Hurdle rates, declining discount rates, and uncertain opportunity cost

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The statements, findings, conclusions, and recommendations of this study are those of the author and do not necessarily reflect the views of the Office of Advocacy, the United States Small Business Administration, or the United States Government.

Outline

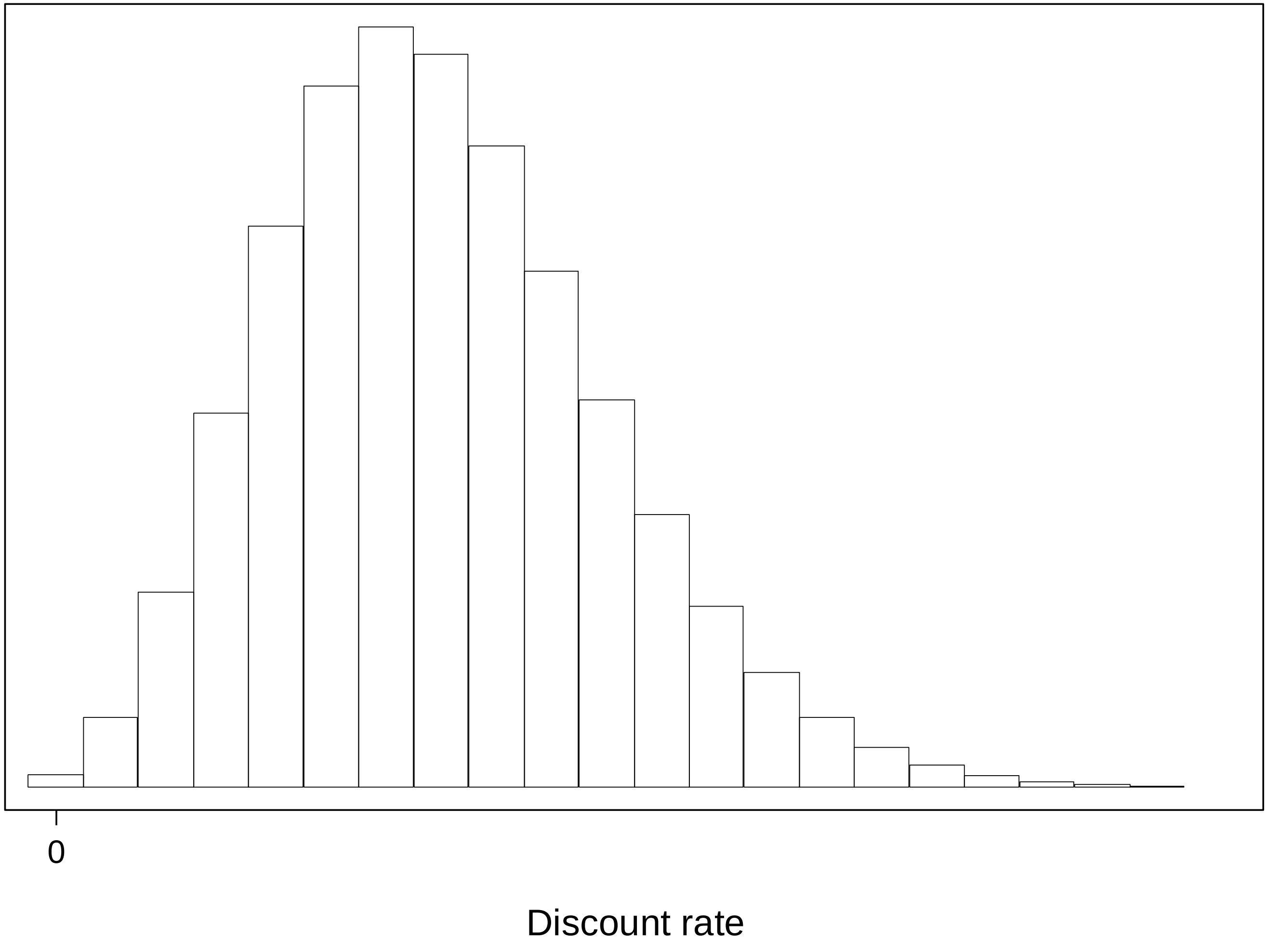
- Uncertain opportunity cost
- Taking an average
- Declining discount rate
- Effect of an outlier
- Hurdle rates
- Implications for expected value
- In practice

