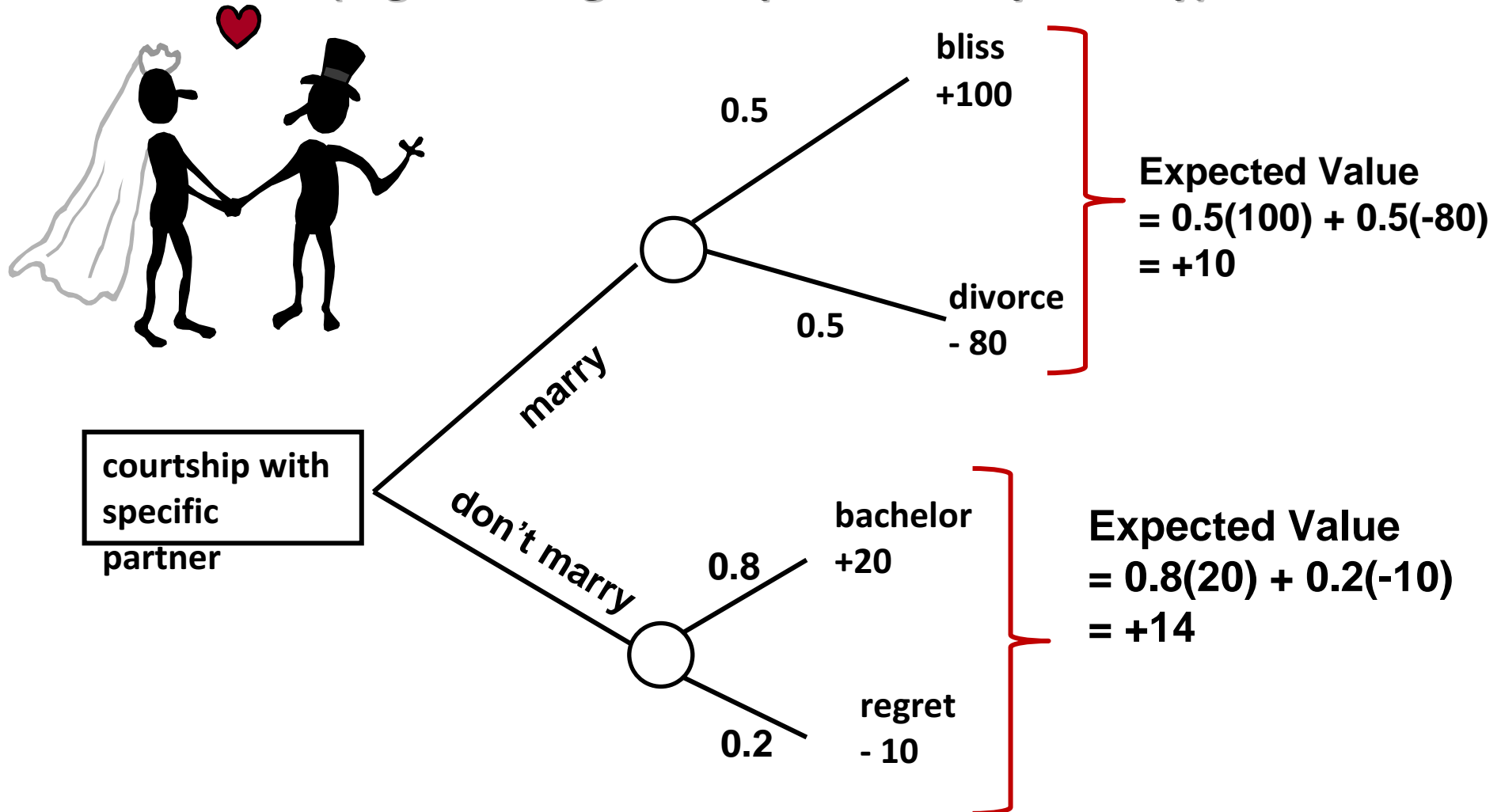## (e.g. marriage: one-period analysis only)
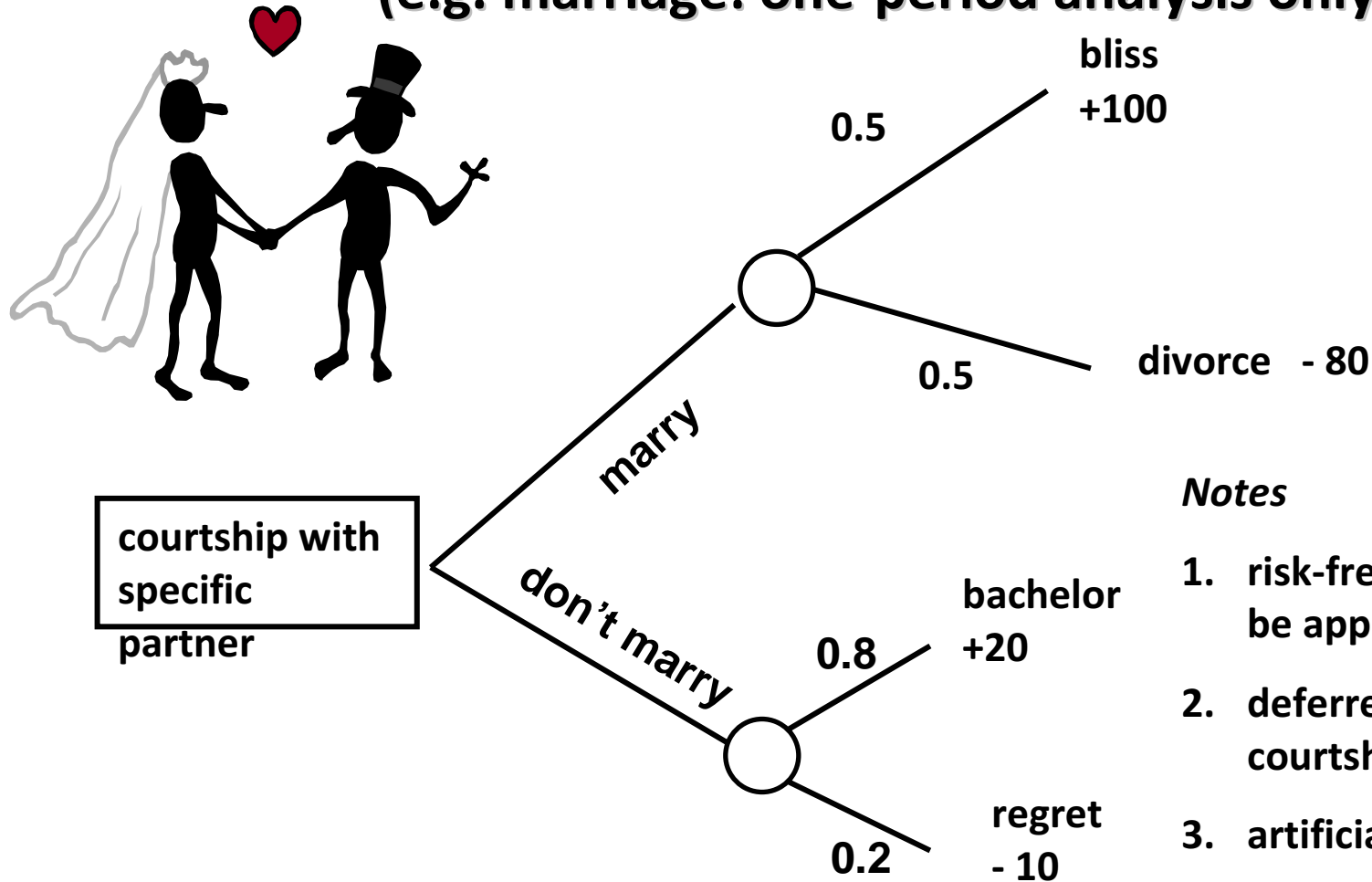
bliss
+100

