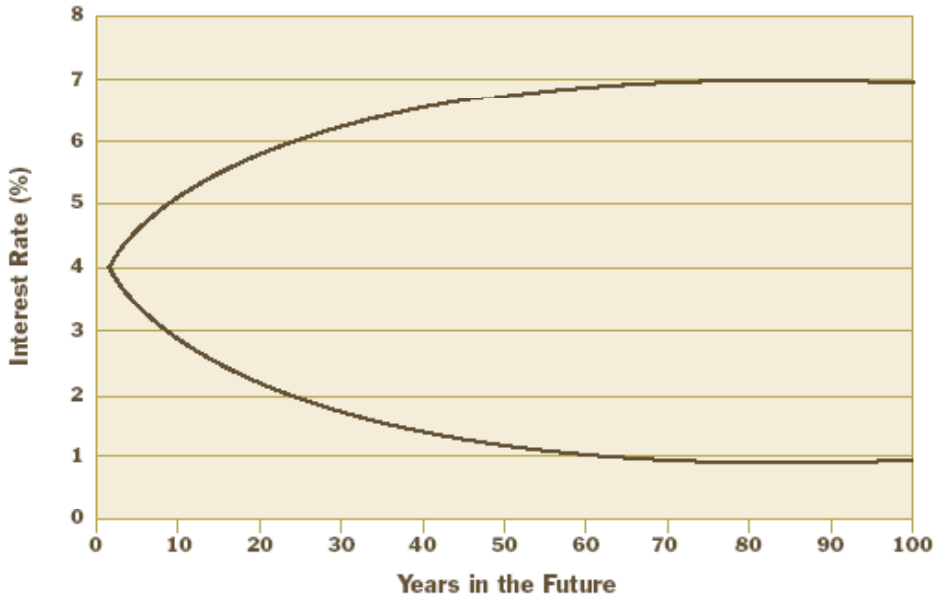
Uncertainty and Discounting

Uncertainty and Discounting

- Assume the real rate of interest/productivity is uncertain
  (Few risk-free investments beyond say 30 years exist)
- Find the certainty equivalent discount rate to evaluate costs and benefits of climate policy

Example:

- Current rate of 4% can rise to 7% or decline to 1% over the next 100 years



Source:
Newell, R. and W. Pizer (2001), "Discounting the benefits of climate change mitigation: How much do uncertain rates increase valuation", PEW center, Economics technical series.

Uncertainty and Discounting

In 100 years

- ***$100*** is worth ***$20.28*** (lower path) or ***$0.20*** (higher path)
- Assume they are equally likely: Expected value: ***$10.24***

In 101 years

- ***$100*** is worth ***$20.28/1.01=$20.08*** (low path) or ***$0.20/1.07=0.19*** (high path)
- Expected value: ***$10.13=0.5 $20.08 + 0.5 $0.19***

Effective certainty equivalent discount rate

- ***$10.24 / $10.13 = 1.01 = 1+r*** [equivalent to ***$10.13 = $10.24/(1+r)***]
- Effective Discount rate ***r=1%*** is determined by smaller discount rate
- Reason: large discount rate heavily discounts future benefits such that it adds little to the expected value

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- British Green Book prescribes for evaluation of long term cost and benefits declining ('hyperbolic') discount rates:

TABLE 6.1: THE DECLINING LONG TERM DISCOUNT RATE

Period of years	0–30	31–75	76–125	126–200	201–300	301+
Discount rate	3.5%	3.0%	2.5%	2.0%	1.5%	1.0%

stating that "The main rationale for declining long-term discount rates results from uncertainty about the future. "

Source: HM Treasury (2003), The Green Book – Appraisal and Evaluation in Central Government, HM Treasury, London.

- However, this reasoning on discounting and uncertainty does not take into consideration learning
  -> More complicated! (current research)