Lecture 09

Discounting and Cost Benefit Analysis

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AEM 4510

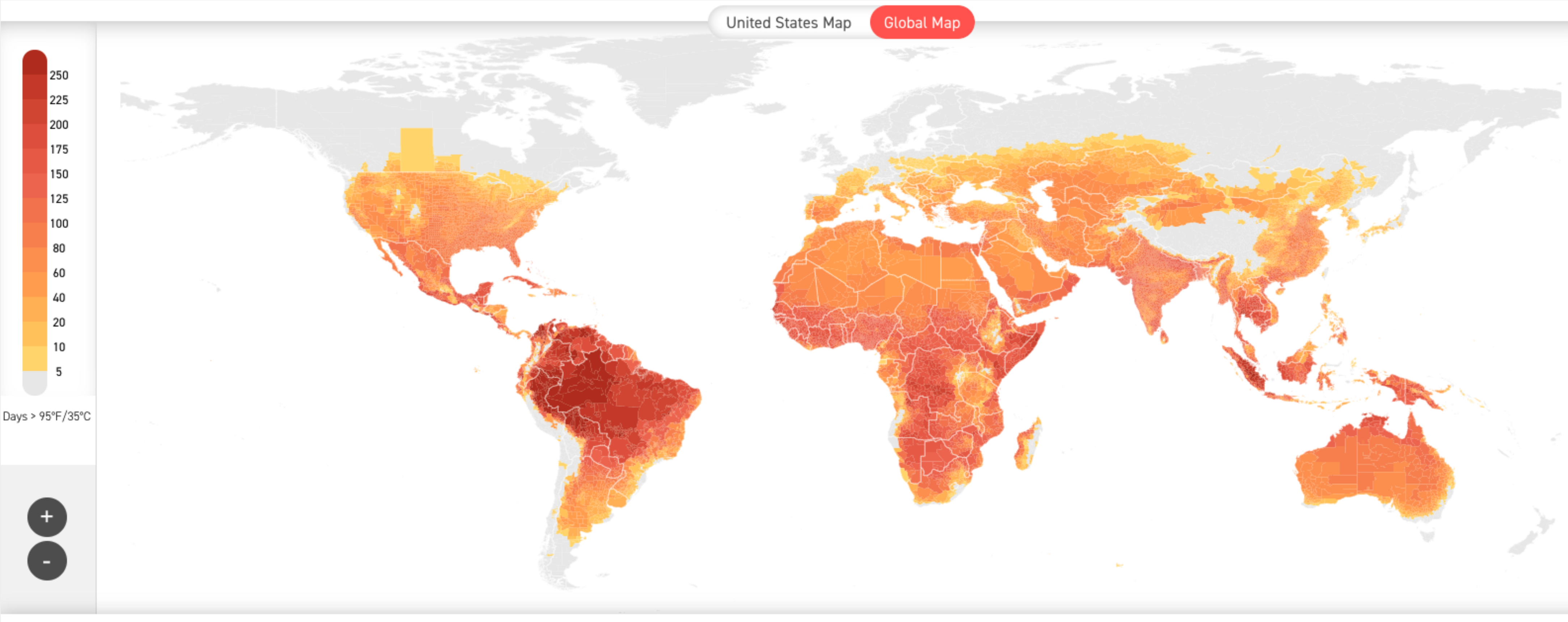
Roadmap

1. What is discounting?
2. What determines the discount rate?
3. What are the implications of discounting on computing the costs and benefits of policies?