0.5

0.5

divorce - 80

marry

courtship with specific partner

don't marry

bachelor
+20

0.8

regret
- 10

0.2

Notes

1. **risk-free discount rate to be applied for NPV**

2. **deferred option of longer courtship not included**

3. **artificial units, not $**

4. **price of ring is a sunk cost**

decision-tree analysis: Expected Value
(e.g. marriage: one-period analysis only)

bliss
+100

0.5

**Expected Value
= 0.5(100) + 0.5(-80)
= +10**

divorce
- 80

0.5

marry

**courtship with
specific
partner**

don't marry

bachelor
+20

0.8

**Expected Value
= 0.8(20) + 0.2(-10)
= +14**

regret
- 10

0.2

decision-tree analysis
(e.g. marriage: one-period analysis only)

bliss
+100

0.5

0.5

divorce - 80

marry

courtship with specific partner

don't marry

bachelor
+20

0.8

regret
- 10

0.2

Notes

1. risk-free discount rate to be applied for NPV

2. deferred option of longer courtship not included

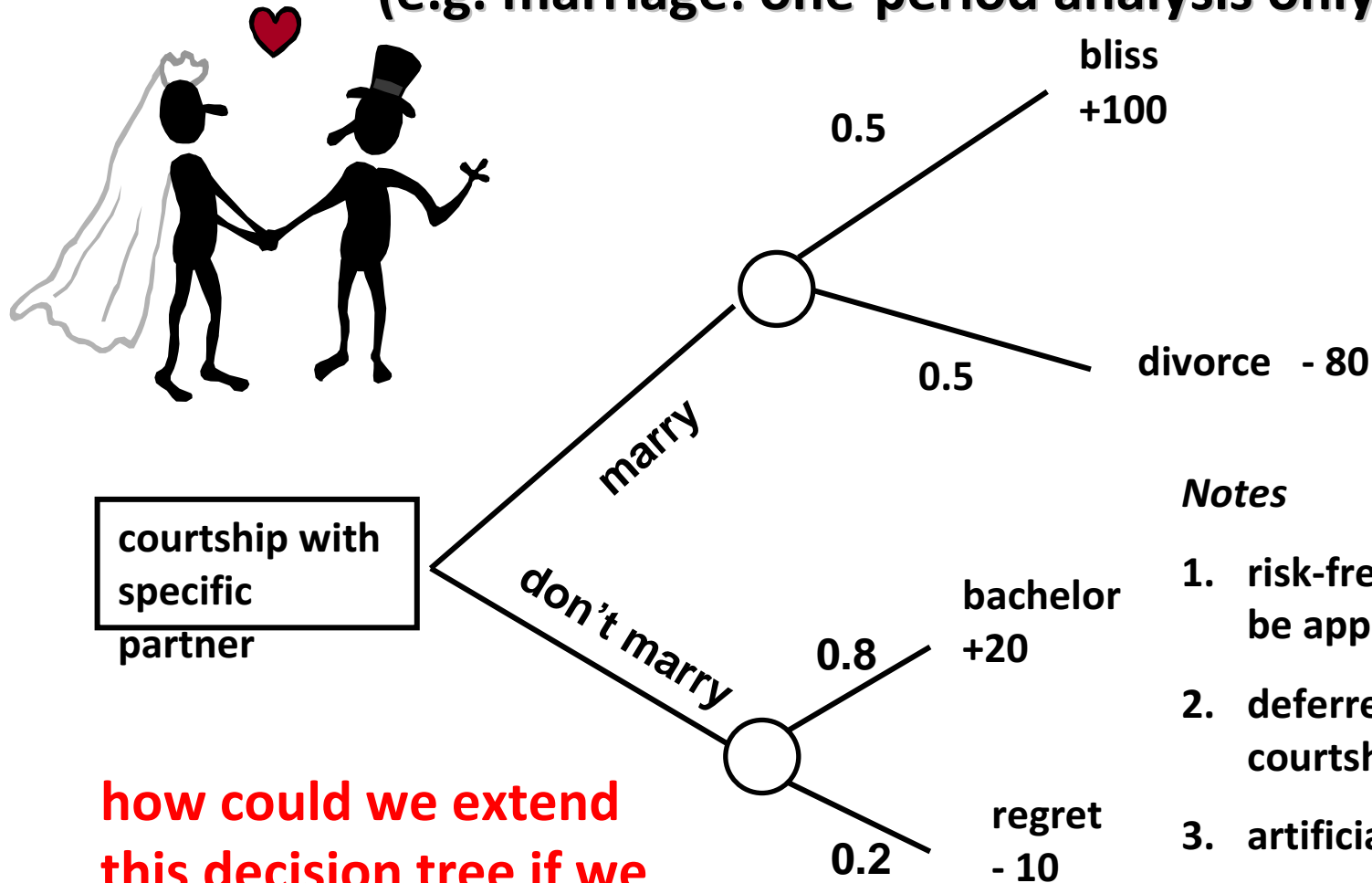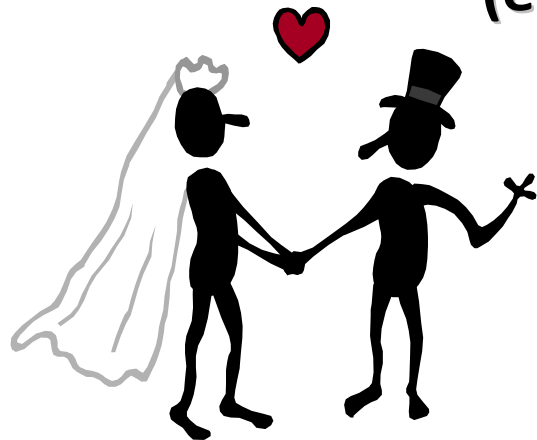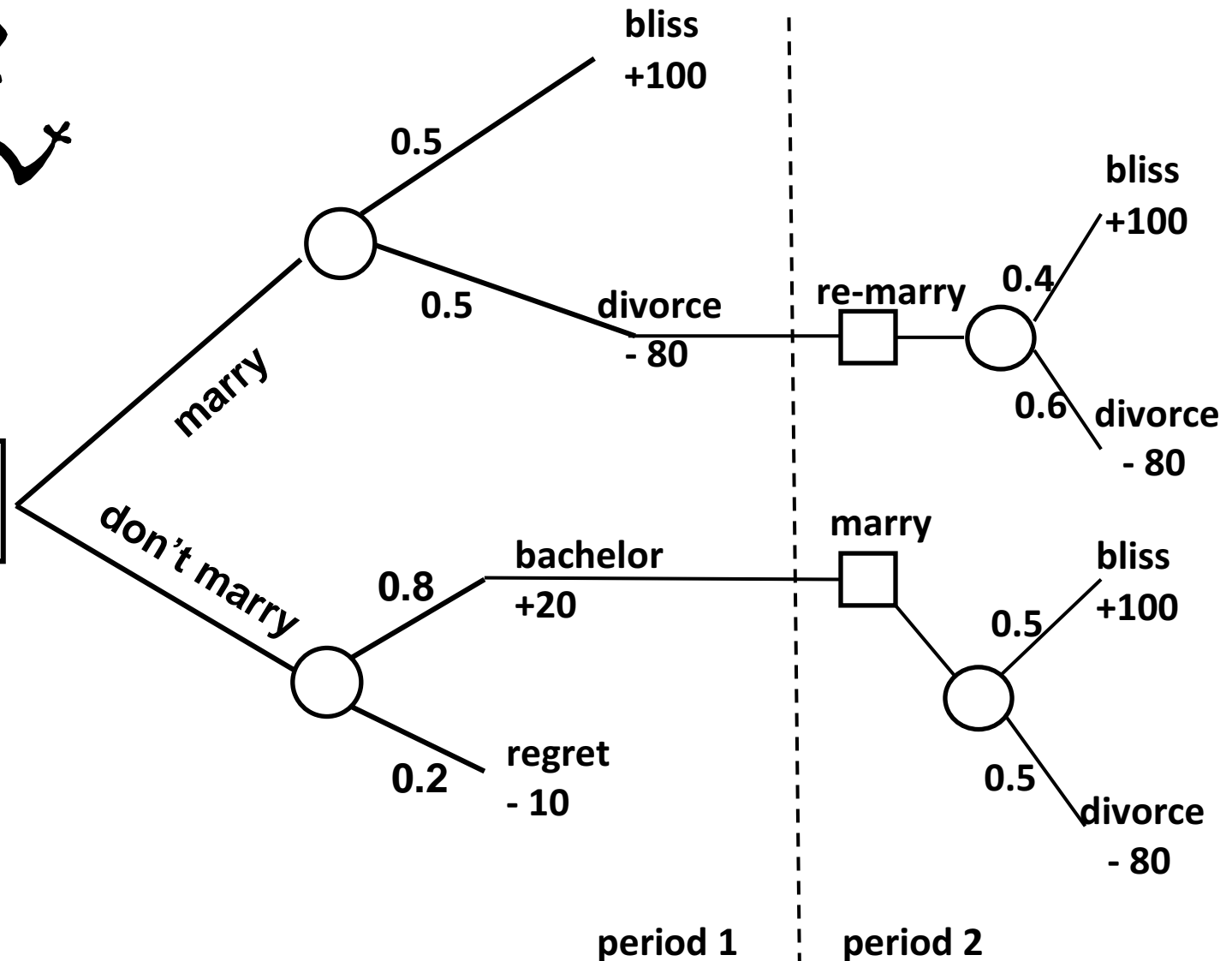3. artificial units, not $

