Lecture 9 (Part 1): CBA Revisited

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1. Introduction
2. CBA: Challenges / Problems / Errors
3. CBA: ex ante / in medias res / ex post

1. Introduction
- Infrastructure projects
  - where project evaluation is most at home
  - big projects, big budgets, choices, scarce resources
  - costs and benefits are generally apparent
  - CBA
  - 'mega-projects' literature...
- Seen some of these applications:
  - infrastructure
  - health...
- As 'gold standard' in economic evaluation formally bringing together a number of key issues here
  - relevant to other methodologies also...
2. CBA: Challenges/ Problems/ Errors

- These arise in all applications of CBA (ex ante), but particularly visible in infrastructure applications
  - scale, cost, duration and regularity
- Pull together key issues across the literature
  - no precise order
  - Key References:
    - Boardman (ch13): dropbox
    - Department of Transport (2009): dropbox lecture 3
    - UK Green Book: dropbox lecture 3
    - Morgenroth (2011): dropbox & Lunn/Ruane Book (ch2)

Omission errors
- leaving something out from the analysis
  - considered too small or unlikely to occur...what if?
  - uncertainty re. likelihood of cost/benefit arising
  - Boardman talks of ‘battle of the experts’
  - what is an evaluator to do?

Double counting
- converse of omission
  - danger of counting the same thing twice
  - house price changes
    - time saved (Luas) / noise (runway)

Forecasting and cost errors
- sometimes forecasting is easier
  - precedent, low complexity of project
  - However, in general can be problematic
  - implications for costs and benefits...
  - Boardman (2006):
    - people systematically underweight low-probability ‘bad’ events and overweight low-probability ‘good events’
    - ‘people who live on flood plains buy too many lottery tickets and not enough flood insurance!’
    - ‘cognitive biases may lead analysts to make severe and systematic errors of forecast and judgment, with an overall tendency towards overoptimism’
– Morgenroth (2011):
  - ‘strong evidence of systematic optimism bias particularly on costs and also on demand for rail’
  - applies also to road traffic projections and costs...
    - reviewed 258 projects from 20 countries
    - road, rail, bridge, tunnel
    - 90% cost overruns,
    - averages
      - rail = +45%
      - bridge and tunnels = +34%
      - roads = +20%

– Need to take account of these possible errors:
  - Department of Transport (2009) sensitivity tests to include:
    - +/- 20% of project cost
    - +/- 10% and 20% of projected demand
    - +/- 10% and 20% of projected benefits
    - re. costs Morgenroth (2011) suggests this too low
  - UK Green Book
    - suggests +/- 40% to cost estimates for sensitivity analysis higher % if greater uncertainty on the cost estimates
    - some differences between road and rail adjustments...

– Implications of this, Morgenroth (2011:7): The implications of the findings of this literature are best illustrated by applying them to an example of a rail project with benefit cost ratios of 1.1. For rail projects the findings are that the benefit (demand) is overestimated by 50% and that costs are underestimated by 40% at the time of project proposal. Adjusting the benefits and costs accordingly reduces the Benefit to Cost Ratio (BCR) to less than 0.75:1.

  Note, Morgenroth (2011:12) highlights a need to establish whether projects in Ireland have been subject to optimism bias...requires ex post evaluation of a comprehensive set of all types of infrastructure projects – DISSERTATION!!
Valuation errors
– Can be difficult to establish values for some intangibles
– shadow prices and willingness to pay techniques
– left out = problem; included incorrectly = problem

Delays between evaluation and build
– evaluation occurs in advance of decision making
– decision making and planning process can take time
– costs and benefits can change...impact on the NPV
  • additional year between decision to build and end of construction leads to a 4.6% increase in costs

Appropriateness of Discount rate
(i) the rate
– social discount rate used to discount future values
– 5% = DPER
– How appropriate?
  • cost of government funds (long term bonds) = then ok
  • should it reflect the return on capital as a better means of capturing the rate of time preference, then = 5-9%
  • different choice would impact on the NPV result

Appropriateness of Discount rate
(ii) exponential v hyperbolic discounting
– currently we use same rate to discount over time
  • 5% each year
  • implies values in the future count for little today
  • problem for environmental and long-term CBAs
– over longer-term suggestion to use hyperbolic discounting
  • declining discount rate into the future
  • UK Green Book does this (3.5% base rate)
  • Morgenroth (2011) suggests for Ireland
Borrowing and the Shadow Price of Public Funds

- can we capture this
- the distortionary effect of taxation
- weight public funds: costs are higher (x1.5)
- merit, becoming required

Appropriate Short Listing

- care in choosing the short list
- limited reviews to see this is being achieved
- quality impact on the CBA
Accounting for Complementary/Substitute projects
   – what of the impact of other projects yet to commence which have capacity to alter (+/-) the NPV
   – if knowledge of this, include in sensitivity analysis, but difficult

Capacity to undertake CBAs

Cost of CBAs
   – time, data and expertise

Summary of the Risks for Infrastructure CBAs
   – From Morgenroth (2011: 5):
     (i) construction risk
     (ii) operating risk
     (iii) demand risk
     (iv) costs of funds change
     (v) political risk
     (vi) optimism bias

3. CBA: ex ante / in medias res / ex post
   • When to do a CBA?
     – certainly ex ante
     – merit in the occasional:
       • ex post - as evaluation lessons to learn
       • in medias res – for long term projects as evaluation lessons to learn
       • see Boardman chapter in dropbox
         – Canadian highway: ex post and in medias res (x2) compared