Uncertain opportunity cost

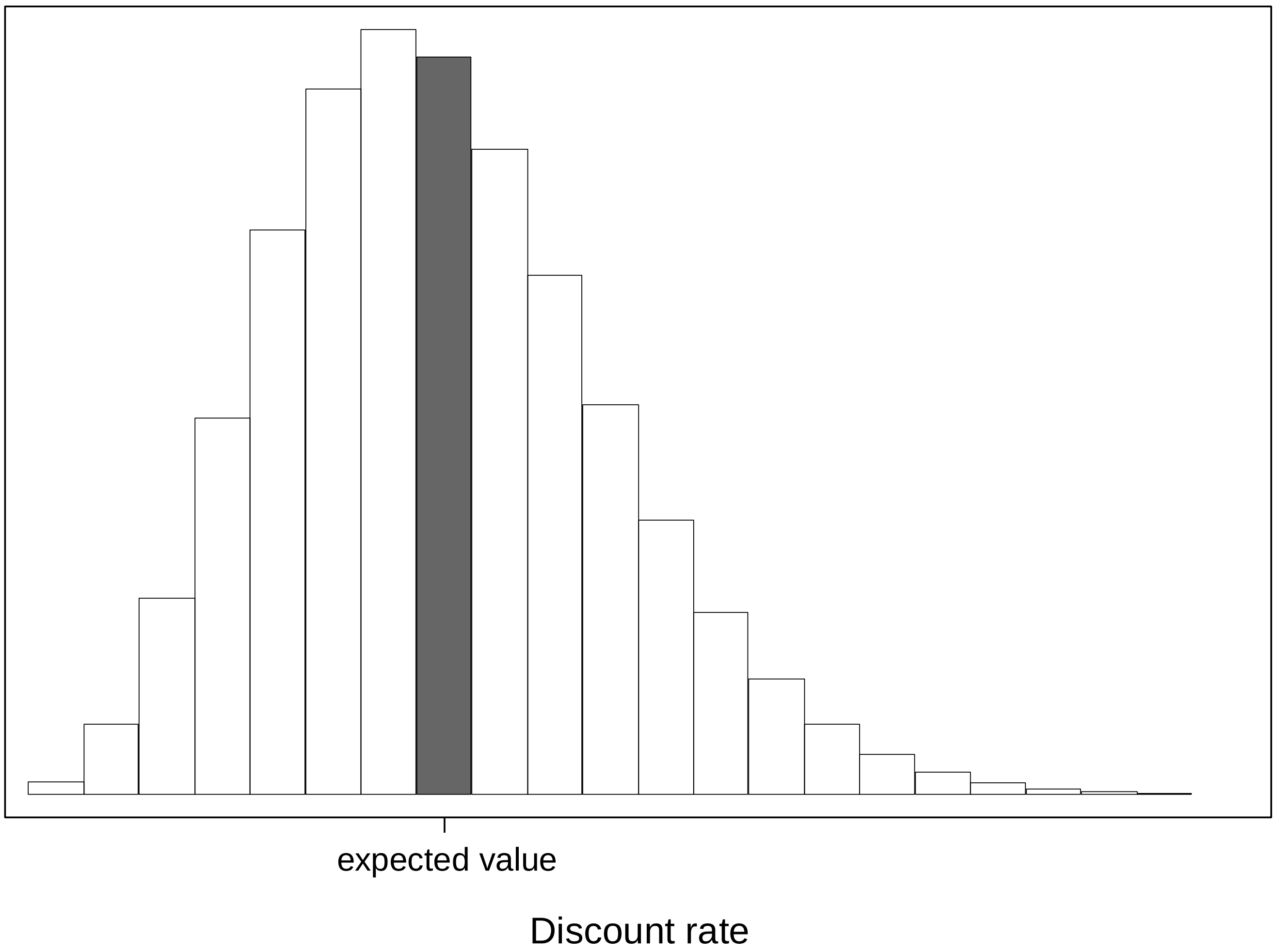
- Policy changes redirect resources from…?
  a) consumption
  b) investment