4. price of ring is a sunk cost

how could we extend this decision tree if we were to examine more than one period??

decision-tree analysis
(e.g. marriage: two period analysis)

courtship with specific partner

marry

0.5 — bliss +100

0.5 — divorce -80 — **re-marry** — 0.4 — bliss +100

0.6 — divorce -80

don't marry

0.8 — bachelor +20 — **marry** — 0.5 — bliss +100

0.5 — divorce -80

0.2 — regret -10

period 1 | period 2

decision-tree analysis
(e.g. marriage: two period analysis)

**bliss
+100**

0.5

**-8/(1+0.1
= -7.3**

-8

**bliss
+100**

0.4

46.4

0.5

**divorce
- 80**

re-marry

0.6

**divorce
- 80**

marry

**courtship with
specific
partner**

don't marry

**10/(1+0.1)
= 9.1**

marry

+10

0.8

**bachelor
+20**

**bliss
+100**

0.5

5.3

0.5

**regret
- 10**

0.2

0.5

**divorce
- 80**

period 1   **period 2**

82
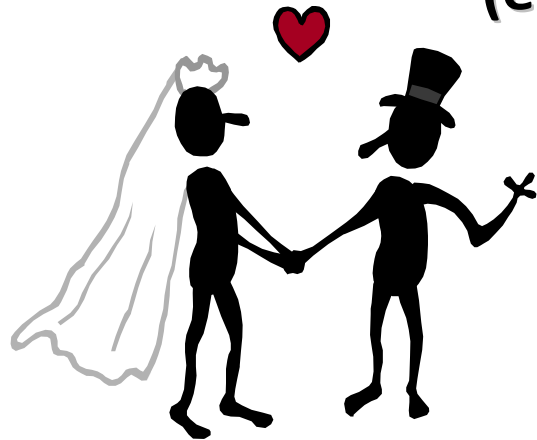
Monte Carlo: a more sophisticated alternative to dealing with uncertainty

- 3 basic steps

(1) identify key variables
  - specify probability distributions
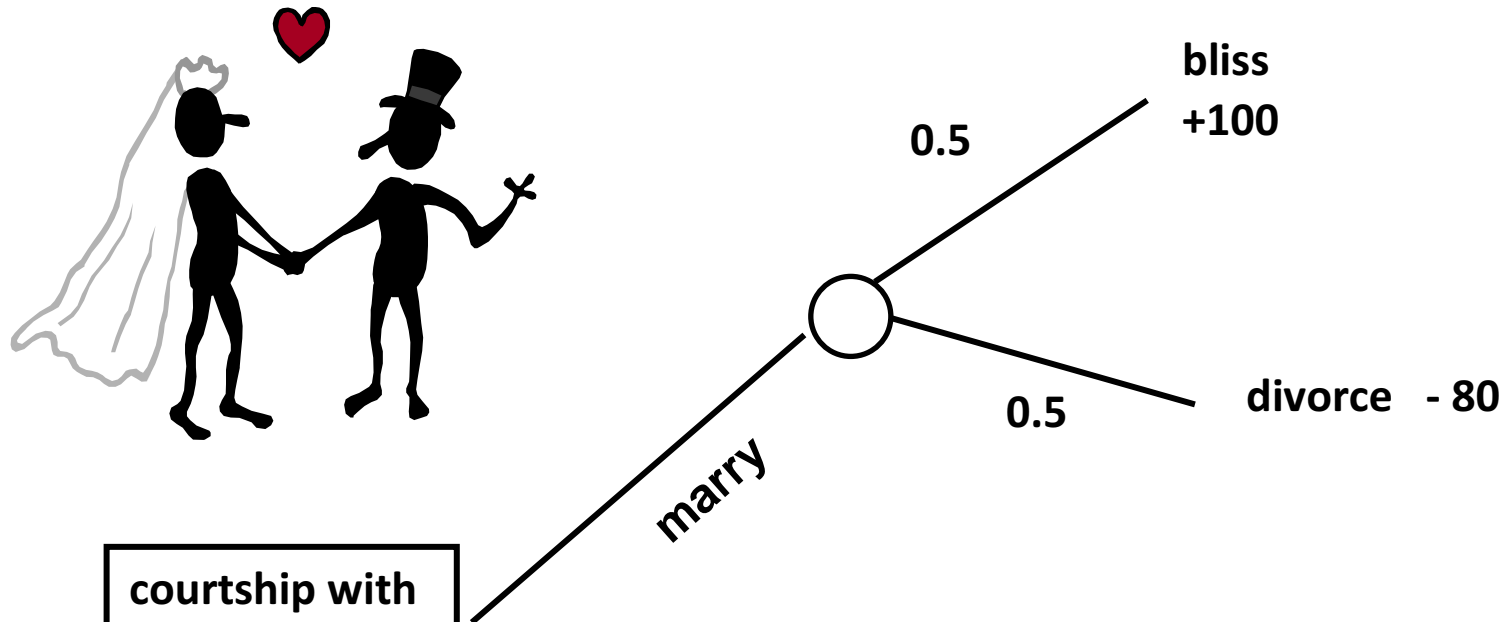 - based on theory or evidence or expert opinion

