

# The “Stern Review” & Its Critics

## Implications for the Theory & Practice of BCA

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# Outline of Paper

- Summarizes Stern Review and its findings
- Summarizes criticisms of Stern Review
- Discusses implications for BCA theory and practice

# What the Stern Review Does

- Assesses costs and benefits of climate change to 2200 (presuming BAU)
- Assesses costs and benefits of GHG mitigation/climate stabilization
- Discusses policy options

*(All this in only 600 pages!)*

# The Stern Review's Model

## ● PAGE2002 IAM

- Designed to assess not only mean expected values of harm but “high harm” scenarios to 2200
- 79 random variables in Monte Carlo analysis
  - Including large-scale discontinuities
- Inputs based on IPCC TAR
- Assumptions (values for Ramsey equation)
  - $\rho = 0.1\%$ ,  $\eta = 1$ ,  $g = 1.3\%$ ,  $r = 1.4\%$

# The Stern Review's Findings

- Cut emissions 25% by 2050 to stabilize global climate at 500-550 ppm CO<sub>2</sub>eq
  - Cost: 1% of global annual GDP (≈ \$1 trillion/year) “forever”
  - Benefits (costs of climate change avoided): 5% of global GDP “forever”
- Recommended policies: Increase price of carbon by taxes or tradable quotas

# Controversial Aspects of Stern Review

(1) Damage estimates greatly exceed those of other BCAs

- E.g., Nordhaus & Boyer (2000); Mendelsohn et al. (1998); Tol (2002)

(2) Recommends earlier and more extreme cuts in GHG emissions

(3) Underlying (1) and (2): exceptionally low discount rate

# Critiques of the Stern Review

## ● The Critics

- Nordhaus, Tol, Yohe, Mendelsohn, Dasgupta and Weitzman

## ● The Critiques

- problems in damage estimates
- $\rho = 0.1\%$  is too low
- $\eta = 1$  is too low
- $r = 1.4\%$  is too low
- What about the  $g$ ?

# Problems with Stern's Damage Estimates

- 3 standard deviations higher than earlier estimates (Yohe & Tol 2007)
- Assume pessimistic scenarios (Yohe & Tol 2007)
- Do not take adaptation into account (Mendelsohn 2007)
- Assume large nonmarket damages (Mendelsohn 2007)
- Do not specify valuations of human life and other nonmarket effects
- No sensitivity analysis

# Is $\rho = 0.1\%$ Too Low?

- Yes (Nordhaus 2006; Yohe & Tol 2007)
  - Much lower than any other climate change BCA (but see Cline 1992)
  - People observed to use must higher rate (Weitzman 2007)
  - Explains Stern's higher damage estimates
    - At  $\rho = 3\%$  Stern's damage estimate reduced by 80-90%
- No
  - Discounting is generally unethical (Stern 2006; Ramsey 1928)
  - Climate change is special case
    - Potential for reductions in consumption (Dasgupta 2006; 1999)
    - Like foreign aid (Schelling 2006)

# Is $\eta = 1$ Too Low?

## ● Yes (Dasgupta 2006)

- Even after adjusting for risk, later generations will be much wealthier than current generation
- $\eta = 1$  implies ridiculously high savings rate (97.5%, assuming 4% rate of return on risk-free investments)

## ● No (Quiggin 2006)

- Dasgupta's assumed rate of return on risk-free investments is unreasonably high; 1-2% observed in practice

# It's the $r$ , smarties! (Weitzman 2007)

- It is the combination of  $\rho$ ,  $\eta$ , and  $g$  that matters for the Ramsey equation
  - If  $\rho = 2\%$ ,  $\eta = 2$ , and  $g = 2\%$ , then  $r = 6\%$
  - If  $\rho = 0\%$ ,  $\eta = 3$ , and  $g = 2\%$ , then  $r = 6\%$
- Stern Review's low  $r$  is problematic
  - “[S]trongly against mainstream economics”
  - Ignores how people are observed to behave
  - Paternalistic: imposes analyst's own values
- Stern's  $r$  may end up being “more right than wrong”
  - Uncertainty over  $r$  is the “most important uncertainty in the economics of climate change”
    - Long-run uncertainty could reduce value of  $r$  from  $\approx 6\%$  to  $\approx 2\%$  (close to Stern figure)

