Economic Analysis: Regional Cooperation Projects

Maria Rowena Cham, ADB
John Weiss, ADB Consultant

06 September 2023

Outline of the Presentation

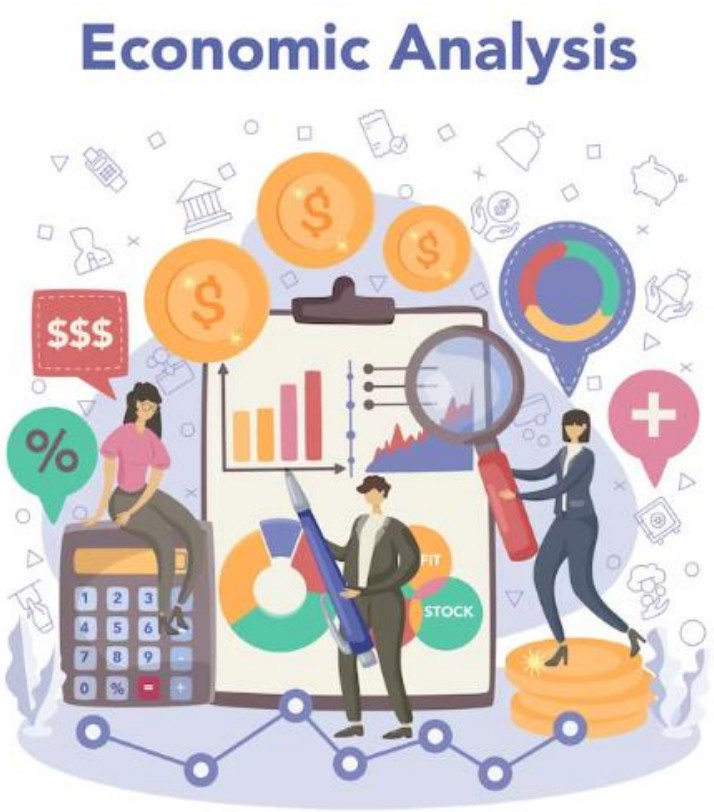
1. Introduction
   a. What is economic analysis?
   b. Why do we do economic analysis?
   c. Key areas of economic analysis
   d. Decision Criteria
2. Overview of the Economic Analysis Guidelines of RCI projects
   a. Benefits from RCI projects
   b. How are RCI benefits valued?
   c. Stages of analysis
      Stage 1 - RCI scorecard
      Stage 2 - Assessing the project's regional impact
   d. Illustration of Economic Analysis on selected ADB projects
   e. Wider economic benefits
3. Conclusion

Economic Benefits versus Economic Costs

- Assesses contribution of project to the economy
- Requires monetary estimates of benefits and costs in future years of project's life
- Benefits and costs should capture impact on the economy
- Impacts in future less valuable than same effect in the present due to 'cost of waiting'
- Addressed by discounting

What is economic analysis?

- All projects have effects that create either costs or benefits for an economy
- Economic analysis quantifies and compares these costs and benefits
- A project where benefits exceed cost should contribute to a country's development
- Economic analysis is technique used for this purpose to separate acceptable from unacceptable projects



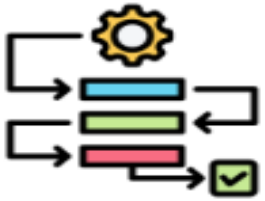
Why do Economic Analysis?