(2) select random numbers (with replacement)
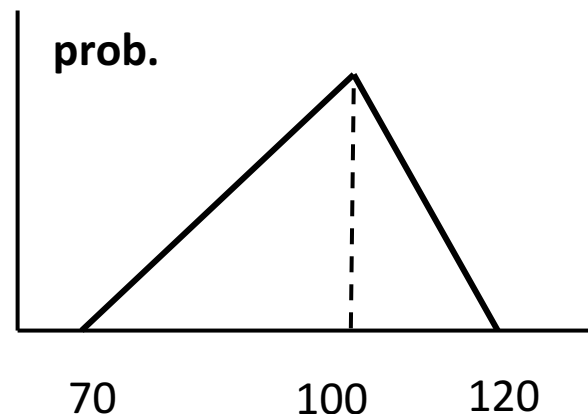 - note variable value for the random number
  - estimate net benefits

(3) repeat steps 1 & 2 many times

software available: "@Risk" (Excel compatible)

Monte Carlo simulation of "marry" branch

bliss
+100

0.5

divorce   - 80

0.5

marry

courtship with specific partner

prob.

70   100   120

The values used (e.g. "bliss" = 100) are deterministic. They are certain and therefore exact. In reality, we may be uncertain of them. For example, +100 may be the most likely estimate of the value of bliss, or our "best guess". But we may also have evidence or expert opinion that a minimum value is +70 and a maximum is +120. This can be illustrated as a triangular distribution.
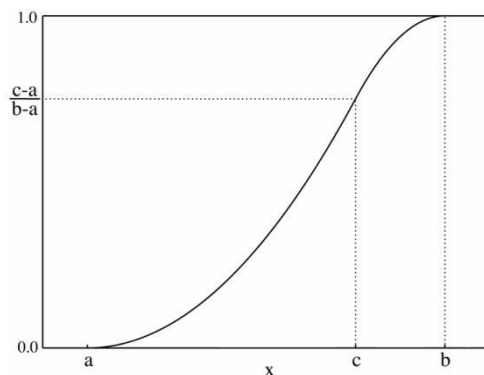
Monte Carlo example

probability density function (pdf)

bliss

divorce

0   70   100   120   -90   -80   -50   0
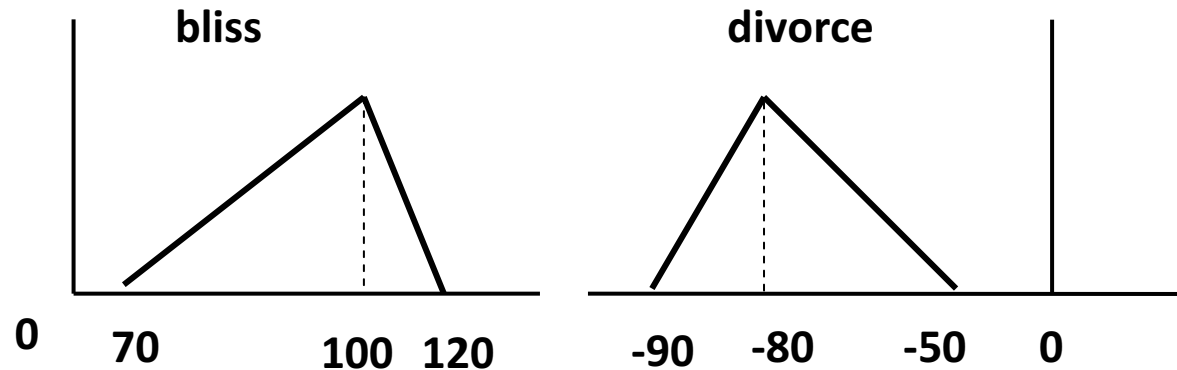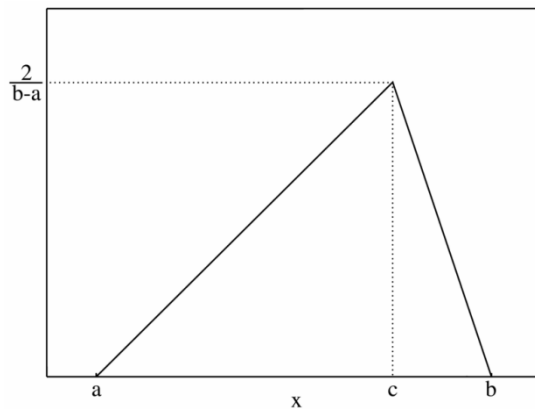
both "bliss" and "divorce" are now defined by probability distributions (pdf), rather than a single value. Each pdf can be transformed into a cdf.

cumulative density function (cdf)

By drawing random numbers many times, the corresponding values for "bliss" and "divorce" can be simulated within the range of values for each one.

The Expected Value of the "marry" branch now becomes a probability distribution rather than a single value.

uncertainty: the 'real options' approach

- **analogous to financial options; mainstream CBA**
  - **e.g. lottery ticket ('win': windfall; 'lose': only price of ticket) [risk is asymmetrical]**
  - **e.g. take umbrella on cloudy day walk ('win': stay dry; 'lose': carry umbrella)   [risk is asymmetrical]**
- **real = physical**
- **right to exercise, but no obligation**
- **possible to delay full implementation**
- **pay premium to acquire option**
- **action is at least partially irreversible**
- **contract exercise price and period**
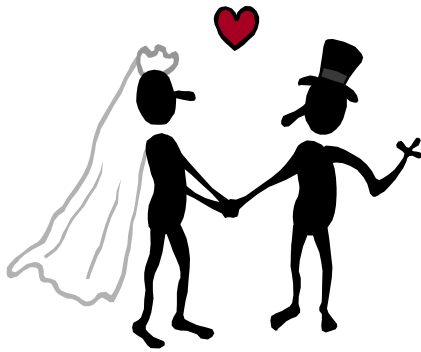
deferred decision: more information gained
quasi-option values

would outcome change if we were to defer the decision?? i.e. longer courtship

marry immediately

0.5 — bliss +100

0.5 — divorce - 80

extended courtship

use d=0.1: high time preference for bliss

don't marry

0.8 — bachelor +20

0.2 — regret - 10

marry

0.8 — bliss +100

0.2 — divorce - 80

don't marry

0.8 — bachelor +20

0.2 — regret - 10

year 1 | year 2

deferred decision: more information gained
quasi-option values

marry immediately

bliss +100 — 0.5

+10

divorce - 80 — 0.5

extended courtship   64/(1+0.1)

use d=0.1: high time preference for bliss

don't marry

bachelor +20 — 0.8

+14

regret - 10 — 0.2

+64 marry

bliss +100 — 0.8

divorce - 80 — 0.2

don't marry

+14

bachelor +20 — 0.8

regret - 10 — 0.2

year 1

year 2

a "real option" example

"real options" are intuitive ways of dealing with uncertainty. They can be used even if calculations are not carried out.