- In the future, people will be investing in…?
  a) comic books
  b) fusion reactors

A probability distribution



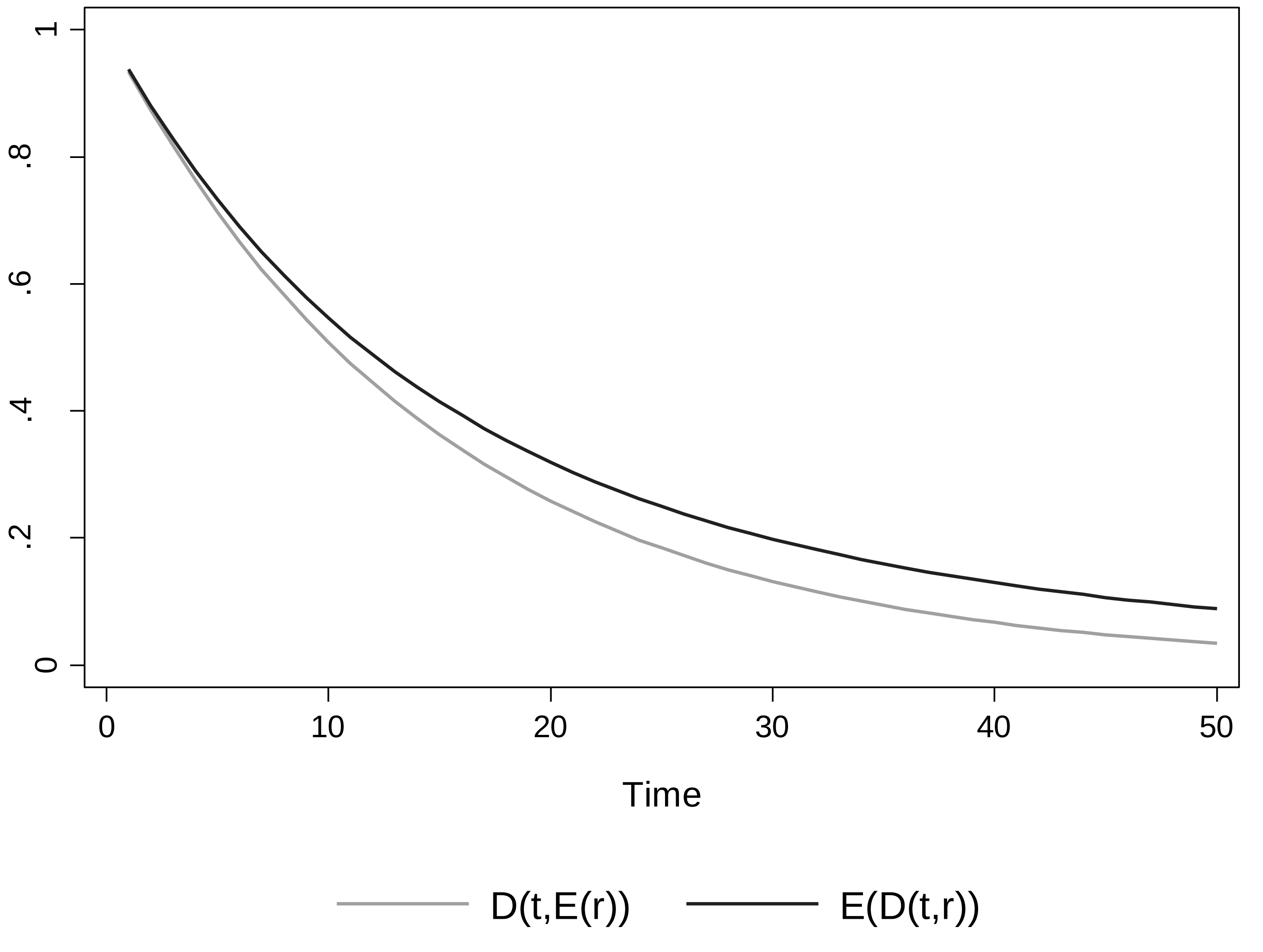
The expected value



Which expected value?

