Why it is that Public Transport and Roads fare differently around cost-benefit analyses

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Outline

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   - The role of viewpoint
   - Why CBA?
   - Effect of discount rate choice
   - Difficulties of implementing CBA
   - Does CBA tell the whole story?
2. Economic Impact Analysis
3. Relationship to CBA
4. Conclusions

1. Investment and Evaluation

What is investment? Why evaluate?

› Investment is using resources to create an addition to the present facilities
   - whether public or private
› In economic terms, investment is a diversion from current consumption to uses which will improve the efficiency of the production process
› Benefits > Costs for investment to be worthwhile
› Time is involved in judgement – so Benefits > Costs over time
› This is the foundations of Evaluation

What makes Transport Evaluation difficult?

› In many cases, investments are large eg a motorway and not divisible (eg a 2 lane motorway may not be big enough but a 3 lane too big)
› Transport investments can be long lived and when comparing schemes can have very different lives.
› Both demand and costs are difficult to estimate
› Impact of investment not only on users
› Transport investments can involve significant resources
› Public transport projects in particular often have long lead in times

The role of viewpoint

› This is the institutional position that the evaluator takes with respect to the investment under consideration
› Many items are different to different viewpoints eg pollution is no use to the polluter but can be felt as a serious cost by the non-user
› Users, producers, local government and national governments all have different viewpoints
Private versus Public Investment

- Crucial difference is between viewpoints
  - Private investor only interested in own benefits and costs
  - Public investment needs to consider the costs and benefits to society as a whole, to both users and non-users of the investment.

Why Cost Benefit Appraisal in Transport?

<table>
<thead>
<tr>
<th>Financial Appraisal</th>
<th>CBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective function</td>
<td>Profit max</td>
</tr>
<tr>
<td>Viewpoint/ concentration of interest</td>
<td>Unified</td>
</tr>
<tr>
<td>Political Implications</td>
<td>Generally few</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Good on costs</td>
</tr>
<tr>
<td>Ease of decision taking</td>
<td>Few difficulties</td>
</tr>
<tr>
<td>Appropriate application</td>
<td>Small scale, privately financed investments, revenue earning</td>
</tr>
</tbody>
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Choice of Method

- To an extent determined by viewpoint
- To an extent determined by scale
- To an extent determined by Spread and Complexity of Impact

Benefit and Cost cash flows of infrastructure projects

\[ \sum (B_t - C_t) \]

\[ K = B_0 - C_0 \]

Net Present Value (Net Present Worth)

\[ NPV = \sum_{t = 0}^{T} \frac{B_t - C_t}{(1 + r)^t} \]

- CBA decision rule: If NPV \( \geq 0 \) project is worth doing
- What does it mean if NPV = $50,000?
Effect of different discount rates

![Discount Rate Diagram]

PV of future benefit or cost

\[ PV = \frac{1}{1+i^n} \]

PV functions with \( i \) increasing

\( i = \text{infinity p.a.} \)

Practical difficulties of implementing CBA

- Investment will give rise to future flows – in demand, cost etc
  - Costs can be difficult to predict
- Demand more difficult because transport demand is a derived demand dependent on the scale and location of economic activities and on the pattern of residential land use
- Projects are long lived and often a comparison with ‘do nothing’ is not realistic.
  - Comparisons with ‘do minimum’ suffer from gerrymandering

CBA and Large-Scale Investments

- CBA rewards projects that can be implemented quickly with immediate phase-in of benefits, for example congestion mitigation
- Many large-scale infrastructure projects have long construction periods with benefits that phase in more slowly

<table>
<thead>
<tr>
<th>Project</th>
<th>Discount rate</th>
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<tbody>
<tr>
<td>2012</td>
<td>1.00</td>
</tr>
<tr>
<td>2024</td>
<td>0.62</td>
</tr>
<tr>
<td>2036</td>
<td>0.39</td>
</tr>
<tr>
<td>= infinity p.a.</td>
<td></td>
</tr>
</tbody>
</table>

The projects that survive CBA tend to be incremental in nature and short term fixes where benefits follow a short spending period

Does CBA tell the whole story?

- CBA evaluates the economic efficiency of the project(s) under consideration
- Projects often put forward for multi-dimensional reasons
  - To stimulate the economy
  - To provide jobs in particular sectors
- Important also to consider the economic impacts of the project, alongside efficiency arguments

What is Economic Impact Analysis?

- The short and long-run changes from a project/policy on the economy, measured in terms of:
  - Jobs
  - Business Output – the total amount of money flowing through an industry in a year.
  - Value Added – measure of value creation in an economy. Gross Regional Product (GRP) is the total amount of annual Value Added in the GMA Economy.
  - Compensation – wages and benefits to labour in a year.
- Impacts by Industry

For clarity:
- Benefits – positive outcome in a CBA
- Impacts – results of the EIA
How does Transport Stimulate the Economy?

- Short term:
  - Construction spending
  - Operations & Maintenance spending
  - Reduced time (excl. personal time)
  - Agglomeration from improved access
  - Station-area development
  - Tourism

- Long term:
  - Spending-Related
    - Reduced travel costs
    - Agglomeration from improved access
  - Productivity-Enhancing
  - Business Attraction

3. Relationship to CBA

- CBA is ‘wider’ than EIA in including:
  - Environmental benefits
  - Safety benefits
  - Benefits from reduced personal travel time (non-commuting and non-business)
  - Benefits from reduced crowding

- EIA is wider than CBA in including:
  - Activity consequent on construction spending
  - Follow-on economic activity downstream effects

Differences between results of EIA, CBA and the presence of Wider economy impacts (WEI)

Multimodal Corridor Example

Northeast CanAm Connections: Integrating the Economy and Transportation

- Study Objective – to identify freight transportation deficiencies affecting economic development of Northeast US States and Canadian Provinces
- Approach:
  - Set economic development goals
  - Local, Regional & National
  - Develop investment scenarios
  - Include “hard” and “soft” options
  - Evaluate scenarios
    - Economic growth (EIA)
    - Economic efficiency (CBA)
Multimodal Corridor Example

Northeast CanAm Connections: Integrating the Economy and Transportation

- Key factors:
  - Accessibility to regional markets and international gateways
  - Efficiency of national freight infrastructure to/from ports
  - Intra-regional mobility

- Key results:
  - EIA identified which options met economic development objectives
  - CBA identified which options were economically efficient
  - Combination of analysis methods allowed for trade-offs among project objectives
  - "Soft" options performed better in CBA
  - Rail option performed better in EIA

4. Conclusions

What is Gained through Economic Impact Analysis

- New perspectives
  - Wider economy impacts, which can improve CBA outcomes
  - Measures of temporary economic stimulus
  - Measures of long-term job and wealth creation
  - Identifies productivity-enhancing sources of growth

- Communication among stakeholders
  - More comprehensive coverage of consequences appeals to broad range of stakeholders
  - Industry breakdown communicates economy-wide value of investment
  - Impacts to manufacturers and freight groups from road decongestion

A Comprehensive Message

- CBA and EIA are complementary
- Need both for comprehensive message
- CBA
  - Captures economic efficiency
  - Captures environmental, safety, and value of personal welfare
- EIA
  - Captures productive consequences of investment
  - Short term stimulus
  - Long term productivity growth

Links to Example

- Northeast CanAm Connections