Discounting

Motivating discounting: http://impactlab.org/map

At the end of the century we will have much more hot days in some places



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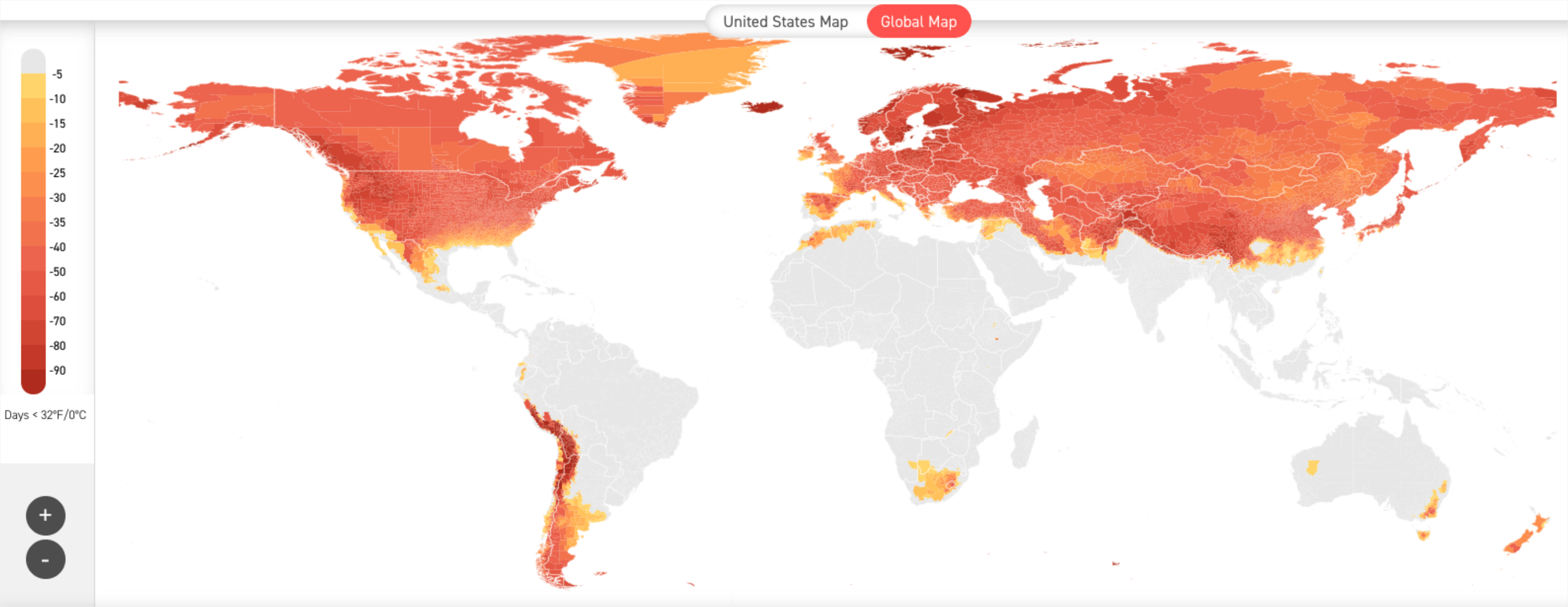

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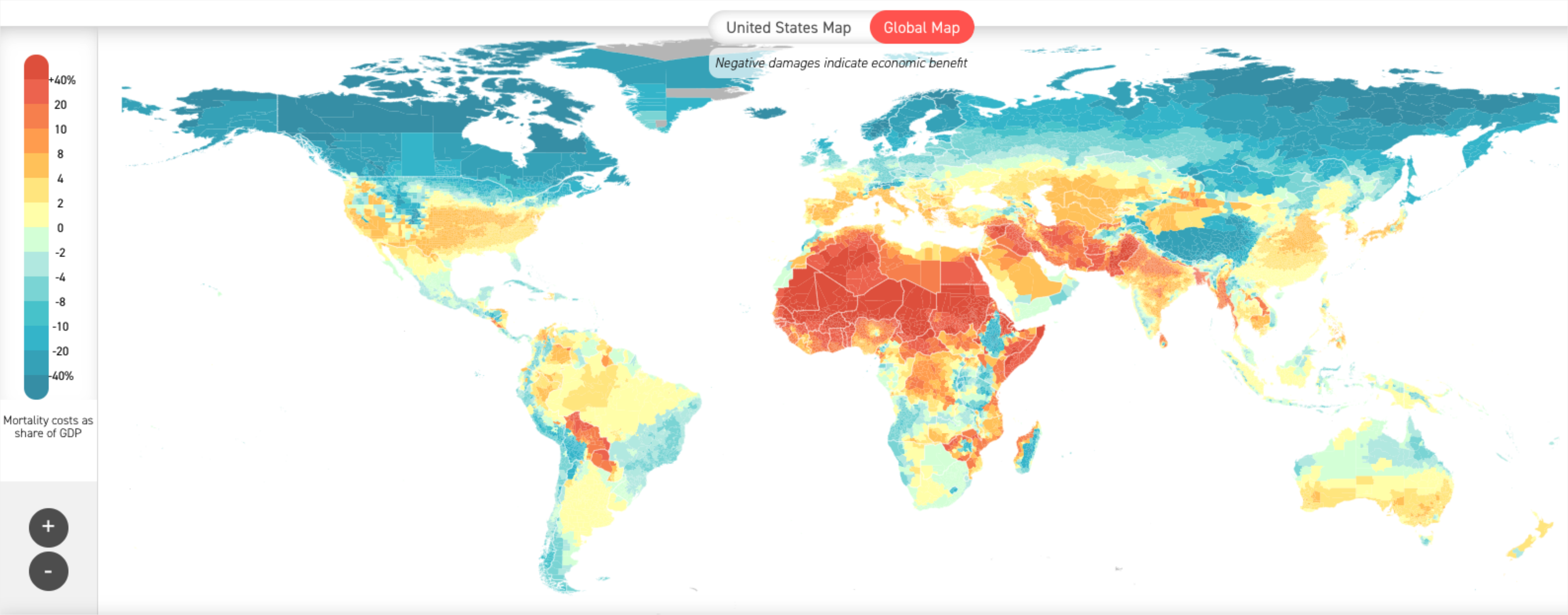
This has massive implications for mortality



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We use a **discount rate:** a value that tells us how much future dollars are worth in today's terms

Return to Manne-Richels

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$$\min_{a_1} E[TC] = \underbrace{\frac{1}{2}a_1^2}_{\text{current cost}} + \beta \left[(1-p) \times \underbrace{0}_{\text{good state cost}} + p \times \underbrace{\frac{1}{2}(1-a_1)^2}_{\text{bad state cost}} \right]$$

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How does discounting affect our decisionmaking?