- The discount factor $D(t,r)=1/(1+r)^t$ is a convex function of the discount rate r
- By Jensen's Inequality, the expected value of the discount factor, $E(D(t,r))$, will be greater than the discount factor that corresponds to the expected discount rate, $D(t,E(r))$

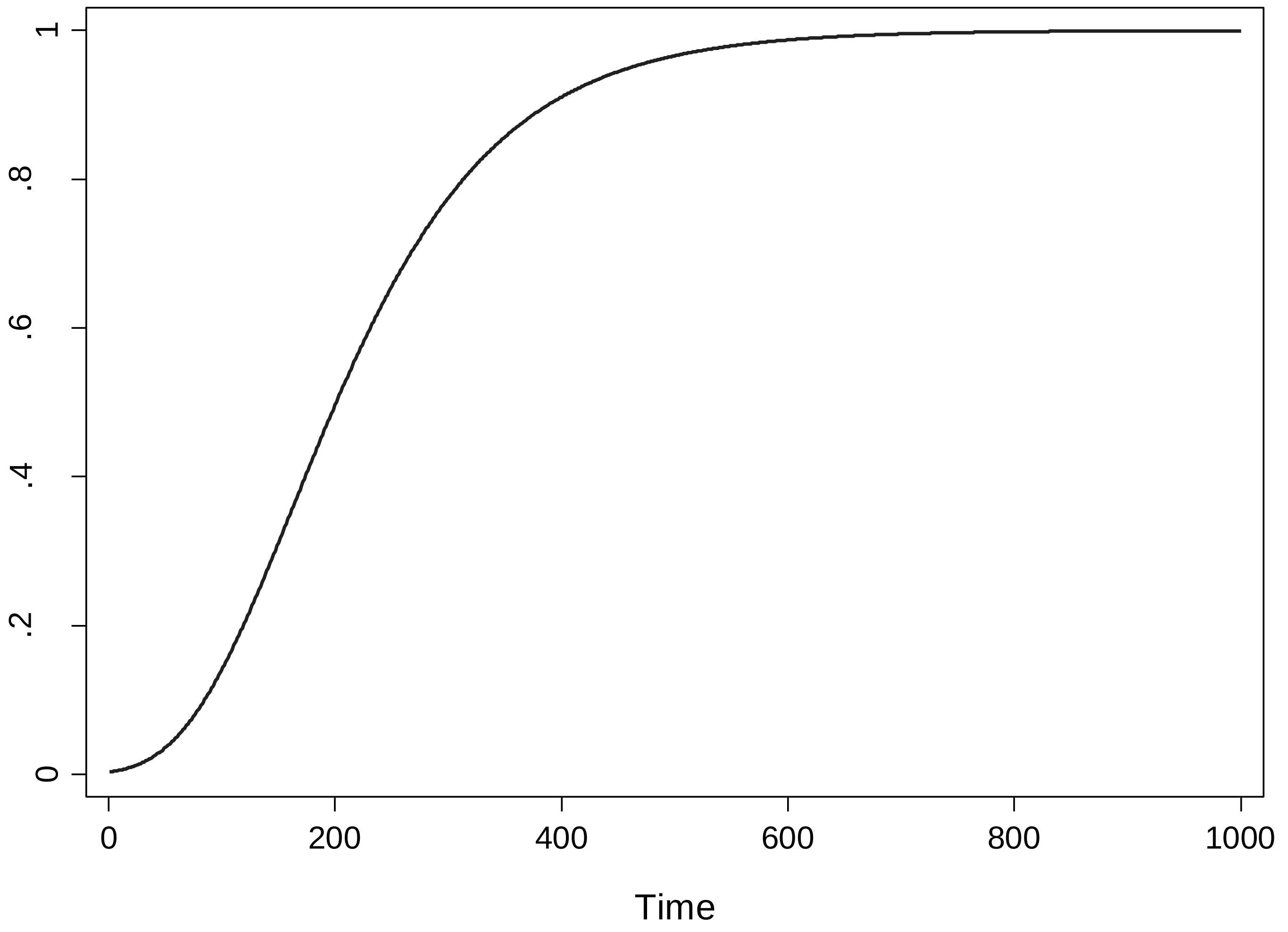
The declining discount rate



In the long run

- The declining discount rate converges to the lowest rate in the distribution
- Summarizing a distribution using an expected value can be problematic when the expected value is dominated by a single scenario

