



NEW ZEALAND INSTITUTE FOR THE STUDY
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ECONOMICS AND THE ENVIRONMENT: SAVE THE PLANET OR LET IT BURN?

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CBA in Environmental Policy

- Cost-benefit tools increasingly used in policy analysis (in UK Green Book, BRE)
- General observations but with illustrations based on “*Stern Review of the Economics of Climate Change*”
- Professor Nick Stern
 - Professor of Economics in London
 - Chief Economist & Senior VP at World Bank
 - Head of HM Government Economic Service
 - FBA etc. etc. ... and very clever guy
- Published by HM Treasury October 2006, high profile

- “The Stern Report should be seen across the globe as the *final word* on why the world must act now to limit the damage we are doing to our planet” (Tony Blair, 2006)
- ... but mixed reception from informed readership
- Serious and influential piece of work on an important topic – deserves scrutiny
- Which are economic questions, which aren't.

What did the Stern team do?

- Global focus. Makes particular (a) scientific and (b) economic assumptions, then cranks numbers.
- Result: Effort now to stabilise CO₂ at 550ppm would be highly cost-effective (increase NPV)
- But important distributional issues - *within* (Bangladesh vs. NZ) and *across* generations

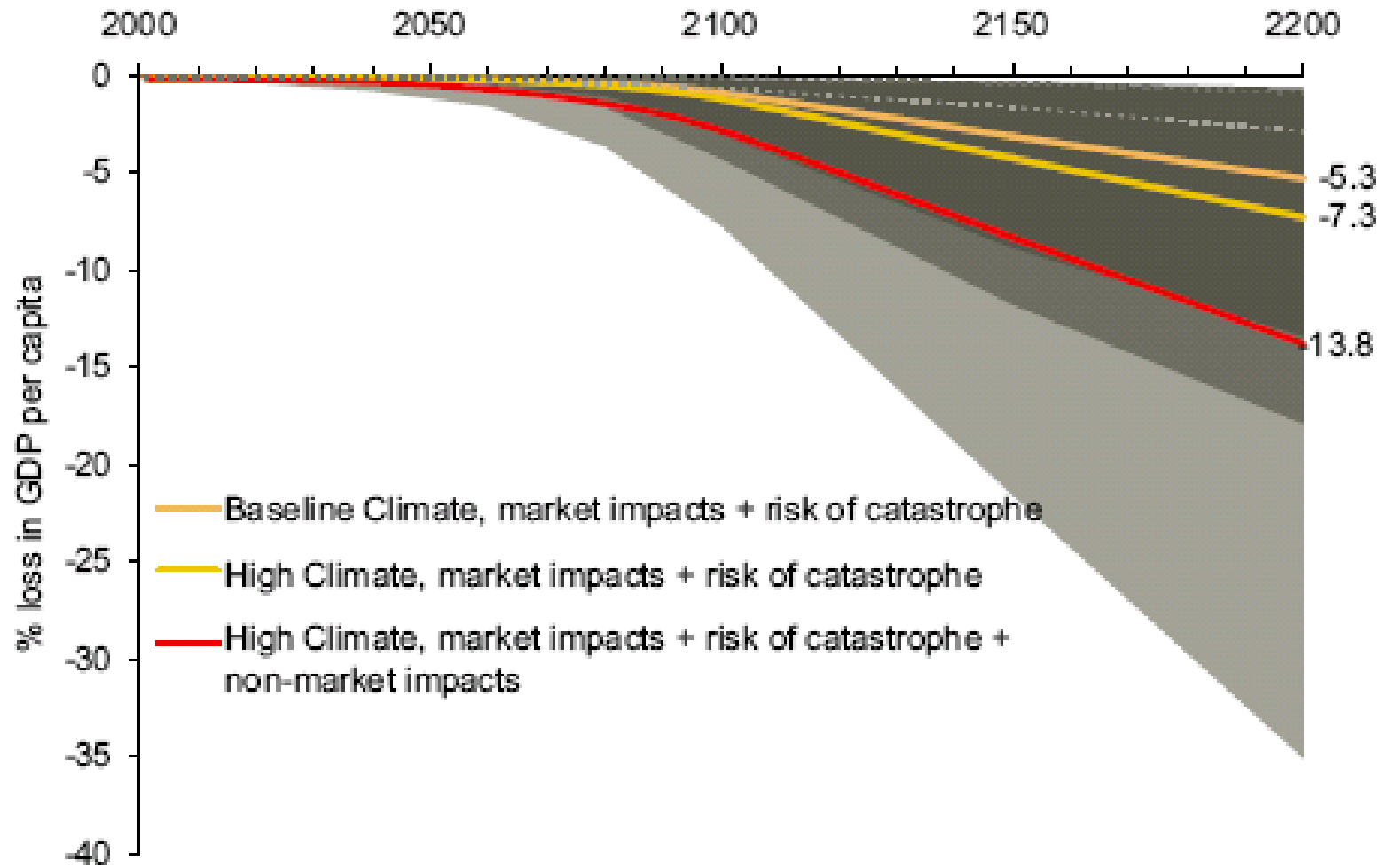
Conceptual steps ...