a newly-married couple :
build a large house?

or

build a small house?

climate change: sea wall 'real option'

A benefits ⟶ time

build sea wall
or levee bank

B

monitoring and periodic
re-evaluation

time

build foundation only

build (or raise) wall
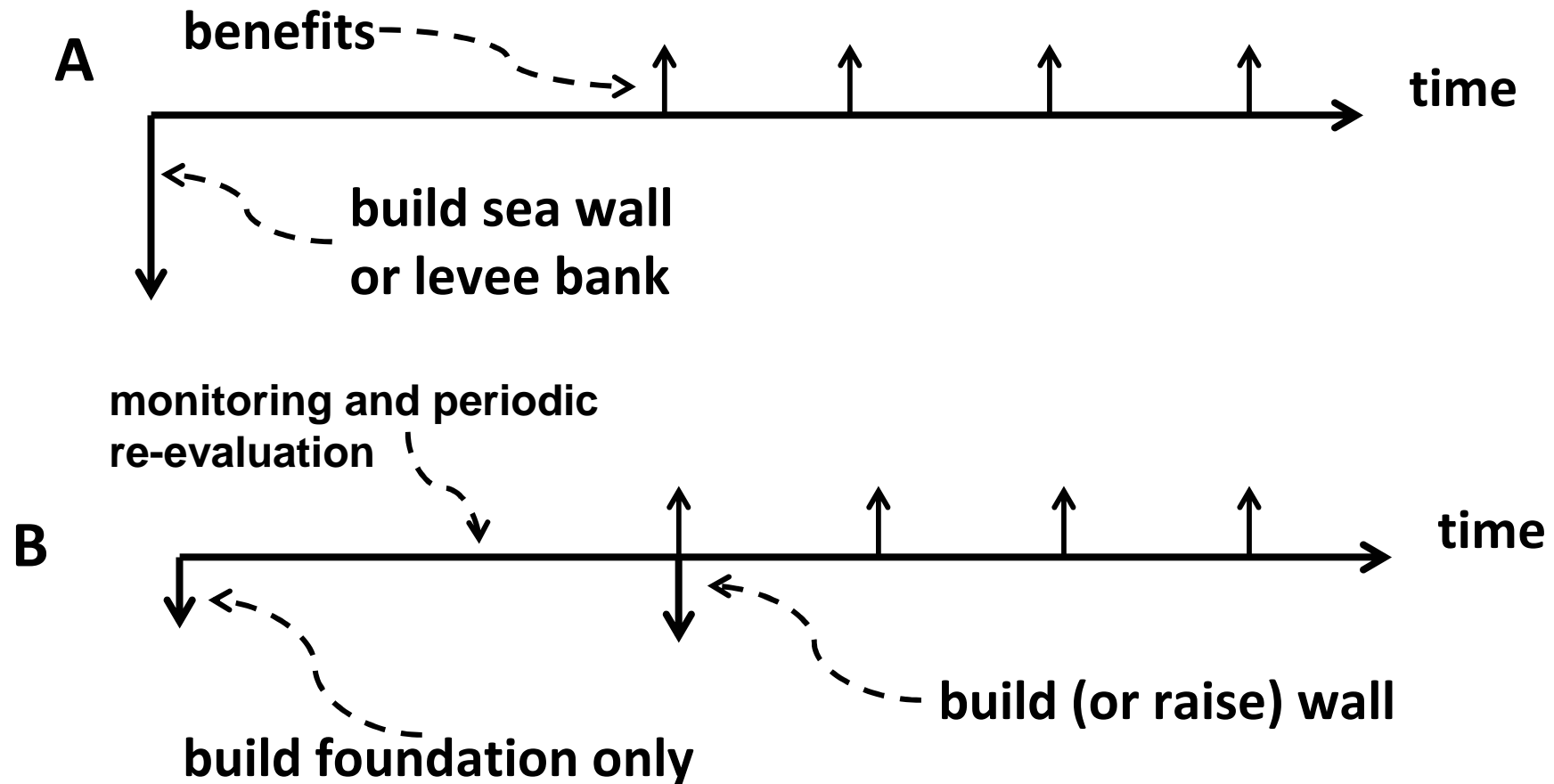
other examples of real options

- "fitted for but not with": the military option

- irrigated wheat farmers may grow sorghum

- a short runway, or a long one?

- reduce maintenance on houses?
  - is retrofitting a furphy?

- research

the central Australian climate

Fitzpatrick and Nix
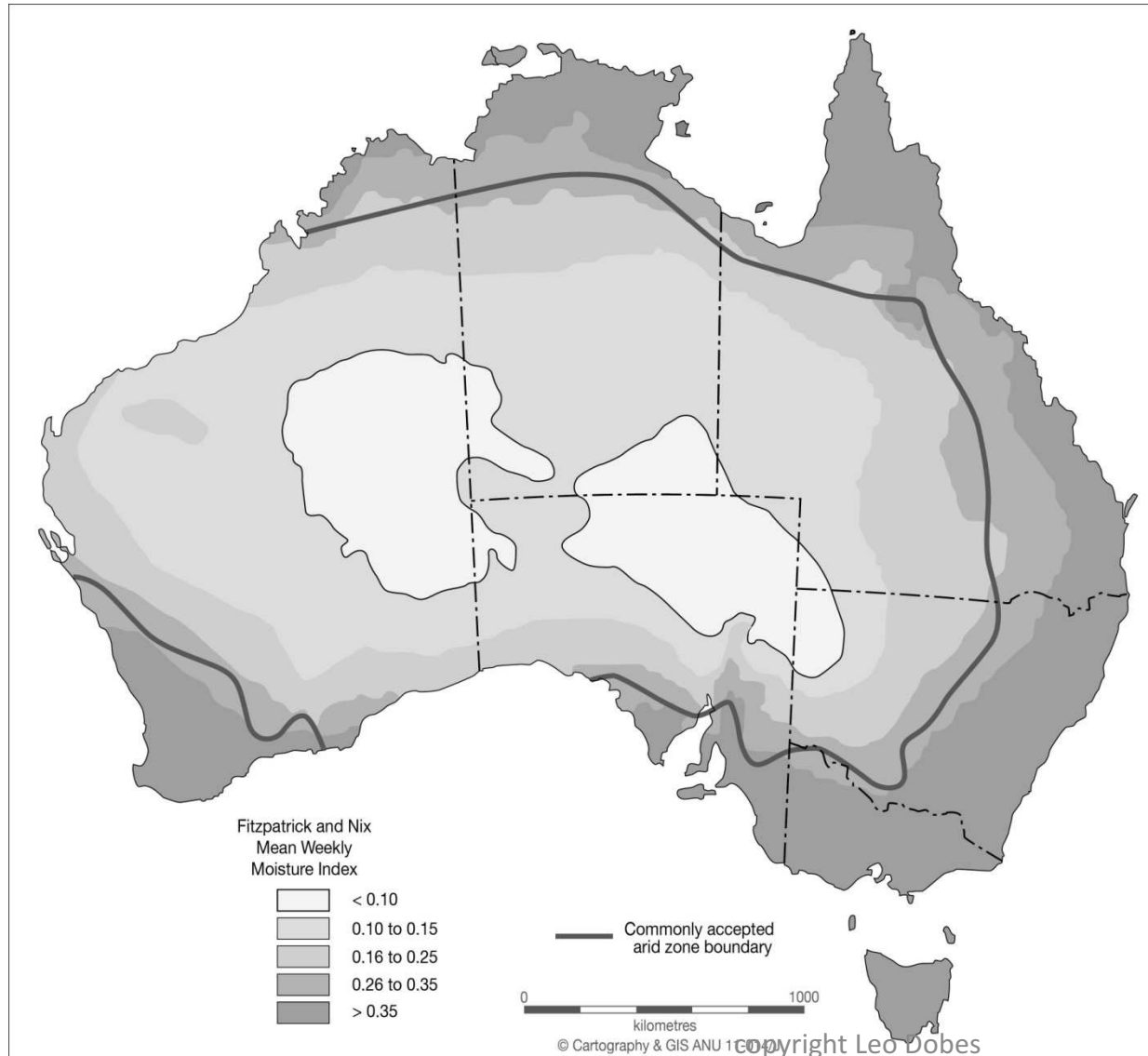Mean Weekly
Moisture Index