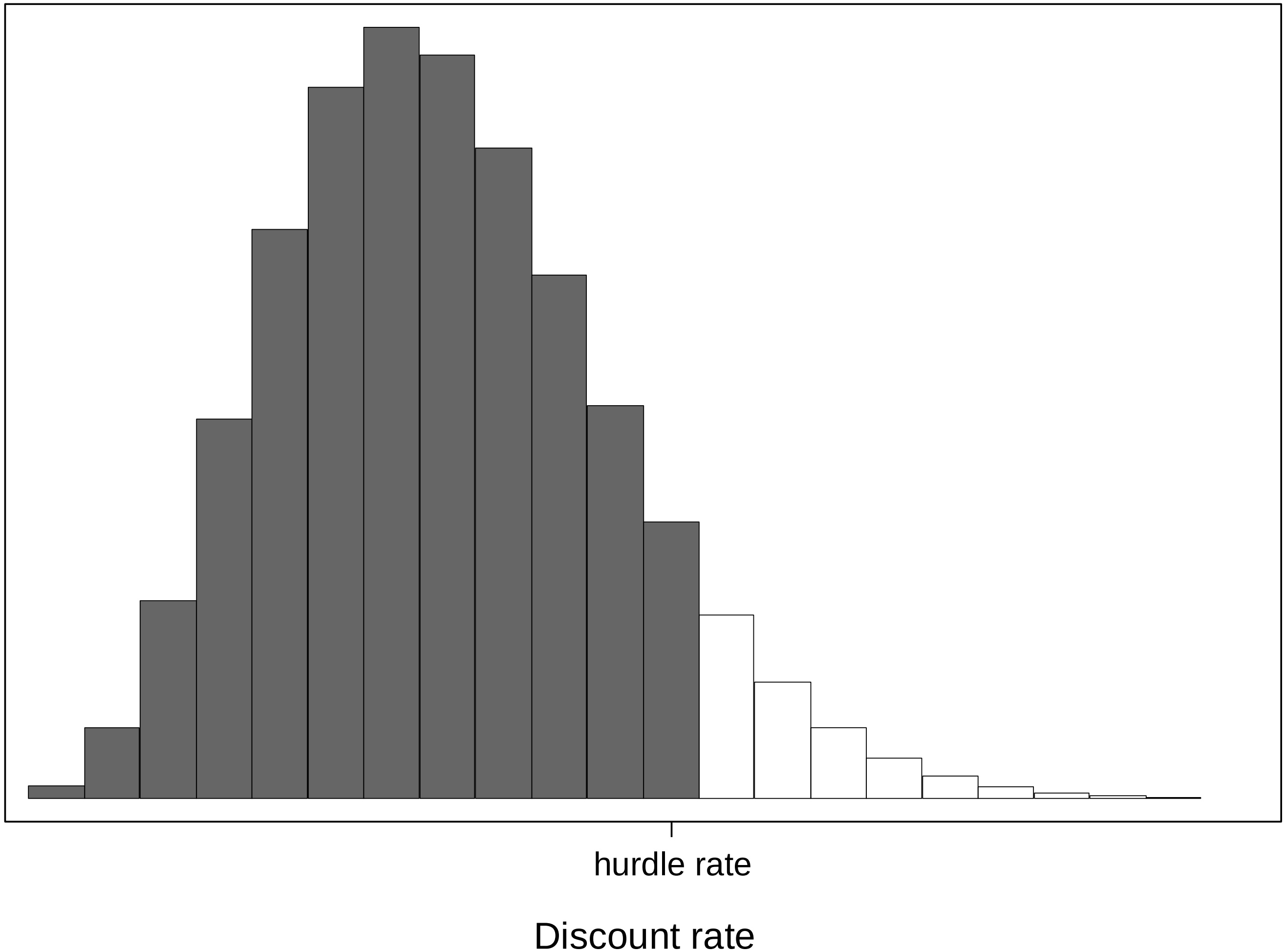
Proportion of the expected discount factor attributable to one scenario



