

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

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## Outline

1. Investment and Evaluation
  - What makes transport evaluation difficult
  - 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

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## 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

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## 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

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## 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

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### 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?

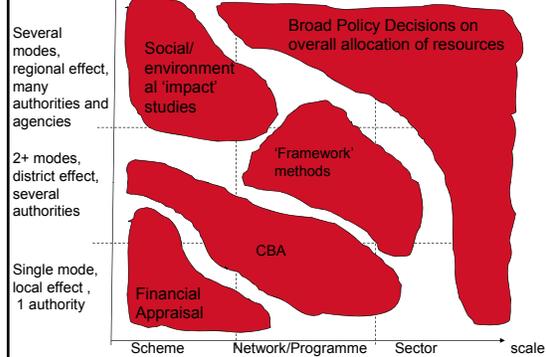
	Financial Appraisal	SCBA
<b>Objective function</b>	Profit max	Welfare max
<b>Viewpoint/ concentration of interest</b>	Unified Concentrated	Fragmented Diverse
<b>Political Implications</b>	Generally few	Varies considerably
<b>Accuracy</b>	Good on costs Poor/uncertain on revenues	Many problems – intangibles, long life, interest rates
<b>Ease of decision taking</b>	Few difficulties	Subject to public participation often
<b>Appropriate application</b>	Small scale, privately financed investments, revenue earning	Large scale Public/private/joint venture Generating social benefits



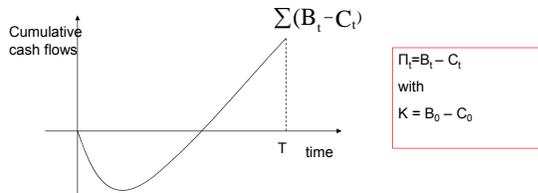
### Choice of Method

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

### 'Spread' and complexity of impact



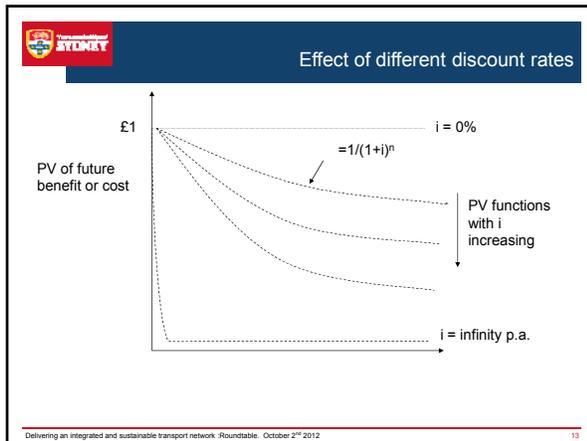
### Benefit and Cost cash flows of infrastructure projects



### 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  $NPV = \$50,000$ ?



- ### 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 ie 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
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### 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

Project Year	Discount rate	
	4%	7%
2012	1.00	1.00
2024	0.62	0.44
2036	0.39	0.20

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

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- ### 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
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## 2. Economic Impact Analysis

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- ### 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
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## How does Transport Stimulate the Economy?

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

Spending-Related

Productivity-Enhancing

Business Attraction

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## Follow-on Indirect & Induced Impacts

**Investment affects jobs, business output, value added and compensation relative to base case both directly and indirectly**

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## 3. Relationship to CBA

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

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## Both CBA & EIA can be considered as a 'wider' analysis...

› 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

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## 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)

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**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

The flowchart illustrates the process from a 'CanAm Scenario' to 'Economic Impact Analysis'. It starts with 'CanAm Scenario' leading to 'Changes in Travel Patterns' (including Travel volume and Access to markets). This leads to 'Direct Impact Concepts' (Travel Savings to Users, Highway modes, Rail modes, Marine Trade diversion) and 'Other Travel Related Impacts' (Tourism, Supply chain and logistics, Increased port activity). These then lead to 'Benefits Cost Analysis' and 'Economic Impact Analysis'. The TREDIS logo and 'Economic Development RESEARCH GROUP' are also present.

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**4. Conclusions**

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**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

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**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

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**Links to Example**

- Northeast CanAm Connections
  - <http://canamconnections.com/bm-doc/Final-Report.pdf>

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