	< 0.10
	0.10 to 0.15
	0.16 to 0.25
	0.26 to 0.35
	> 0.35

Commonly accepted
arid zone boundary

0 ———————— 1000
kilometres

© Cartography & GIS ANU 1990

- highly variable localised rainfall
- unpredictable rainfall: no succulents
- growth occurs in pulses
- 1890s rabbits, erosion, cattle ticks
- region-wide droughts e.g. 1895-1902
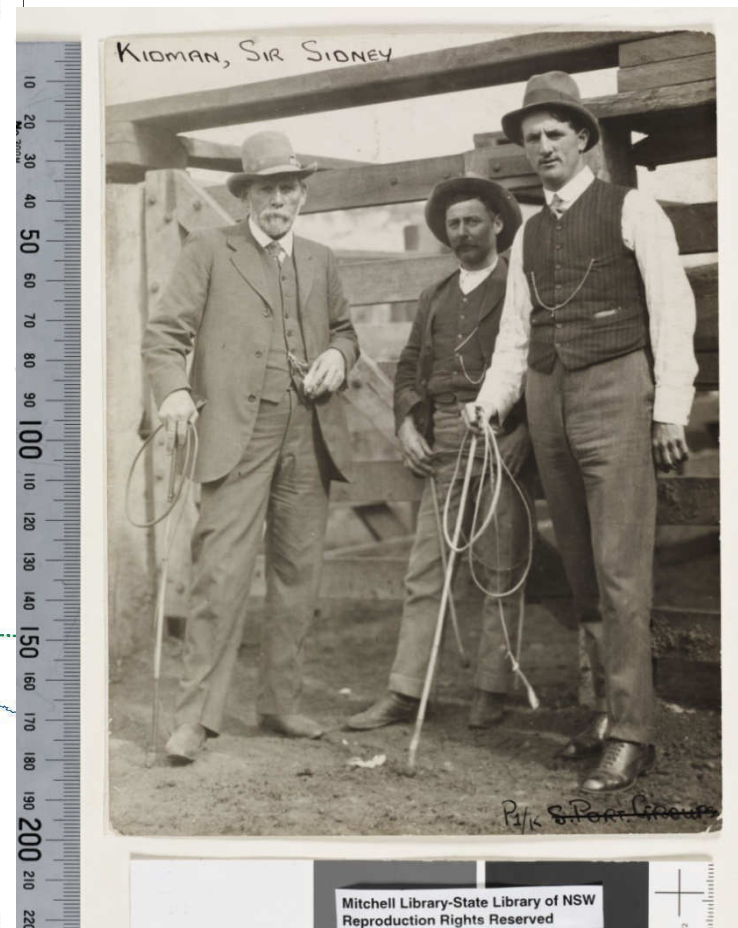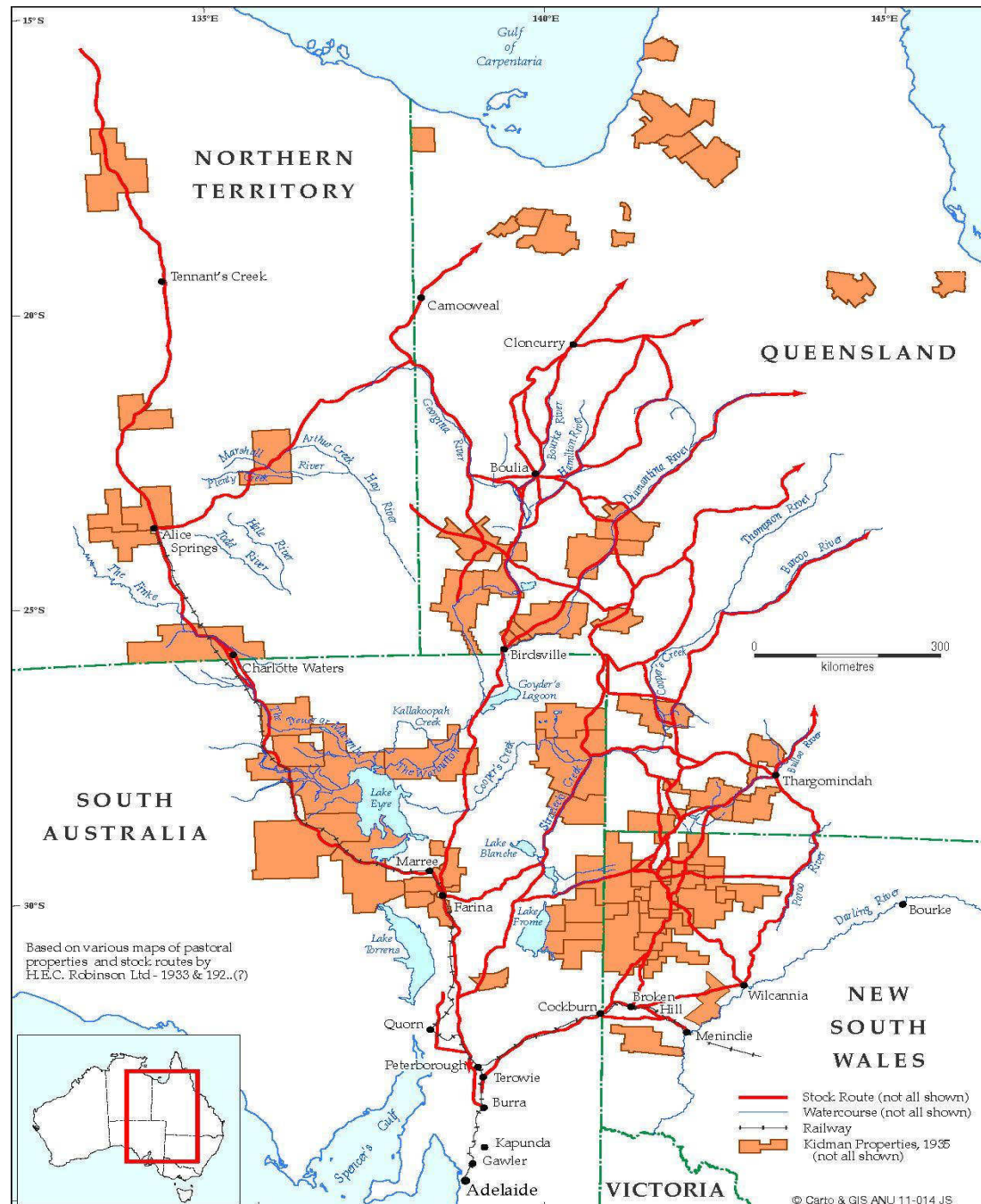
copyright Leo Dobes