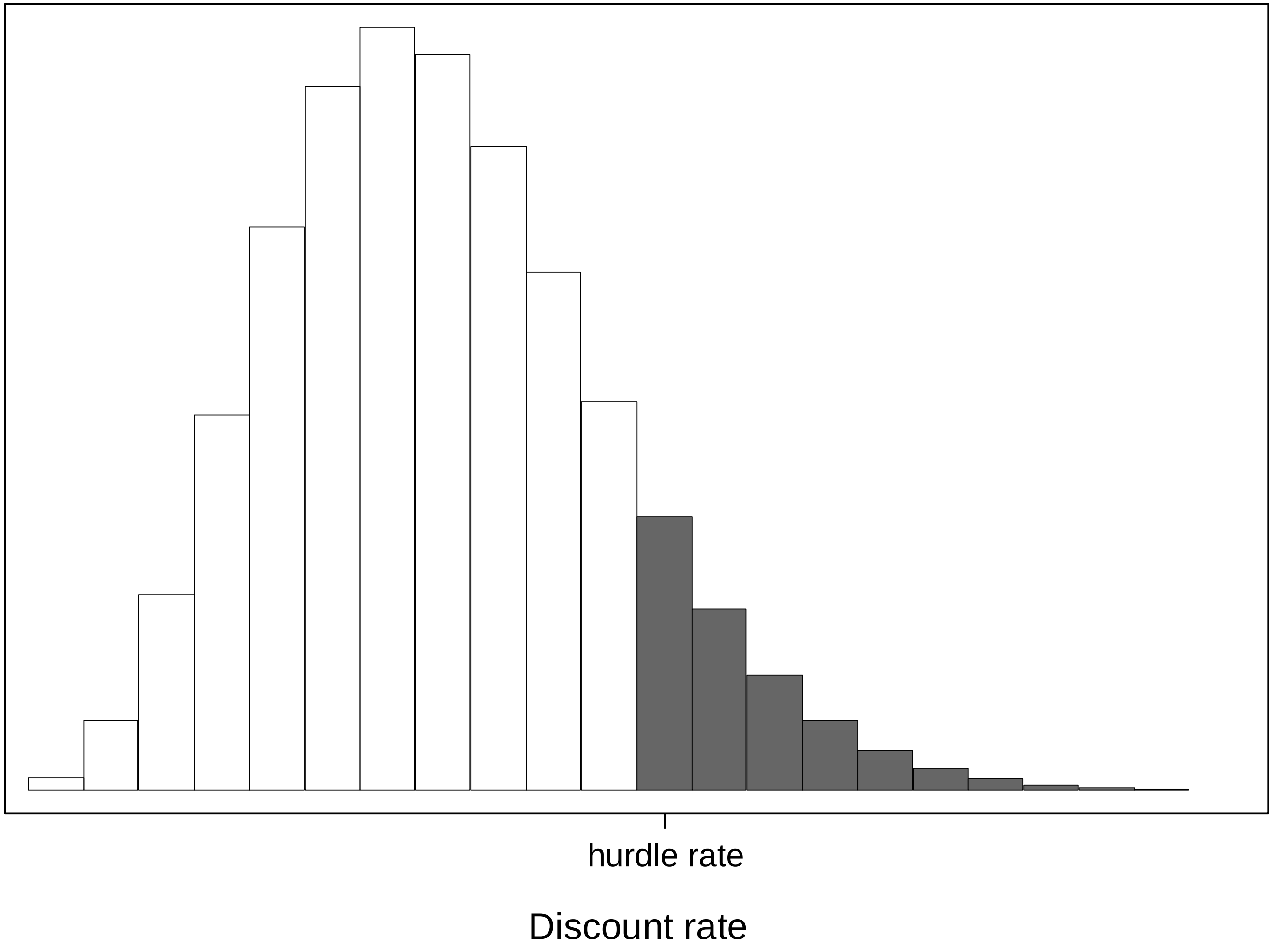
Hurdle rates

- What if we want a minimum probability of positive net benefits?
- When costs precede benefits, positive net benefits at a given discount rate imply positive net benefits at every lower discount rate