- ADB's development mandate
  - ➢ ADB is mandated by its founding charter to assess the economic impact of projects it finances
- Loans should have developmental impact so 'economic due diligence' required
- Part of the due diligence requirement
  - Project document required to give results of Economic Analysis; EA linked document
- Economic Analysis assesses benefits versus costs of project to the economy
  - Financial analysis assesses benefits and costs of project to investors

Key areas of EA in ADB

1. Country context analysis
2. Sector analysis
3. Identifying rationale for public intervention
4. Demand analysis
5. Alternative analysis
6. Cost-benefit analysis
7. Sustainability analysis
8. Sensitivity and risk analysis
9. Distribution analysis
10. Design and monitoring framework

Key procedures and Decision Criteria



Procedures:

- Quantification and valuation of effects each year of project's life
- Effects in each year must be converted to common base year through discounting
- Discounted flow of benefits/costs termed present value

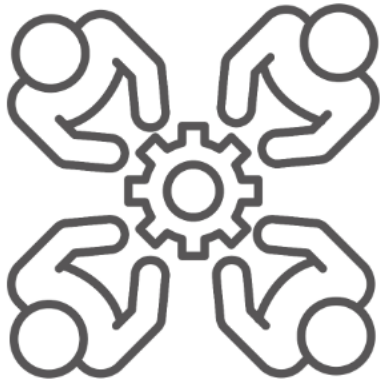
Key decisions indicators:

- Economic Net Present Value (ENPV) Economic Internal Rate of Return (EIRR)
- ENPV gives economic surplus over project's life
- EIRR gives % return on project investment
- Accept project if ENPV > 0, and EIRR greater than discount rate

EA Guidelines for RCI Projects

- ADB Guidelines (ADB 2017) has perspective of national project
- Guidelines (Draft) for RCI projects extends this to regional perspective
- First stage is establishing case for RCI project based on scorecard
- Economic analysis of regional impact of projects is the second, more detailed, stage
- By definition, RCI project should be one that creates benefits in countries other than the country of project location
- Benefits are greater than benefits from independent country investment

Expected Benefits from RCI



- Greater connectivity through cross-border transport improvements; e.g., road corridors
- Greater trade between countries through trade facilitation; e.g., standards harmonisation, customs agreements
- Collaboration of control of infectious disease, e.g., joint vaccination
- Provision of basic services, e.g., regional power export
- Development of human capital, e.g. student exchange programmes

Valuation of User Benefits

- Benefits vary between sectors

road user savings

increase in trade value added

cost savings use of WTP

incremental earnings

averted costs

- Regional analysis requires these allocated between countries

Stage 1 Scorecard Assessment

- Initial screening: scores given in relation to criteria
- Country readiness is a commitment to RCI
- Potential for creation of cross-border benefits vary by type of project
- Important to set out rationale for expected cross-border benefits which can be tested at stage of Economic Analysis
- Minimum score required on all aspects of scorecard to proceed to conduct the EA

Stage 2 Economic Analysis

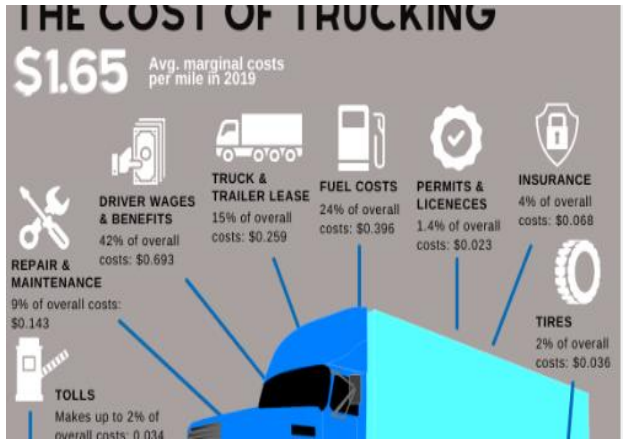
- National ENPV/EIRR compare benefits and costs for single country
- Regional economic analysis aims to add economic net benefits (or costs) created in one or more other countries (the ‘regional effect’)
- Regional effect reported as economic present value and incorporated in overall ENPV/ EIRR for region.
- For multi-country regional project, with cost sharing, full regional economic analysis estimates return to region as a whole and distribution of net benefits between countries.
- Regional ENPV = Σ of NPVs for the countries involved.