93

flexibility to move stock during drought along adjoining properties

submersible bridge: Gairloch Qld

Source: Queensland
Heritage Register

Storm Water Management and Road Tunnel (SMART):
Kuala Lumpur

Source: Mott MacDonald

dual-use cyclone shelter: Vietnam

source: Kien Van Nguyen

8. conduct sensitivity analysis

- **Even if use prob. approach, face uncertainty about values and magnitudes of impacts**

- **Sensitivity analysis tests robustness of assumptions and sensitivity of results to them**

- **Can't examine myriad combinations**

$$(\text{no. assumption levels})^{(\text{no. assumptions})}$$

1. **Partial analysis (one assumption at a time)**
2. **Worst and best scenarios in plausible range**
3. **Monte Carlo techniques**

9. Undertake distributional analysis to assist decision-makers

- Helpful to decision-makers to know who is gaining in consumer/producer surplus terms

- Also helpful to know financial gains/losses

- If asked to attach weights to groups in the analysis, should also do an unweighted calculation for comparison

- Weights should be specified (by decision-makers?) before the analysis begins

10. make a recommendation

- **Ultimately, analyst needs to make a judgement call**
  - perhaps tempered by lessons from behavioural economics

- **Any unquantified components need to be explained**

- **The alternative with the highest NPV should be preferred**

- **Remember: the actual decision is up to the decision-maker, not the analyst**
  - decision-makers may prefer an entirely different use of the resources

alternatives to CBA

✓ **Cost Effectiveness Analysis (CEA)**

- eg cost (often budgetary) per life saved (output)

- but cost could be 'social cost/output'

☺ **Planning Balance Sheet method**

- present distribution of social costs and benefits

☹ **Triple Bottom Line**

- people, planet, profit

☠ **Multi Criteria Analysis (MCA)**

multi-criteria analysis

- **various names: e.g. multi-attribute analysis**
- **like popular composite indexes:**
  - **Best City - Most Liveable City index**
  - **vulnerability indexes (climate change)**
  - **national competitiveness indexes**
  - **'true standard of living' indexes**
  - **hazard indexes**
  - **best university in the world**
  - **staff selection in the Australian Public Service**

multi-criteria analysis: simplified example

road widening project : goals achievement matrix

attribute	units	impact	score (-4 to +4)	weight %	weighted score
travel time saving per trip	minutes	13	2	10	20
growth in local business p.a.	revenue ($)	56,000	4	40	160
reduction in crashes p.a.	number	4	3	10	30
employment	jobs	23	3	20	60
cost of project	$	89,000	-4	20	-80
total				100	190

MCA attribute selection and bias

attribute	units	impact	score (-4 to +4)	weight %	weighted score
travel time saving	minutes	13	2	10	20
growth in business	revenue ($)	56,000	4	10	160
reduction in crashes	number	4	3	10	30
employment	jobs	23	3	10	60
cost of project	$	89,000	-4	20	-80
dead wombats	number	27	-4	20	-80
more CO_2	tonnes	55	-4	20	-80
total				100	30

there is no theoretical guidance as to number or choice of attributes/criteria

bias in (arbitrary) MCA scores

attribute	units	impact	score (-5 to +5)	weight %	weighted score
travel time saving	minutes	13	3	10	30
growth in business	revenue ($)	56,000	5	40	200
reduced crashes	number	4	4	10	40
employment	jobs	23	4	20	80
cost of project	$	89,000	-5	20	-100
total				100	250

- **small change in score scale increases result by 32 % (= 250/190)**
- **there is no theoretical guidance for choosing scale**

bias in (arbitrary) MCA weights

attribute	units	impact	score (-4 to +4)	weight %	weighted score
travel time saving	minutes	13	2	20	40
growth in business	revenue ($)	56,000	4	20	80
reduced crashes	number	4	3	10	30
employment	jobs	23	3	40	120
cost of project	$	89,000	-4	10	-40
total				100	230

- **reversal of weights increases result by 21%   (= 230/190)**
- **there is no unique theoretical guidance for choosing weights**

MCA mathematically flawed

 + **= ?**

travel time saved (minutes, cardinal scale)	**+**	reduction in crashes (number, cardinal scale)	**= ?**
			contravenes dimensionality
score (ordinal scale) X weight (interval scale)	**+**	score X weight	**= ?**
			unitless

in defence of MCA ?

- **avoids monetisation**
  - no! implicit monetisation present
  - e.g. cost/employment = $3,896.57 per job (because cost and employment have been given equal weights in the MCA)
- **easier to carry out – anyone can do it**
  - but life wasn't meant to be easy
  - ecological construction focus group, late 2009
- **easier to understand – intuitive**
  - only if can add apples and oranges
- **ministers want it**
  - vulnerable to vested interest influence ("stakeholders")
  - or temptation to 'second-guess' ministers
  - APS Values and Code of Conduct: ethical, impartial, "frank, honest, comprehensive … advice" ?

Cost Effectiveness Analysis

- **Defence and Health use CEA**

- **When monetising benefits is too difficult or costly**

- **Measured incrementally**

$$CE = \frac{C_i - C_j}{E_i - E_j}$$

- **eg asthma drug, effectiveness=episode-free days**

- **Costs: budgetary or economic (social)**

project	Lives saved	Budget cost $m	CE ratio $m/life	E≥50 CE ratio	C≤$250m CE ratio
A	100	250	2.5	2.5	2.5
B	20	44	2.2	-	2.2
C	100	300	3.0	3.0	-
D	50	300	6.0	6.0	-
E	10	20	2.0	-	2.0
F	100	900	9.0	9.0	-
G	60	210	3.5	3.5	3.5
H	50	200	4.0	4.0	4.0
I	40	100	2.5	-	2.5
J	45	110	2.4	-	2.4

limitations of CEA

- **Scale problem (previous slide), but can impose constraints**

- **Omitted benefits, but can use**

  cost = social cost – other social benefits

- **Discount costs? and effectiveness?**

- **Only measures technical efficiency**

- **Multiple measures of effectiveness: which one to use? Data Envelopment Analysis?**