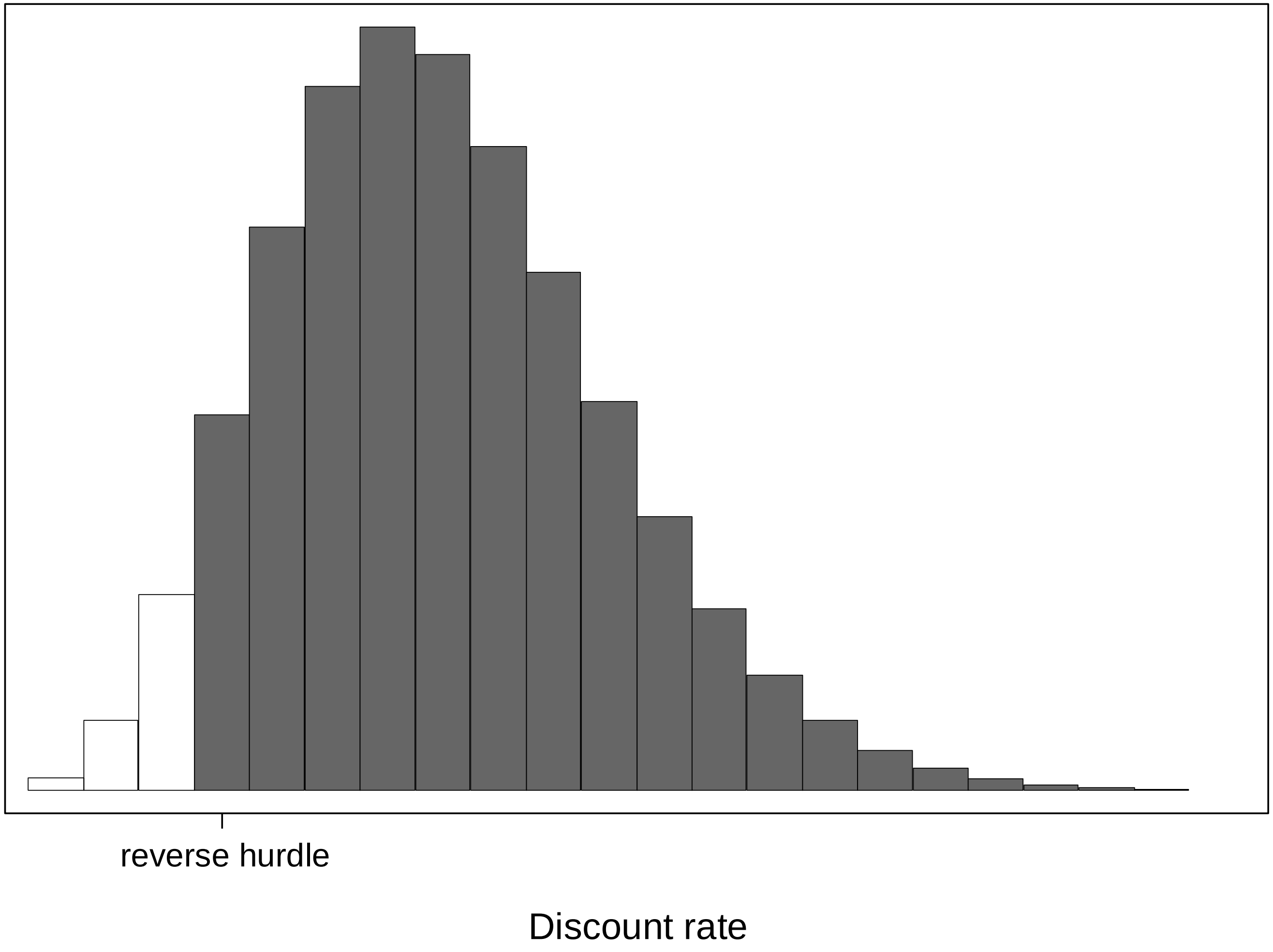
A hurdle rate



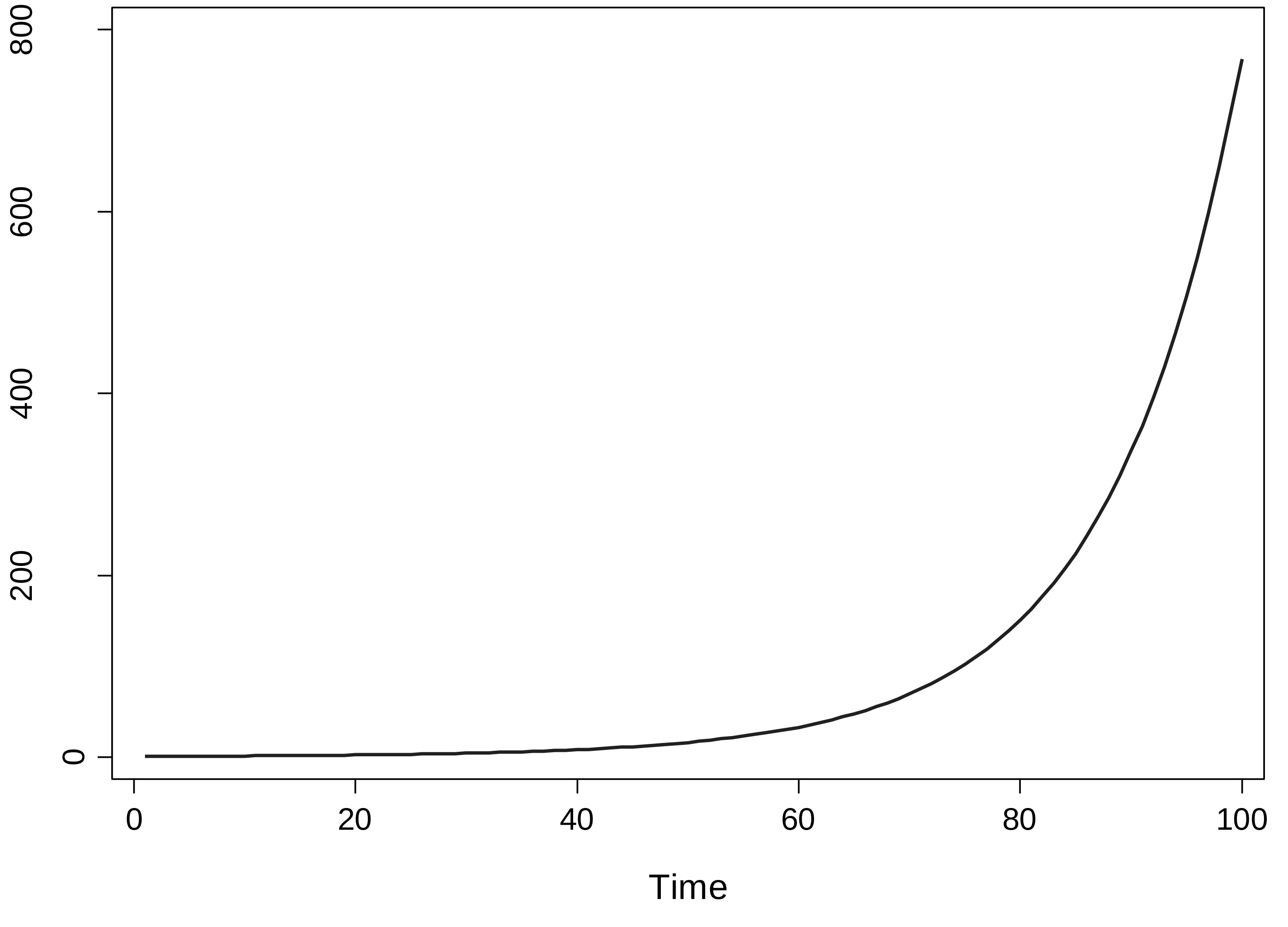
If costs follow benefits



A reverse hurdle rate



The ratio of E(D(t,r)) to D(t,hurdle)



In practice

- Declining discount rate in the UK
- A low rate combined with a high rate in the US
- Risk of strategic choices