Discounting and decision making in the economic evaluation of health care technologies

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Overview

• There has been a long running debate over the appropriate use of *discounting* in the economic evaluation of health care technologies

• This presentation will summarize the **key policy implications** of two upcoming papers co-authored with Karl Claxton and others (including the prominent authors on both sides of the recent debate)
Take home messages

• CADTH should discount costs and health at a common rate of 1.5% per annum
• Current CADTH guidance to discount at a rate of 5% unjustifiably discriminates against interventions with largely up-front costs and/or long term health benefits (e.g. vaccinations and surgery)
The two papers

- Karl Claxton, Mike Paulden, Hugh Gravelle, Werner Brouwer and Anthony J. Culyer ‘Discounting and decision making in the economic evaluation of health care technologies’ *Forthcoming in Health Economics*

- Mike Paulden and Karl Claxton ‘Budget allocation and the revealed social rate of time preference for health’ *CHE Research Paper 53, October 2009*
The ICER decision rule

• Both NICE and CADTH determine whether a technology is cost-effective by comparing its discounted ICER to an estimate of the current cost-effectiveness threshold ($k_1$)

• This **ICER decision rule** may be expressed as:

\[
\text{Accept tech if } \frac{\Delta c_t}{\Delta h_t} \frac{\sum \frac{\Delta c_t}{(1 + d_c)^{t-1}}}{\sum \frac{\Delta h_t}{(1 + d_h)^{t-1}}} < k_1
\]

where the discount rates applied to health benefits and to costs are $d_h$ and $d_c$ respectively
Questions of fact and value

• To establish the appropriate discount rates one must determine CADTH’s preferred decision rule

• This depends upon CADTH’s objective (e.g. max health, max social welfare)...

• ... which in turn depends upon CADTH’s perspective on social choice (e.g. welfarist, social decision making)

• It also depends on whether CADTH assumes health budgets to be fixed in each period
One possible perspective...

• **Welfarist perspective**
  • CADTH’s guidance should aim to maximize social welfare, as expressed by some explicit social welfare function (SWF) which serves to aggregate individual preferences

• **Problems**
  • Who defines the SWF?
  • SWF will inevitably be **dictatorial** (Arrow)
  • What if the policies and values required to maximize the SWF contradict those of democratically elected policymakers?
... another perspective

- **Social decision making perspective**
  - Far more modest than the welfarist perspective
  - Regards existing decision making processes as **socially legitimate**
  - This legitimacy rests upon strong democratic institutions, elected policymakers, free press, and various other checks and balances
  - Decision makers who adopt CADTH’s guidance ought to satisfy the objective(s) handed down to them by a **legitimate higher authority**
What is NICE’s perspective?

- NICE is charged by the UK’s Secretary of State for Health “... to appraise the clinical benefits and the costs [of] health care interventions... and to make recommendations” (NHS, 2005) (i.e. NICE’s objective is not to maximize social welfare)
- NICE has interpreted “clinical benefits” as the expected gain in health by the recipients of care and has recommended the EQ-5D version of the QALY as its preferred quantitative indicator of this gain (NICE, 2008) (i.e. NICE focusses on health)
- NICE has stated that “an additional QALY is of equal value regardless of other characteristics of the individuals, such as their socio-demographic details, or their pre- or post-treatment level of health” (NICE, 2008) (i.e. NICE maximizes health)
- NICE recognizes that there are “implications for healthcare programmes... that may be displaced by the adoption of the new technology” (NICE, 2008) (i.e. NICE assumes a fixed budget)
What is NICE’s perspective?

• NICE appears to adopt a social decision making perspective, seeking to maximize health, subject to society’s time preference for health, assuming a fixed budget in each period

• This implies the following decision rule:

\[
\text{Accept tech if } \sum \frac{\Delta h_t}{(1 + r_h)^{t-1}} > \sum \frac{\Delta c_t}{k_t \cdot (1 + r_h)^{t-1}}
\]

where \( r_h \) denotes society’s rate of time preference for health

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The appropriate discount rates

- CADTH would appear to adopt the same preferred decision rule as NICE
- The appropriate discount rates for CADTH to adopt are those which ensure that the ICER decision rule used in practice is algebraically equivalent to CADTH’s preferred decision rule
The appropriate discount rates

- ICER decision rule (actually used):

  \[
  \text{Accept tech if } \frac{\sum \Delta c_t}{\sum \frac{\Delta h_t}{(1 + d_c)^{t-1}}} < k_1
  \]

- Preferred decision rule (should be used):

  \[
  \text{Accept tech if } \sum \frac{\Delta h_t}{(1 + r_h)^{t-1}} > \sum \frac{\Delta c_t}{k_t.(1 + r_h)^{t-1}}
  \]

- We demonstrate that \(d_h = r_h\) and \(d_c \approx r_h + g_k\)

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Implications so far

- CADTH should adopt differential discounting if *and only if* it expects the threshold to *grow over time*.
- The actual discount rates to adopt depend upon:
  - The growth rate of the threshold
  - Society’s rate of time preference for health
Health output ($H_t, H_{t+1}$)

Budget ($B_t, B_{t+1}$)

Slope = $1/k_{t+1}$

Period $t+1$ health production function

Slope = $1/k_t$

Period $t$ health production function
Intertemporal health production possibility frontier

Period $t+1$ health production function

Budget constraint

Period $t$ health production function

Slope = $1/k_{t+1}$

Slope = $-(1+r_h)$

Slope = $1/k_t$

Slope = $-(1+r_s)$

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Deriving $r_h$ from $r_s$ and $g_k$

- The threshold in each period ($k_t, k_{t+1}$), the growth rate of the threshold ($g_k$), and society’s rate of time preference for health ($r_h$) are all implied by the allocation of health budgets across periods.

- Furthermore, since health budget allocations are influenced by the government’s real interest rate, $r_s$, it follows that there is a relationship between $r_s, g_k$ and $r_h$.

- We demonstrate that this relationship simplifies to $r_h \approx r_s - g_k$. 
Linking back to the first paper

- Our first paper demonstrated that CADTH should discount health and costs at $d_h = r_h$ and $d_c \approx r_h + g_k$
- Our second paper demonstrated that $r_h \approx r_s - g_k$
- CADTH should discount at $d_h \approx r_s - g_k$ and $d_c = r_s$
- Since empirical data on $g_k$ is lacking, and it is not obvious whether $g_k$ is positive or negative, it would be reasonable for CADTH to assume that $g_k$ is zero
- This implies that CADTH should discount at a common rate equivalent to $r_s$
What is $r_s$?

- $r_s$ is the **real interest rate** faced by governments whose decision makers adopt CADTH’s guidance.
- This is approximated by the *real* return on a bond issued by the government in question.
- The **Bank of Canada** estimates the real return on a long-term federal government bond to be $\sim 1.5\%$.
- For provincial governments, $r_s$ is likely to be very slightly higher, but $1.5\%$ remains a reasonable approximation.
- This implies that $d_h = d_c = 1.5\%$. 

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Conclusions

• CADTH should discount health effects and costs at a common rate of 1.5% per annum

• CADTH should not introduce differential discounting of health effects and costs unless it has good reason to believe the threshold will change over time

• CADTH should amend its discounting guidance as soon as possible - in the mean time it risks discriminating against technologies with up-front costs and/or long term health benefits