Real Option Analysis as a Tool for Valuing Investments in Adaptation to Climate Change

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Contribution

• Research Question: To what extent adaptation investment strategies involving real options would be cost-saving?

• Significance
  – Time-varying uncertainty with regard to the climate change and its consequences
  – Disproportional burden on developing countries’ scarce resources
Policy Goal and Strategies

• Goal: Minimize costs of adaptation investment
  – Capital expenditure and operation cost
  – Expected value of the residual damage

• Strategies analyzed for two cities:
  – A once-and-for-all decision (not a real option)
  – Two flexible real options with different information sets

• The comparison depends upon the tradeoff between the present and future:
  – Whether reductions in economic damages and population impacts are sufficient to offset investments
Discounting: Valuing the Tradeoff between the Future and Present

*The paper uses a constant interest rate, 3%.*

Weitzman (2007):

“It is not an exaggeration to say that the biggest uncertainty of all in the economics of climate change is the uncertainty about which interest rate to use for discounting.”
The Discounting Rate

• What is the proper discount rate to use?
  – Stern (2006)
  – Weitzman (2007)

• Uncertainty in future interest rates leads to higher valuation of future benefits (costs)
  – Santoro and Wei (2011)

• Are the planners really risk neutral? Are there risk premiums for the real options?
Suggestions and Conclusion

• Suggestions
  – Sensitivity analysis with different interest rates
  – Randomize the interest rate as Newell and Pizer (2002)
  – Assume possible correlation between the interest rate and coastal flooding

• In all,
  – Challenging topic
  – Carefully executed analysis