- How do we get at a NPV of policy and draw Stern-type conclusions?
 - ❖ Step 1: Generate climate-adjusted GDP time series (include non-market benefits)
 - ❖ Step 2: Turn that into utility time series
 - ❖ Step 3: Turn utility time series into NPV

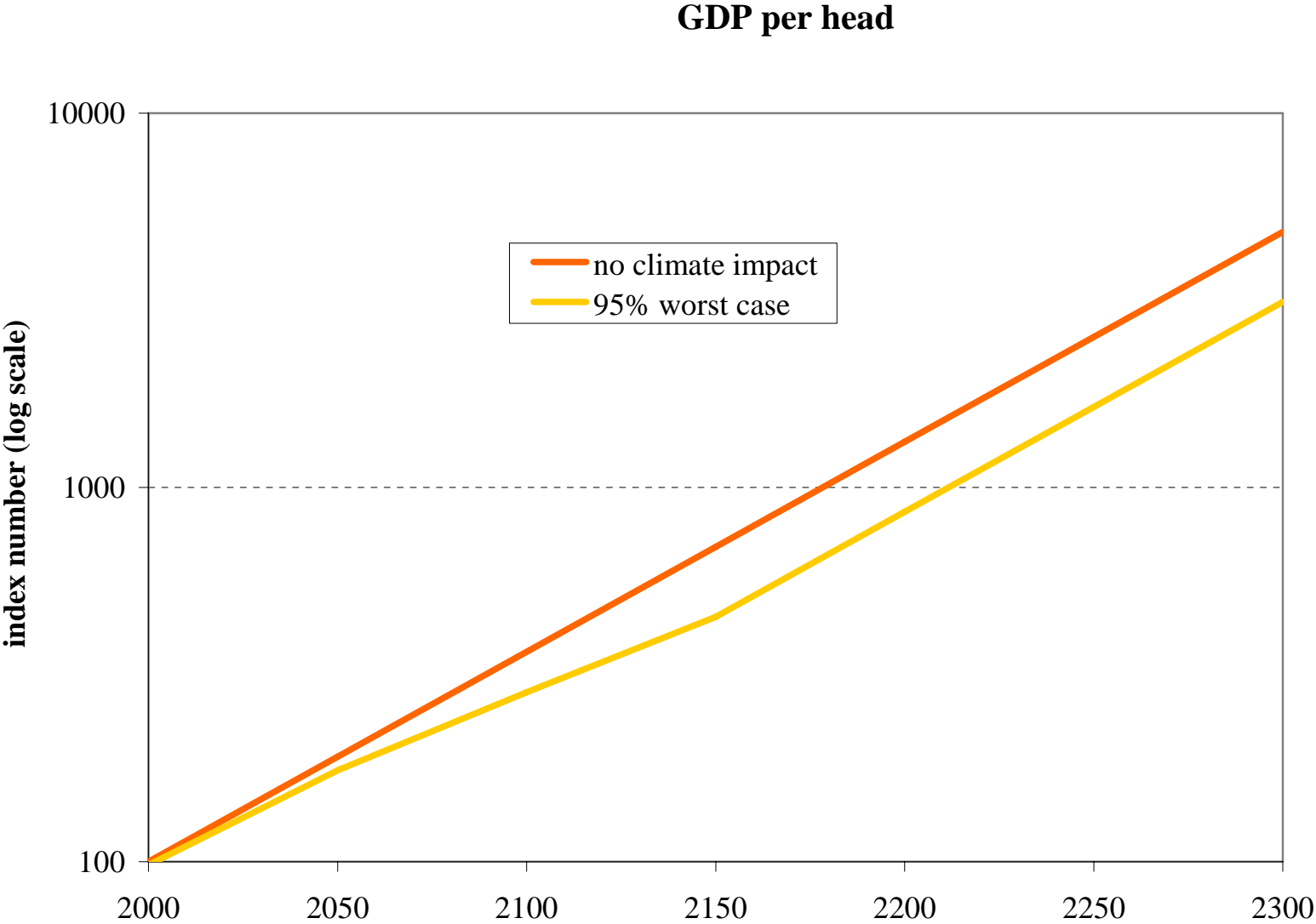
Step 1 ...

