cpb

RMNO Conference

Risk and time in SCBA's: a practioners view

Prof dr Casper van Ewijk

CPB / University of Amsterdam

Scheveningen
January 17, 2008

CPB: Many different areas

SBCA's in the Netherlands

- SCBC's for (almost) all major public projects
- performed by CPB and other research institutes
- advice by high level committee
- common guidelines
  - "OEI" ("Analysis Effects Infrastructure") = the Dutch "Green book" (CPB et al. 2000, 2004)

Process of SCBA

- 1. quick scan / full SCBA
- 2. careful project definition
  - relative to best alternative !
- 3. critical assesment of inputs
  - lots of common sense
- SCBA:
  - net present value
  - valuation of (environmental) externalities if possible
  - if not: reporting of effects
  - uncertainty about assumptions:
    => sensitivity analysis / scenario’s

Risk and time in official guidelines

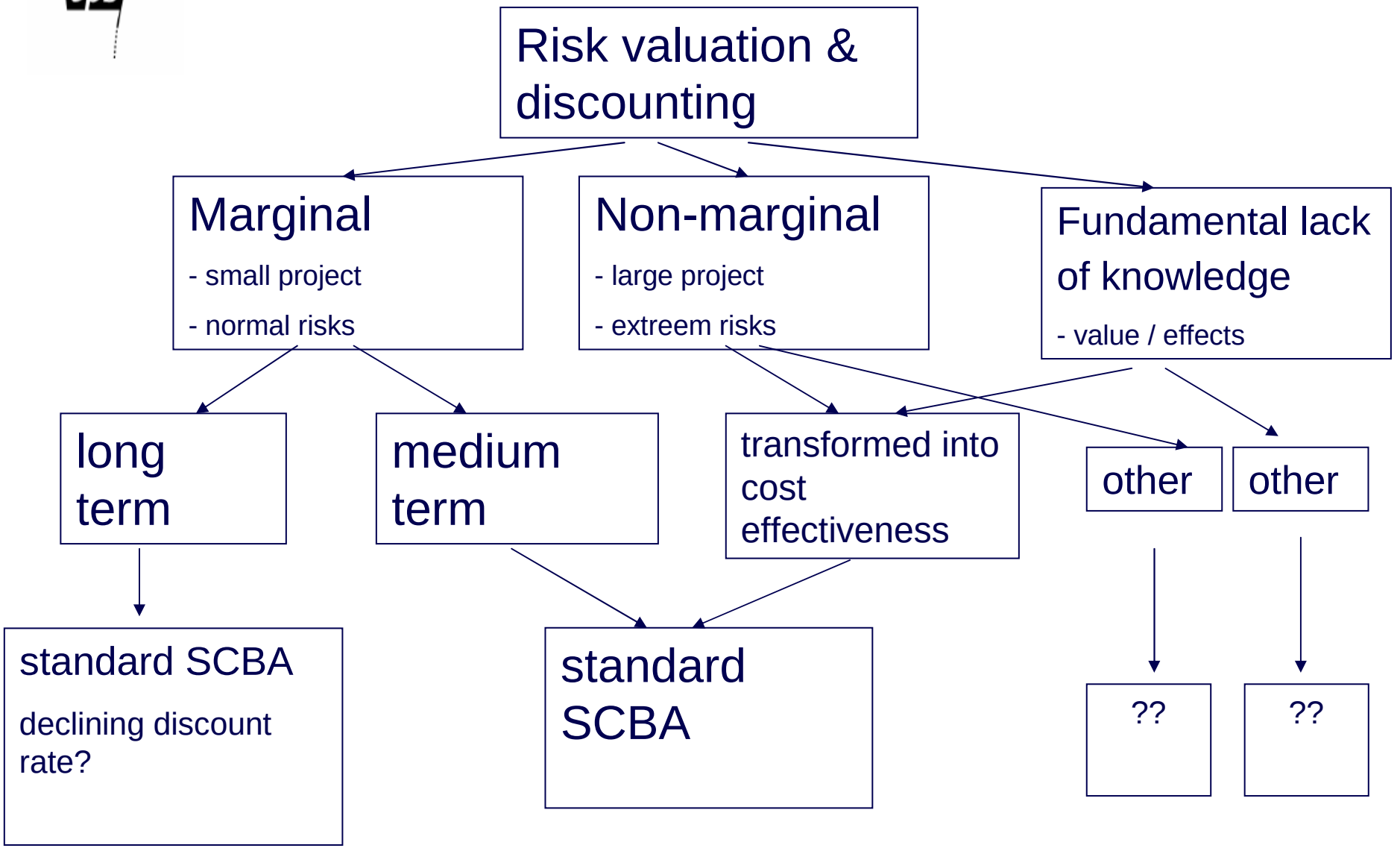
- discount rate
  - real risk free rate 2.5% (revised in 2007)
- valuation of risk
  - so far, focus on infrastructure projects
  - aim at market value
  - risk valuation preferably project specific
  - focus on non-diversifiable risk
    - observed required rates of return
    - or covariance with market risk => beta's
    - default: risk premium on top of discount rate 3%