Examples of RCI Projects

1. Transport: *TAJ: CAREC Corridor 6 Ayni-Uzbekistan Border Road Improvement Project*
2. *Trade Facilitation:* PRC: *Guangxi Regional Cooperation and Integration Promotion Program (GRCIP)*
3. *Power: SASEC Second Bangladesh–India Electrical Grid Interconnection Project*
4. *Education*
5. *Environment*







Regional Benefit Valuation : Transport

- Direct benefits:
  - user benefits in cost and time savings
  - accident and emissions reduction
- Possible wider effects: productivity and induced investment
- Regional effects arise through:
  - cross-border traffic and possible wider second-round benefits
- Valuation requires distinction between normal, diverted and generated traffic and between national and regional traffic

ADB

Regional Benefit Valuation: Transport

- Normal regional traffic

$$TNR_{it+1} = TR_{it}*((1+g)*yr)$$

Where: TNR is normal regional traffic,
TR_{it} is base year regional traffic
g is the g is the projected GDP growth between t and t +1
yr is the income elasticity for regional traffic flows.

- Regional generated traffic

$$TGR_{it+1} = TR_{it}*((GTC_{it-1} - GTC_{it})/GTC_{it})*nr))$$

Where: TGR is generated regional traffic,
TR_{it} is base year regional traffic
nr is price elasticity for regional traffic
GTC_{it} is generalized travel cost in region $_i$ in year $_t$

TAJ: CAREC Corridor 6 Ayni-Uzbekistan Border Road Improvement Project

- Quantified benefits identifed:
  - (i) savings in VOCs and travel time for existing traffic
  - (ii) benefits accruing to traffic generated by additional economic activity
  - (iii) benefits to mining activities
  - (iv) agricultural producer surplus for farmers
- Much of general generated traffic will be on mining and agricultural goods, reworking omits general category of generated traffic
- Estimate that 10% of benefits from normal traffic go to region (CAREC) and not to national road users and 10% of the benefits from additional mining and agriculture activities also go to region
- Total (regional) project ENPV = $75.9 million and EIRR = 18%
- National (country) ENPV = 63.2 million and EIRR 17%
- Regional spillover of $12.7 million

Regional Benefit Valuation: Trade Facilitation

- Economic analysis typically estimates benefits in terms of time and cost savings for governments (through higher staff productivity at border crossings), and vehicle operators (through time savings and lower working capital requirements)
- Regional benefits expected through impact of lower transit time on cross border trade
- Procedures that delay goods at border in principle equivalent to cost imposed by import tariff
- Estimates of import elasticity of demand with respect to import tariffs can be used
- Benefits is value-added not gross value of additional trade

Regional Benefit Valuation: Trade Facilitation

- Impact of direct cost reduction likely to be small as costs saved due to improved logistics will be small proportion of the value of most good
  - if import elasticity of demand is -0.8 and reduction in unit cost due to trade logistics reform is 2% impact on demand from trade facilitation project will be only 1.6%.
- Main regional effect of trade facilitation will be creating operating environment stimulating investment in export activities on both sides of border
- This type of induced trade effect will be very difficult to capture at project level and will not be picked up in trade elasticity estimates; trade model is required.
- Qualitative discussion should identify areas for potential specialization on both sides of border

PRC: Guangxi Regional Cooperation and Integration Promotion Program (GRCIP)

- Expansion of Pingxiang border trade service centre designed stimulate trade PRC and Vietnam
- Original RRP estimated incremental export value associated with border trade services at CNY 426 million giving EIRR of 22%
- Recalculation assumed only 40% of gross export value was a net benefit giving revised EIRR of 8% and making project marginal

The new ADB financed border facility in Huu Nghi, Vietnam

Regional Benefit Valuation: Power

- Export generation project must include direct benefits of sale of power given by contracted export price (national benefit) + any surplus benefits received by consumers/importers in the importing country
- Additional regional benefits arise in export generation project when there is a consumer surplus for the regional importer
- Power transmission project which allows for imports of power must include both benefit to domestic power users (national benefit) and benefits to exporting country
- Additional regional benefits arise only if there is a producer surplus in the regional exporter