- **Decision rule requires fixed budget or set price per unit of effectiveness**

Riscos Fiscais e Sustentabilidade Fiscal em Contratos de PPP
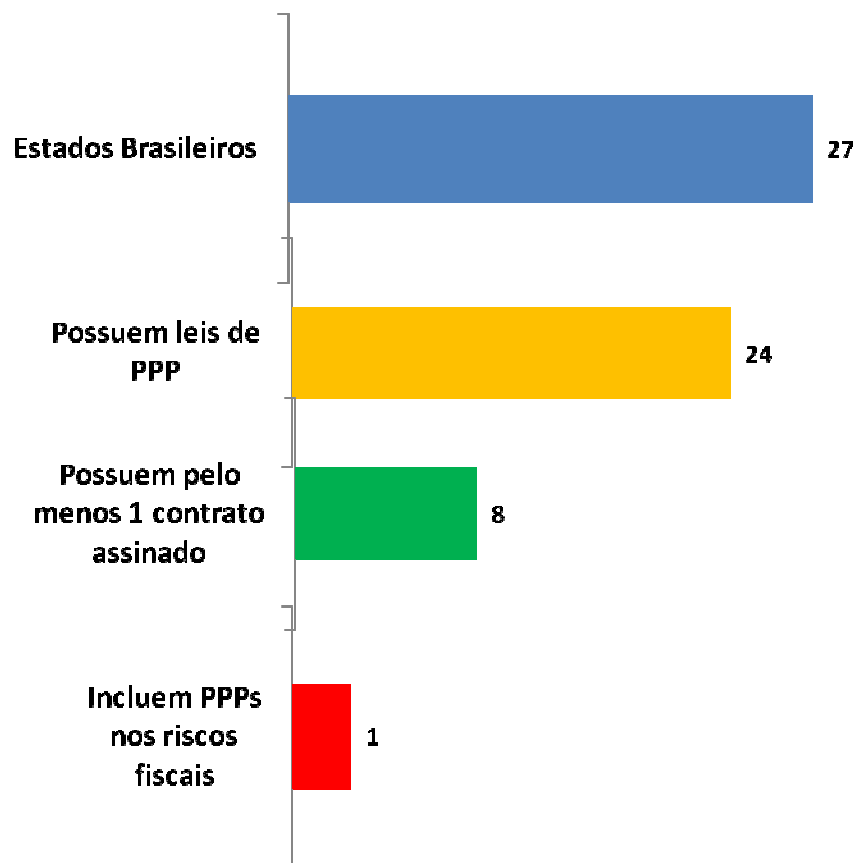
Rafael Barroso

(Economista, Banco Mundial)

Reunião do Conseplan - São Paulo, 27/02/2013

Estados brasileiros veem riscos fiscais em PPPs?

Mensagem

- A boa gestão dos riscos fiscais oriundos de PPPs aumenta a credibilidade do programa de PPP e portanto eleva a capacidade do Estado de contratar PPPs.

O que é preciso saber sobre riscos fiscais?

- ## Definição
  - Riscos fiscais referem-se à possibilidade de mudança nas variáveis fiscais (receitas, despesas, resultado primário, etc) em relação ao que estava previsto no momento do orçamento.

- ## Fontes
  - Choques macroeconômicos;
  - Mudanças legais; e
  - Passivos contingentes (explícitos ou implícitos).

5 passos para gestão de riscos fiscais

1. Identificação
   - Fonte, probabilidade, impacto
2. Transparência
3. Gestão
   - Mitigação, transferência
4. Incorporação na análise fiscal
5. Arcabouço legal/ administrativo

De onde surgem os riscos fiscais em PPPs?

- Compartilhamento de riscos e garantias
    - Garantia de demanda mínima;
    - Cobertura de risco cambial, etc.
- Assunção pelo governo de compromissos de PPP além da capacidade de pagamento.
- Projetos mal estruturados e avaliados.

Compartilhamento de riscos e garantias

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- Passivo contingente por definição.
- Aplicação dos "5 passos".
- Risco procíclico.
- Pode ser amortecido por estruturas de garantia.
- Importância das garantias implícitas (riscos políticos).

Passivos contingentes de PPP na Colômbia

- Uso intensivo de PPPs para desenvolvimento de rodovias.

- Falta de clareza no compartilhamento de riscos.

- Grande parcela dos riscos assumidos pelo governo.

- Grande volume de despesas não previstas.

- Emissão de títulos públicos.

Transporte em Portugal: iceberg fiscal

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S I: 40 € MM

Cap. 50:   169 € MM

ENCARGOS COM PROGRAMA DE TRANSPORTES - 2008

MOPTC 449 €MM

Institutos e SFA: 337 € MM

OE   700 € MM

Ind Compensatórias cap 60 (MFAP) : 251 € MM

Fundos EU Empresas   € 130MM

Receitas consignadas €480 MM da CSR

Variação de passivo total das empresas SEE de infraestrutura e transportes: cerca de 2.500 a 3.000 € MM

Variação do VAL da "previsão de encargos com concessões" PPP de transportes e acessibilidades: 3.000 €MM

http://ppplusofonia.blogspot.com

Compromissos de PPP x capacidade de pagamento

- Decisão de se contratar uma PPP é tomada 4 a 6 anos antes do 1º pagamento.
- Não é refletida no orçamento ou LDO.
- Projeto de "custo zero" para o governo atual.

Compromissos de PPP x capacidade de pagamento

- Integrar os compromissos de PPP à análise fiscal de médio e longo prazo, incluindo um *worst case* cenário.

- Projetar, publicar e incorporar no processo orçamentário o comprometimento do governo com todos os pagamentos (contratados e de projetos em análise) de PPP ano a ano.

- Fazer o cotejo com as projeções de receita disponível (descontados outros usos de receita).

Falha nos projetos

- Demanda superestimada.
- Divisão de riscos sub-ótima.
- Subestimação dos pagamentos governamentais.
- Atendimento a interesses políticos ou grupos de pressão.

VLT Jaén - Espanha

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- Custo: € 100 milhões
- Inaugurado em 2011
- Demanda: zero
- Situação atual:
  fechado

Falha nos projetos

- Incorporação do processo de análise de PPPs ao arcabouço de gestão de investimentos públicos.

- Estruturação de um processo de decisão colegiado.

- Poder de veto dos órgãos centrais de orçamento e finanças ("gateway").

Processo decisório com gateway

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1 Triagem **G** **2** Análise **3** Estruturação **G**
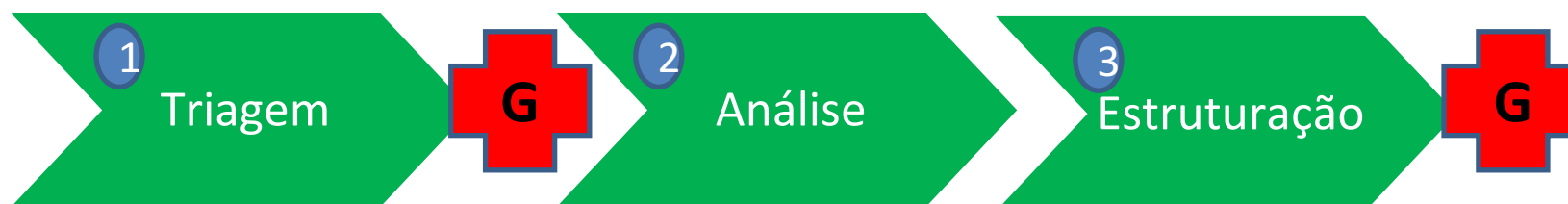
- Evitar despesas com desenvolvimento de projetos inviáveis ou com alto custo fiscal

- Com base na análise de *affordability*, SEFAZ e SEPLAN devem ter palavra final com relação ao aspecto fiscal.

4 Licitação **5** Gestão do Contrato **G**

- SEFAZ e SEPLAN devem ter a possibilidade de vetar renegociações que impliquem em maiores despesas ou riscos fiscais