Topic: Poor Decisions

Introduction

- The definition of public health economics emphasizes externalities and public goods, but it includes other reasons for public intervention
- One of these is *poor decisions* (we'll define this in a minute)
- Poor decisions often arise when people make choices between present and future costs or benefits
- Keep this question in mind: Should the public intervene when people make poor decisions?

Discounting

- Before discussing poor decisions, we need to understand discounting
- Economists assume that people *discount* the future, meaning they value future outcomes less than current outcomes
- For example, Keeler, et al., discounted the external costs of a sedentary lifestyle
- To be specific: $$U_t = \sum_{\tau=0}^{T-t} D(\tau) u_{t+\tau}$$

U = lifetime utility from the perspective of the current period t
(t is often assumed to be 0)
T = the last period of the problem (often the last year of life)
τ = a 'counter' that goes from 0 up to T-t
D(τ) = the discount function
u = utility during period t+τ

Exponential Discounting

- The *exponential* discount function is: $D(\tau) = \delta^{\tau}$, $0 \le \delta \le 1$
  - A unique feature of the exponential discount function is that the ratio of costs or benefits in any pair of adjacent years is always equal to δ
  - For example, $D(3)/D(2) = \delta^3/\delta^2 = \delta$ and $D(103)/D(102) = \delta^{103}/\delta^{102} = \delta$
  - Keeler, et al., used exponential discounting – as do most cost-benefit analyses
  - So what do we mean by *poor decisions*?

Meaning #1: δ is Close to Zero

- People put very little value on future costs and benefits (δ is close to zero)
- Such people may drop out of school, smoke, or engage in risky sex
- But saying these are poor decisions really means, “I think these people should care more about the future than they do.”

Meaning #2: δ Increases over Time

- These people learn to appreciate the value of future benefits as they ‘grow up’
  - For example, $\delta = .8$ at age 18 and $\delta = .95$ at age 22
  - In other words, $D = D(\tau,t)$
- Suppose another year of school at age 18 costs €100 and pays €200 at age 22
  - The value of the return from the perspective of the 18-year old is €200 x $.8^4$ = €82, so the extra year of school is not worth the cost
  - However, at age 22 the return would have been worth €200 x $.95^4$ = €163
  - The person *regrets* their decision not to invest
- Whose preferences should society respect?
  - No clear answer, but there is a strong bias not to respect the teenager’s preferences
  - It is assumed that only ‘mature’ individuals have the right to act on their preferences, and teenagers are not mature

Meaning #3

- Future values fall very rapidly for small delay periods, but then fall slowly for longer delay periods
- Example: $D(\tau) = 1/(1+\alpha\tau)$
- Suppose $\alpha = .05$:

$D(0) = 1$

$D(1) = .95$

$D(2) = .91$

The discount factor falls in a hyperbolic path →

$D(1)/D(0) = .95$

$D(2)/D(1) = .96$

Hyperbolic & Quasi-Hyperbolic Discounting

- This is called 'hyperbolic discounting" (HD)
  - The ratio of $D(\tau+1)/D(\tau) \rightarrow 1$ as τ gets large
  - Consistent with laboratory experiments: People want rewards today versus tomorrow, but they don't see much difference in the value of a reward in 20 years vs. 21 years
  - Doesn't seem like a big deal, but it is
- With 'quasi-hyperbolic discounting' (QHD) the person places full weight on the current period and then down-weights all future periods by a factor $0 < \beta < 1$ applied to exponential discounting:

$$D(\tau) = 1 \text{ if } \tau = 0$$

$$D(\tau) = \beta\delta^{\tau} \text{ if } \tau = 1,2,\ldots$$

- Results for HD and QHD are similar, so I'll use QHD to illustrate

Example of QHD

- Suppose $\beta = .9$ and $\delta = .95$
- At time 0, should I invest €100 that pays €110 in period 1 (or do my homework or clean my room)?
  - No, because $100 > .9 \times .95 \times 110$
- But from the perspective of time 0, should I make that investment in time 1 for a payoff at time 2?
  - Yes, because $.9 \times .95 \times 100 < .9 \times .95^2 \times 110$
- You always put off the investment and you never make ‘tough choices’
- This is an economic theory of *procrastination*

Private Solutions to the Problem

- Rational individuals may adopt ‘commitment mechanisms’ to ensure they don’t procrastinate
  - Smokers leave home without their pack of cigarettes
  - Stick-It web site
- Many people volunteer for programs that limit individual choice
  - Contributions to individual retirement accounts for a given year must be made by April of the following year
- Kevin Volpp, at the University of Pennsylvania, is an expert in using commitment mechanisms to change behavior

Volpp's Study

- Obese and overweight people at a military veterans' medical center were randomly assigned to a control group and two interventions:
  1. A lottery for eligible people who achieved a target weight loss
  2. A deposit contract in which people invested their own money and lost it if they failed to meet their weight loss goals
- Outcomes: weight loss after the 16-week experiment ended, and weight loss at 7 months (with no financial incentives during the maintenance period)

Results

GROUP	MEAN WEIGHT LOSS AT 16 WEEKS (LBS)	MEAN WEIGHT LOSS AT 7 MONTHS (LBS)
CONTROL	3.9	4.4
LOTTERY	13.1	9.2
CONTRACT	14.0	6.9

- The only other predictor of weight loss was race: blacks lost less weight than whites
- Results show that financial incentives are effective in promoting weight loss
- However, the effects wore off during the maintenance period – a common finding in behavior change programs

Kevin Volpp, et al., "Financial Incentive-Based Approaches for Weight Loss: A Randomized Trial," JAMA, 300:22 (December 10, 2008), 2631-2637

Chesson's Study

- Harrell Chesson, et al., examined the relation between discount rates and risky sexual behavior among teenagers and young adults
  - Are teenagers and young adults with higher discount rates more likely to engage in risky behavior?
- Note: I have been using discount factors, and they used discount rates
  - The relation between them is $\delta \equiv 1/(1+r)$, so $\delta = .95$ is a discount rate of $r \sim .05$
  - People with high discount factors have low discount rates and vice versa

Measuring Discount Rates

- A common method involves the time tradeoff: Would you rather have €400 today or €1,200 one year from now?
- Repeat the question with payoffs of €800 and €500
  - If you prefer €500 next year to €400 today, your discount rate must be less than .25
  - If you turn down €500 next year but accept €800, your discount rate must be $.25 < r < 1$
  - If you turn down €800 next year but accept €1,200, your discount rate must be $1 < r < 2$
  - If you turn down €1,200 next year, your discount rate must be $r > 2$
- Almost half of the subjects in their study had discount rates above 2

Results

- Subjects with higher discount rates were more likely to have had risky sex
- They also reversed the model and found that risky sexual behavior predicts higher discount rates
- Conclusion: "…the short-term decision-making focus of teenagers and young adults may be a key factor in the decision to engage in risky sex." (page 228)

Harrell W. Chesson, et al., "Discount Rates and Risky Sexual Behaviors among Teenagers and Young Adults," *Journal of risk and Uncertainty, 32 (2006), 217-230*