SASEC Second Bangladesh–India Electrical Grid Interconnection Project

- Transmission line appraised from viewpoint of Bangladesh
- Benefits in Bangladesh cost savings/WTP for power, costs are project costs plus export price from India
- Given surplus capacity in India additional regional benefit is export price minus long-run cost of supply from India taken as Tk 5.11 (lowest of bid prices for sales from India to Bangladesh)
- Ratio of supply cost to export contract price is 5.11/6.21 or 82% so annual benefit to India of selling surplus power is 18% of annual revenue
- The full results: (i) National (project) ENPV Tk 12,494, National EIRR 22%; (ii) Regional (both countries) ENPV Tk 46,540 mill and Regional EIRR 47%.
- The regional spillover is Tk 34, 046 million.

Regional Benefit Valuation: Education

- Economic benefits of education projects typically are based on incremental life-time earnings as proxy for higher productivity
- Regional dimension: students that study in another country in the region, will earning more as a result of their education through the project

Project A will set up or expand a university, estimate annual benefits B as:

$$B = (Yw - Ywo)^* (1-d)^*N$$

where: Yw is discounted lifetime earnings before tax for graduate,

Ywo is discounted lifetime earnings before tax for non-graduate,

Allowing for possibility of unemployment,

d is non-graduation rate,

N is number of students enrolled each year

- For regional dimension number of students from another country must be identified .

Regional Benefit Valuation: Environment

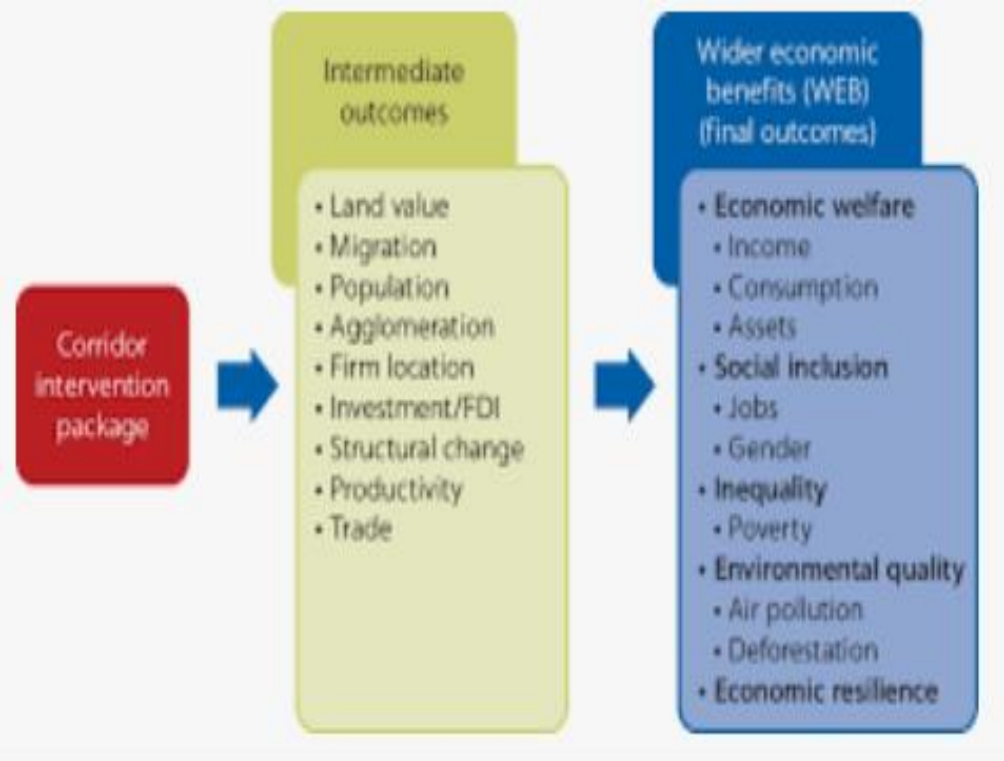
- Environmental valuation is important and a difficult issue and in practice short-cut approach involves transferring values from one study site to another and applying these transferred values in particular appraisal
- If carbon sequestration/CO2 emission reduction is valued at a standard price (ADB 2017 recommended $36/ton at 2016 prices rising annually at 2%), a simple procedure for an RCI project which reduces emissions is to allocate value of emissions reduction between participating countries on population basis
- More sophisticated procedure, involves contingent valuation surveys in different countries which involves estimating the willingness to pay for environment, but rarely used.