# Or, Is It the $g$ ? (Weitzman 2007)

- Climate change damages may not correlate well with aggregate economic activity
- Low probability, high temperature increases could lead to “low- $g$ ” disasters
  - Knightian uncertainty: we don’t know how much we don’t know about “tail probabilities”
- Weitzman recommends combining gradualism of Nordhaus with more study of the “low- $g$ ” events on which predominate Stern’s (2006) analysis

# Implications for Practice

- Special problems for BCAs at the frontiers of scientific knowledge and economic understanding
- The political nature of BCAs and the importance of sensitivity analyses
- The eternal issue: discounting
- Issues in Damage Estimation
  - The importance of transparent nonmarket (including human life) valuations
  - Taking seriously expected damages beyond the mean
- BCA as a dynamic, interactive process

# Of Confidence and Caveats

- *Ex ante* BCAs about climate change are bound to be wrong
  - Long time horizons, incomplete scientific information, high uncertainty
- Stern (2006) overly confident of relatively radical conclusions and recommendations
- BCA authors should be parsimonious about conclusions and recommendations
  - The greater the uncertainties, the greater should be the modesty of conclusions

# The Politics of BCAs

- Stern (2006) was as much a political document as an economic analysis
- But all BCAs are (more or less) political
  - Subjective elements (e.g., parameter values) inevitably informed by author's political or ideological predilections
- Emphasizes importance of sensitivity analyses
  - Stern (2006) initially failed to include one

# On Discounting

- The choice of parameter values greatly influences the outcome of BCAs (Duh!)
  - Choice of  $\rho$  alone is not critical;  $r$  is what counts
- No consensus on a “best practice” for choice of discount rate (Portney & Weyant 1999)

Pro discounting	Anti discounting
<ul style="list-style-type: none"><li>• People do it</li><li>• It is “conventional”</li><li>• BCA authors shouldn’t impose their own values</li></ul>	<ul style="list-style-type: none"><li>• It is unethical</li><li>• BCA authors cannot avoid imposing their own values</li><li>• Climate change is special case</li></ul>

# Even If Climate Change is a “Special Case”

- Stern wrongly ignored HM Treasury’s discounting schedule (*Green Book*)
  - Consequences
    - creates impression that something fishy is going on
    - unjustifiably erodes authority of policymakers
  - Options
    - use *Green Book* values in alternative calculations
    - explain why *Green Book* values are inappropriate for the case of climate change

# Toward a “Best Practice” of Calculating under Alternative Discount Rates

- Becoming common in US regulatory analyses
- Same effect from independent BCAs on same issue using different discount rates
  - e.g., Nordhaus & Boyer (2000) v. Stern (2006)
  - The “marketplace” of BCAs
  - But Stern (2006) carries inordinate weight
    - imprimatur of the UK government
    - Stern was policy-maker

# Estimating Damages

- BCA damage estimates must be based on
  - Transparent and calculable valuations
  - Consistently applied parameter values
- Problems with Stern Review's damage estimates
  - No way to assess accuracy of damage estimates
  - Calculations can't be replicated
- Low-probability, high-value events at the tails of damage distribution curves should be treated seriously (Weitzman 2007)

# BCA as a Dynamic, Iterative Process

- No BCA is an island; all *ex ante* economic analyses are provisional
- The importance of engaging and responding to critics
  - Stern added sensitivity analysis as postscript
  - Stern welcomed disputation
- Stern: “one contribution to [a] discussion”

# Conclusion

- “We must be transparent and clear. If you take little account of the interests of future generations you will care little about climate change. But ethical positions cannot be dictated by policy analysts...”  
(Stern 2006, postscript)
- Every [BCA] is an exercise in subjective uncertainty. If, as the *Stern Review* puts it, ‘climate change is the greatest externality the world has ever seen,’ then a cost-benefit calculation of what to do about it is the greatest exercise in Bayesian decision theory that we economists have ever performed” (Weitzman 2007)