Environmental SCBA's

- *Can* be different in a number respects
  - non-marginal impact
    - e.g. climate change
  - type of risks
    - non-marginal risks: catastrophies / fat tails
  - difficulty in valuation (e.g. bio diversity)
    - an a fortiori the risk characteristics of this value
  - long time horizon

- *but not necessarily so*
  - most environmental evaluation fits in standard approach
  - often possible to transform problem into cost-effectiveness problem
    - that is: given particular environmental constraints
    - e.g. SCBA of windmills given Kyoto targets

Decision tree SCBA (first glance)



Getting concepts straight (I)

- discount rate
  - in **marginal** analysis (*finance literature*)
    - risk free rate (term structure)
    - applied to certainty equivalent in consumption terms C(t)
      - so, after accounting for the value of risk
      - and after accounting for changes in relative prices
  - in **non-marginal** analysis (*environmental literature*: climate change)
    - “the” discount rate does not exist (endogenous)

Getting concepts straight (II)

- valuation of risk
  - distinct from discounting time
  - distinguish:
    - diversifiable risks => no value
    - non-diversifiable risks => positive / negative value

- different issue: option value
  - irreversibility (e.g. due to sunk costs)
  - NPV no longer proper investment criterion (Pyndick & Dixit)

Non-marginal analysis

- "The" discount rate does not exist in non-marginal analysis
  - Ramsey rule $$r(C_t) = \delta + \eta(C_t) g(C_t)$$

    is state (C(t)) specific

    => general equilibrium analysis
    state contingent (Arrow Debreu) prices

- issues:
  - empirical basis for modeling: what preferences?
    - no information if far from actual realizations
    - standard model fails: equity premium puzzle
    - -> Epstein-Zin preferences?
  - how to take account of fat tails / small risks large consequences (Stern, Weitzman)

Marginal analysis (I)