Practical complications

- Not always possible to quantify and value all of potentially diverse and often intangible effects on different parts of a region
- Where specific cross-border effects benefits can be identified, these should be quantified and included as regional benefits (or costs) alongside the national benefits (or costs)
- Where quantification is not possible, potential regional effects must be explained clearly and judgment made on their significance.
  - If a project is part of sub-regional or regional highway networks, there should be at least qualitative assessment of potential contribution to the ultimate goal of the network and to the outcome indicators used for monitoring and evaluation
- Currently, there are efforts to include wider economic effects for “large projects”

Wider Economic Effects

- All projects have indirect effect on others in the economy.
- In the ADB (2017), these second round or wider effects are rarely included in the economic analysis unless there are clear linkage effects – either backward to project suppliers or forward to processors
- Norm: include cost of inputs of suppliers and benefit from users of processed output in project calculation
- In other circumstances, the omission of wider effects is justified theoretically if no imperfections present in the economy (e.g. no taxation or underemployment)



Wider Regional Effects

AT PRESENT, DIFFICULT TO QUANTIFY WIDER REGIONAL BENEFITS OTHER THAN THROUGH DETAILED MODELLING STUDIES WHICH ARE SUBJECT TO MARGINS OF ERROR

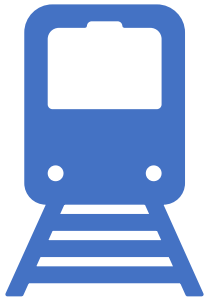
WHERE MODELLING RESULTS AVAILABLE, THESE CAN BE PRESENTED AS COMPLEMENT TO EIRR/ENPV

DRAFT GUIDELINES RECOMMENDS STANDARD ECONOMIC ANALYSIS COMPLEMENTED BY QUALITATIVE DISCUSSION OF POSSIBLE WIDER EFFECTS

SHOULD BUILD ON INITIAL ECONOMIC JUSTIFICATION SECTION OF PROJECT SCORECARD

KEY MECHANISMS – PRODUCTIVITY EFFECTS, INDUCED INVESTMENT, EMPLOYMENT, TRADE

Approaches to estimating wider effects



Use a reduced form equations where relation from literature applied to a project

- link between lower transport costs and higher productivity in urban centres due to agglomeration effects created by higher connectivity

Use of modelling techniques through input-output or spatial general equilibrium models

- Input-output models tend to give high estimates because their multipliers assume unemployed resources with zero opportunity cost
- Spatial models can have stronger theoretical base but highly data-intensive and production side usually very aggregate