Discounting and decisionmaking

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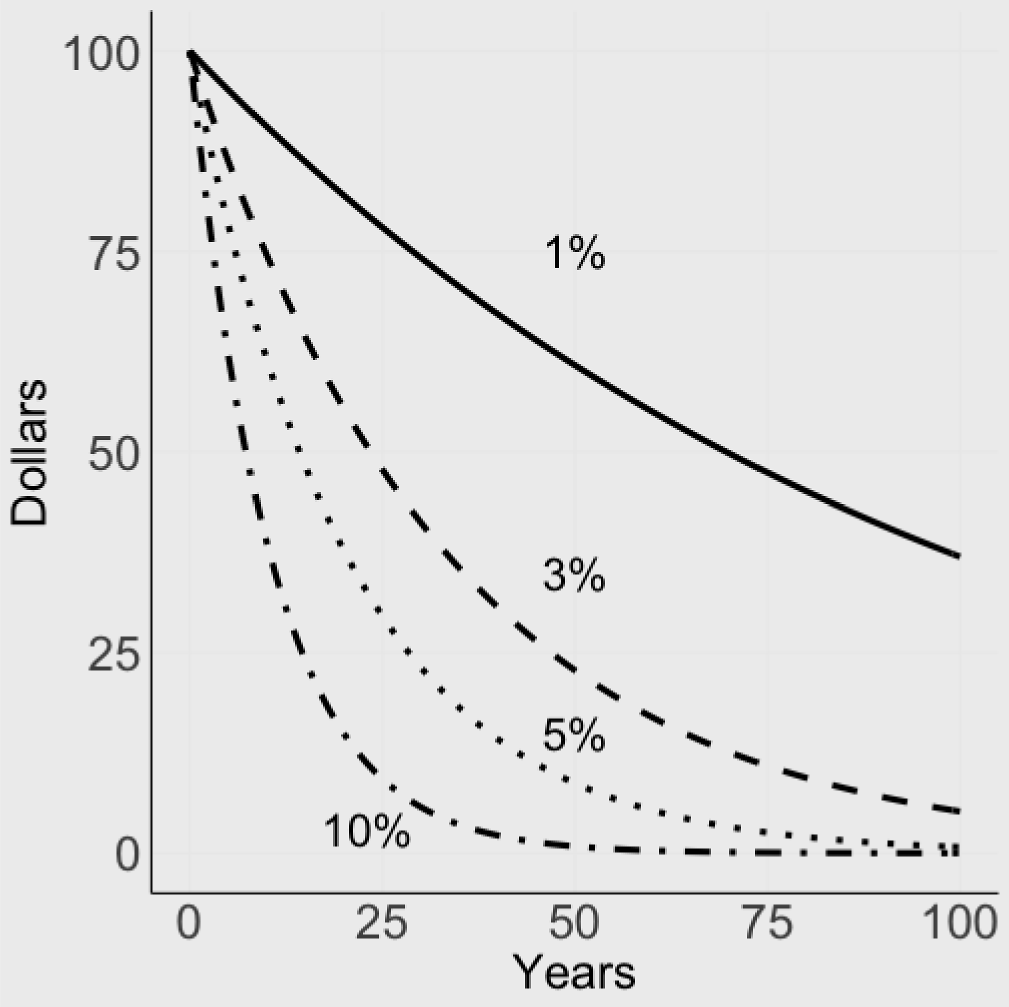
What is the value of a future payment of $100?

PV of $100



Higher discount rates place less value on future benefits

Things > 30 years in the future have basically no value with a 10% discount rate

At a 1% discount rate we value things 100 years in the future at almost half their value today

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Depending on our choice of discount rate these costs and benefits can be substantial or trivial

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This makes the choice of the discount rate one of the most important (and contentious) things about climate change policy

Discounting: how do we choose?

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Why might this not be the rate we want to choose as a regulator?

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Dual-role of individuals: in political roles, people are more concerned about future generations than in their day-to-day behavior which determines the market rate

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And growth: if someone is richer in 10 years, a dollar is worth more to them today than in 10 years in utility terms

Ramsey Discounting

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$$r = \delta + \eta \times g$$

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g is the **growth rate**: how fast does consumption grow over time?

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g: how rich will we / future generations be compared to today?

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Two common approaches: descriptive and prescriptive

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The descriptive approach generally chooses δ so r matches market rates

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That gives us r

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The above arguments are ethical arguments, so are typically used by those favoring the prescriptive approach

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Quick example: $\delta = 2\%, \eta = 2, g = 2\% \rightarrow r = 6\%$

What's the discount rate? Prescriptive

The prescriptive approach often results in δ being zero or nearly zero for the ethical reasons described above

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- η is large: if there is negative growth, we are more likely to invest in the future (future generations will be poorer than today)

Distributive justice

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intergenerational inequality

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More egalitarian perspectives with respect to:

time yields a smaller δ and r

intergenerational inequality yields a larger θ and larger r if growth is positive

What do the experts think? Weitzman (2001)