- Uses an 'IAM' called PAGE-2002 to predict adjusted GDP time series with and without climate change
- Anthony - show me on a single slide what Stern says GW will do to the planet if unabated

5%-95% confidence range of impacts



But in terms of levels (Newberry) ...



- Suddenly – in terms of GDP flows - the ‘worst case’ (95%) scenario doesn’t look so bad.
- But still not sufficient for drawing policy conclusions - welfare
- Let’s move to Step 2 ...

Turning £ into 'utility'

- PAGE-2002 maps emissions paths into GDP paths (including non-market costs and benefits)
- Stern (and debate in general) emphasises uncertainty in the science
- Translating GDP into utility seems difficult, fraught with uncertainty ... right?

Wrong !

- Utility function is

$$U = \log \text{£}$$

- Not necessarily a bad utility function – lack of sensitivity analysis (in original) major omission
- Implies equity weights that many don't like – puts too much weight on rich: question of taste.
- Rule of thumb: if you double income you halve the welfare impact of a given financial burden

Step 3: Discounting

- Rate at which we trade off current and future - low discount rate, higher weight on the future
- Private firms use 'market rate'. In policy design there are good reasons not to.
- Choice **critical** in current setting because of long time horizons. Graphs above went to 2200 - \$1m discounted at say 9% becomes ...
- \$0.006

Nordhaus (2007)

- “...the *Review*'s radical revisions arise because of an extreme assumption about discounting.”
- NZ Treasury says use 10% in its 'Primer on CBA' - though it acknowledges diversity and problems in LR
- So what is the 'right' discount rate?

Getting economists to agree isn't easy ... (Weitzman, AER 2001)