Spatial General Equilibrium Models

Economic Impact in the Simulation

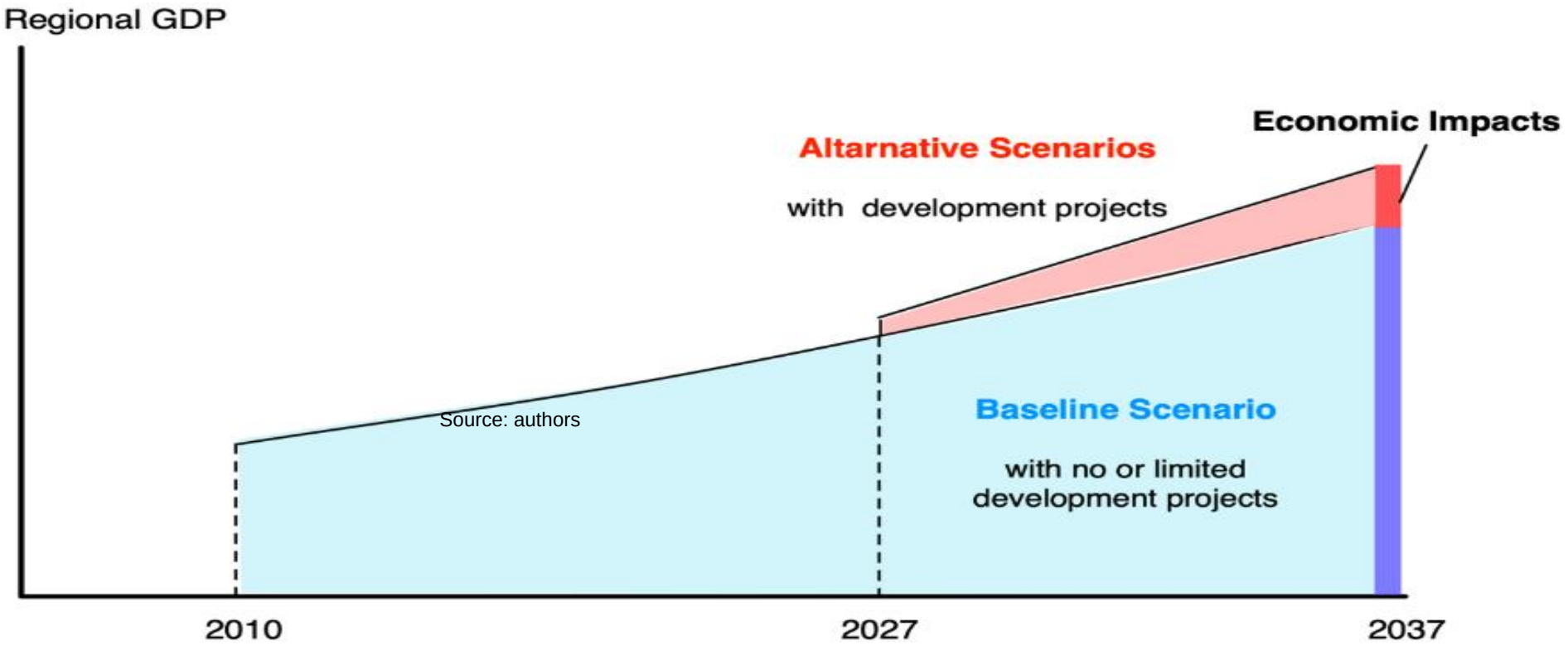


Illustration of Spatial Modelling for RCI

Belt and Road Initiative World Bank study China – Central Asia

- Covers 7 countries, 3 sectors in each and 52 geographic units
- Reductions in travel costs between cells estimated as result of time improvements
- Changes in travel costs stimulate production/consumption changes
- Impacts depend on assumptions on supply response
- Aggregate income change under different scenarios
- Limited supply flexibility 1.9% higher GDP/capita
- With labour mobility and productivity growth through agglomeration 2.7% higher
- With labour mobility, productivity growth and trade facilitation at border 8.8% higher
- Results illustrative not predictions

Modelling: Country Results

Country	Change Income/capita %	
	With Infrastructure Improvement and Supply flexibility	With Infrastructure Improvement and Supply flexibility plus Trade Facilitation
China (3 provinces)	2.4	12.4
Kazakhstan	5.6	7.8
Kyrgyzstan	5.1	17.7
Pakistan	2.7	9.2
Tajikistan	0.9	1.0
Turkmenistan	-0.3	-3.8
Uzbekistan	1.5	6.7
Aggregate	2.7	8.8

Conclusions

- Regional benefit valuation in economic terms – difficult – but not impossible
- Where full quantification not possible, explanation of mechanisms and discussion of expected outcomes required
- Economic Justification Section of Scorecard should be tested
- Evidence from research literature and past projects can be drawn on
- For large projects, fuller analysis of wider economic effects may be justified involving form of model, but results likely to be illustrative not definitive

Thank you.