

Pharmacoeconomics

Discounting

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Learning outcomes

- **By the end of the lecture, you will be expected to:**
 - Understand discounting technique
 - Understand the rationale for discounting in Health economics
 - Understand the time preference for income today rather than income in the future
 - Understand the way discounting adjusts for costs (and benefits) occurring at different points in time.

Think what you would prefer

- To be given 100 JDs today or after 5 years?
 - Hint (think of this in term opportunity cost associated with deferred consumption; i.e. **the value of what is foregone by not having the \$100 over the next five years (% of interest)**)

\$100 five years from now is valued less than \$100 today



Think what would you prefer

- If I ask you to borrow 1000 JDs today and assured you to pay them back in the next 3 years.
- You wouldn't agree to lent me the money unless I paid you back more than 1000.
- Money promised in future, health cost savings promised in future is valued less than money received today

WHY value of money decrease overtime?

- ✓ People prefer to receive money now rather than later because they can generate benefits immediately
- ✓ People prefer to pay out money later rather than now



Another example

- Think of the benefit or outcomes of surgery vs. long-term treatment with medication for knee pain ?
- **In this situation, surgical costs are incurred in the present, whereas medication costs stretch well into the future.**

DISCOUNTING

- Discounting is an economic method that captures an individual's preference for income **today rather than income in the future.**
- This time preference is often explained by the opportunity cost of interest. **Income earned today can earn interest through investment.**
- **In numbers;**
- an interest rate of 3 %, a payment of \$100 today is worth more than the same payment in one year because JDs 3 of interest can be earned if the payment is received today
- **You would have 103 JDs ($PV = \text{payment} / (1+r)^n$. r is the interest rate.**

Discount Rate for Future Costs

- Determination of the most appropriate discount rate for costs in economic analyses is still being debated by health economists, though typically rates of 3% to 5% are used.
- Discounting occur when intervention lasts for more than one year. Not discounting will lead to overestimate the future costs and benefit.
- In practice, most health economists agree that it is reasonable to select a central "**best estimate**" of the discount rate, such as 2%, and to then determine the effect that higher and lower rates (e.g. 2% to 6%) have on study findings and conclusions (i.e. sensitivity analysis).

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- In any economic evaluation where costs and benefits occur over a number of years should consider discounting.
- Discounting adjusts for costs (and benefits) occurring at different points in time.

Example

Alternatives	Year 0	Year 1	Year 2	Total
Surgery	3000			3000
Drug cost (undiscounted)	1000	1000	1000	3000
Drug (discounted)	1000	???	???	???

Which of these interventions more costly?

Knowing the discount rate 5%, what would be the costs after year 1 and 2?

Answers

Alternatives	Year 0	Year 1	Year 2	Total
Surgery	3000			3000
Drug cost (undiscounted)	1000	1000	1000	3000
Drug (discounted)	1000	952	907	2859

- What do you think?

Answers

- Costs occurring in Years 1 and 2 are discounted with Year 2 costs discounted at a higher rate
- Future costs are given less weight because they "impose" on us less than an equivalent cost arising now

Inflation

- Inflation refers to the general upward of the service or good price over time
 - For example the unit cost (price) of drug will be higher in 2018 as compared to 2017
- Adjusting for inflation by using a constant price weight to value all services, most commonly using the year when the trial is stopped
 - Such as using 2018 price weight to value all resource uses even if the resource uses were collected over a period of years
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Inflation versus Discounting

- Inflation is concerned with the unit cost (price) whereas discounting (time preference) concerned with when the total cost have been consumed.
- Adjusting for inflation or not is based on whether we choose a constant or time varying price to value the resource use. The latter occur if we used hospital billing data to cost outpatient care observed over a period of time.
- Adjusting for time preference occur if patients or participants in the trials are followed for more than one year.

Patient follow-up

Price weight

Less than one year

More than one year

Constant

Do not adjust for inflation; do not discount

Do not adjust for inflation; discount

Time varying

Don't adjust for inflation; do not discount

Adjust for inflation; discount

Think about this

- If the patients were enrolled in the trial during a 3-year period, but each is followed for one year only. In addition, the investigators collect hospital bills to estimate inpatient cost.
- Do we need to adjust for inflation and discounting?

Summary

- **Discounting is a technique used to reflect the present value of a cost or health benefit that will occur at some future date.**
- Future costs are discounted to account for the time value of money, and future health benefits are discounted to account for the delay in satisfaction from these outcomes.
- **The effect of discounting is to give future costs and health benefits less weight in an economic analysis.**
- Economics call discounting the notion of **time preference**