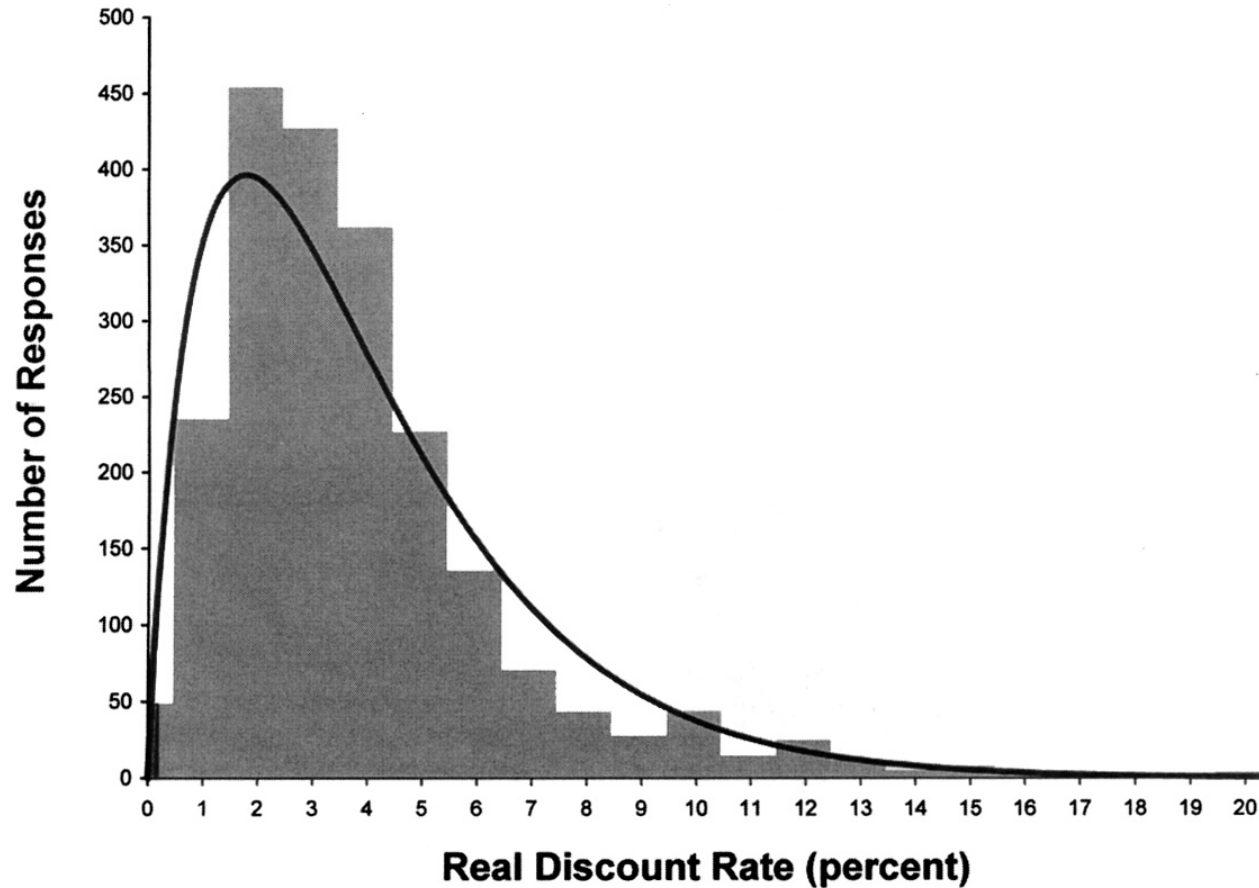


FIGURE 1. ACTUAL (HISTOGRAM) AND FITTED (CURVE) FREQUENCY DISTRIBUTIONS

- Weitzman argues dispersion makes the case for hyperbolic discounting (Green Book)
- As a minimum there is lots of doubt and credible policy analysis needs to be aware of that – lack of sensitivity analysis again.
- But let's think about Stern's choices ...

Time for a little Greek ...

$$\text{Social discount rate} = \delta + \eta g$$

- δ 'pure rate of time preference', η 'income elasticity of marginal utility', g growth rate of per capita consumption
- Stern uses $\delta = 0.1$; $\eta = 1$; $g = 1.3 \rightarrow r = 1.4$
- Lower than normally used – and note 'industry' view
- Higher discount rate reduces appeal of climate policy

So what if we used a higher rate?

- Weitzman (2007) reckons that over a long horizon “most economists would settle for a “trio of two’s”, that is $\delta = 2$, $\eta = 2$; $g = 2$ ”.
- This gives an $r = 6\%$. Do the math on that and the evaluation of damage done in 2100 is *100 times smaller* than that in Stern.
- So what’s going on? Are economists saying we shouldn’t give a damn about future generations?

Ethics of η

- Stern: global per capita income will grow at 1.3% per year → in 2006 \$ will rise from \$8k now to \$94k in 2200.
- So future climatic damages will come out of a much higher level of income (remember earlier chart).
- Stern's high-damage case generates a 14% decline in consumption in 2200 so per capita consumption would grow from \$8k today to only \$81k in 2200.
- **QUESTION:** How much should we sacrifice now to improve situation of later generations?

Answer ... ?

- *This is an ethical* question around **inter-**generational equity, not an economic one.
- Answer is about societal taste, not expert judgement
- Utility function embodies (as η) a particular ethical view – one to which you may or may not subscribe.

Dasgupta (2007)

Are the numbers taken in the Review to reflect the two ethical parameters compelling?

I have little problem with the figure of 0.1 for δ – though many economists would.

The figure adopted for η , the ethical parameter reflecting inequality in human well-being, is *deeply unsatisfactory*. To assume that $\eta=1$ is to say that the distribution of well-being among people doesn't matter much - we should spend huge amounts for later generations even if they are expected to be much better off than us.

Ethics and the Decision Criterion

- Conclusion from Stern is based on NPV: NPV raised, but also redistributes poor to rich.
- Another ethical stance: each generation should leave at least as much total societal capital (tangible, natural, technological) as it inherited.
- Another: Rawlsian - maximize the well-being of the poorest generation.
- Which is “right”? Taste – not expertise.

What of **intra**-generational ethics?

- Distribution of impact **within** may drive taste for dramatic action - GW will hit Bangladesh, Africa etc hardest
- One way to 'help' is to manipulate global climate but there are other more direct, and perhaps much cheaper, things to do: reduce disease impact (sanitation programs), crop vulnerability (diversification)
- “The problem is poverty, not climate” (Newsweek 2007)
- Mixture of abatement vs. adaptation needs more thought

Policy Instruments

- Stern: face carbon users with “price”
- Tax vs. permits equivalent in terms of behaviour – though not distribution – good reasons for preferring tax
- *“My ambition is to build a global carbon market, founded on the EU Emissions Trading Scheme and centred in London”* (Gordon Brown, 12 March 2007)

What price a tonne of CO₂?

- ToI/OECD (2005) meta-analysis – “unlikely to exceed 15 USD”
- Pearce (2003) meta-analysis – 2 to 15
- Nordhaus/DICE – 4
- ETS Futures – 15 to 20
- NZ proposals (15 NZD) – 10
- **Stern – 85 USD: very much an outlier**

Evaluation

- Stern has raised profile of CBA of climate change policy – big contribution
- Stern CBA has “issues”
- But this isn’t (a) to deny global warming nor, (b), to say nothing should be done about it
- Consensus view from the rest of the literature points to a “ramping up” of policy and more of a mix of adaptation and abatement than Stern

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