- Given (market) prices

  - discount rate = risk free rate of return

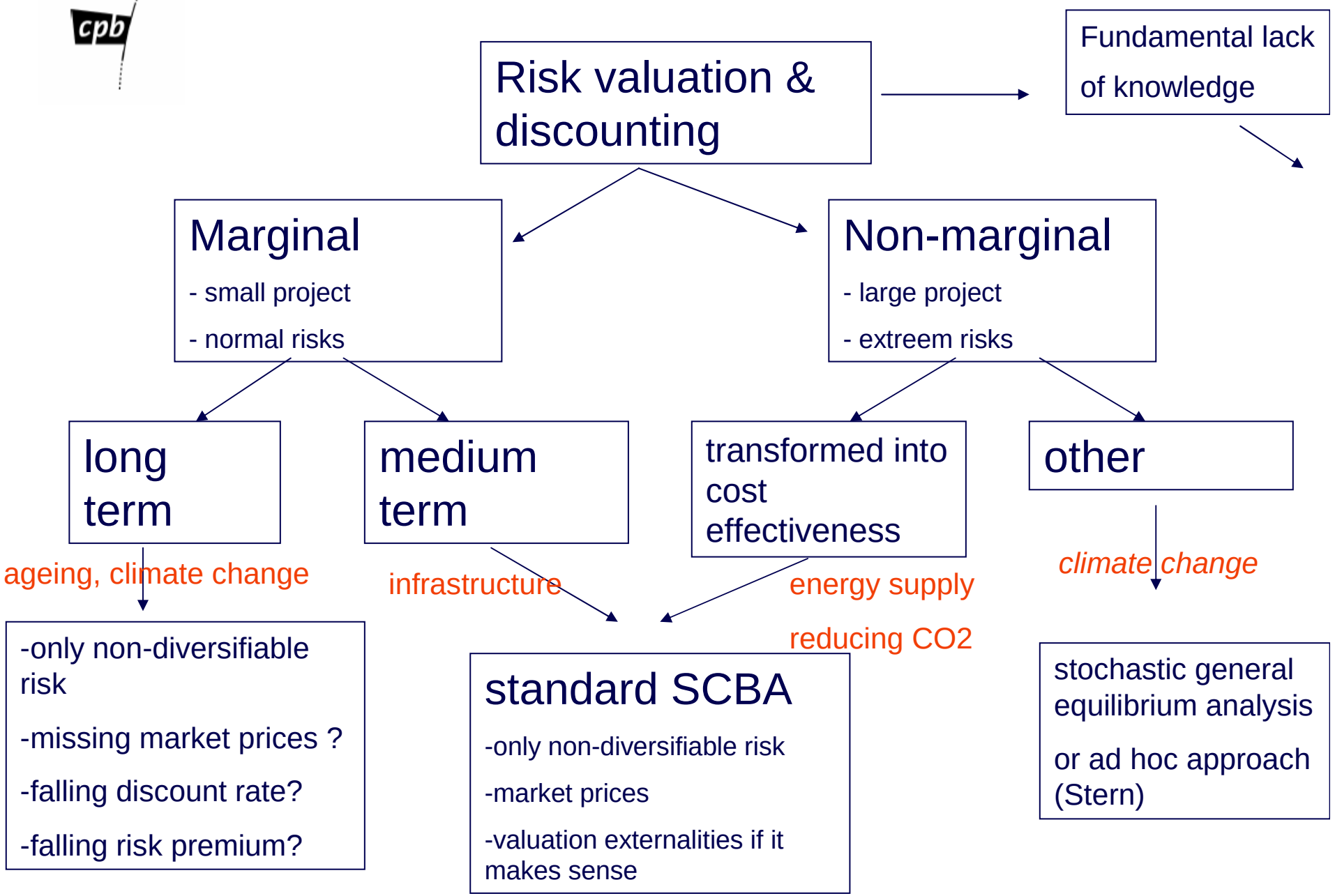
  - risk valuation
    - only non-diversifiable risk
    - (C)CAPM model: beta's
    - applies to value of (environmental) externalities as well

  - in specific cases:
    - time invariant premium on risk free discount rate: $d = r + \pi$
    - only for rising (co)variance over time
      - basis: random process in C, and therefore U'(C)

Marginal analysis (II)

- Issues
  - capital market distortion (equity premium puzzle) ?
    - mixed evidence
    - *note: more public investment is not (first best) solution*
  - sub-optimal intergenerational distribution (policy failure) ?
    - no evidence
    - *note: more public investment is not (first best) solution*
  - is uncertainty about proper discount rate reason for lower rate? (Weitzman)
    - not if it is only Jensen's inequality.....
  - term structure of risk free rate
    - missing or thin markets for long time horizon
    - falling risk free rate for distant future?
      - e.g. due to ageing or declining growth
  - term structure of the risk premium
    - falling over long time horizon?

Decision tree SCBA



Conclusions

- Aart's proposition

  on social discount rate being superior to (social) discount rate based on market prices is far to general, and therefore wrong.

- Different prices for environmental evaluation ?
  - no
    - one price for time and risk (as for labour, bricks,....)
    - necessary condition for efficiency
  - but do take account of specific risk and time features of environmental processes