EC315 Topics in Microeconomics with Cross-Section Econometrics Coursework Summary

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1 Exam Summary

1.1 Cost-Benefit Analysis Summary

1. Purpose
2. Alternatives
3. Who
4. C/B Impacts
5. Lifetime Impacts
6. Monetize:
    - *Social Cost*: harm done to living organisms
    - *Revealed/Stated Preference*: willingness to pay or willingness to accept
        - Revealed: shown in behaviour
        - Stated: questionnaires etc.
    - *Time*:
        - Work vs leisure using wage rate
        - Travel time; how much people are willing to trade-off
    - *Lives*: life expectancy, pay, age, risks taken
    - *Natural Resources*: AONBs, surveys, investment, regulation
7. PV Discounts
    - Social discount rate
    - Intergenerational (more than 50 years)
8. NPV of Alternatives
9. Sensitivity Analysis
10. Recommend

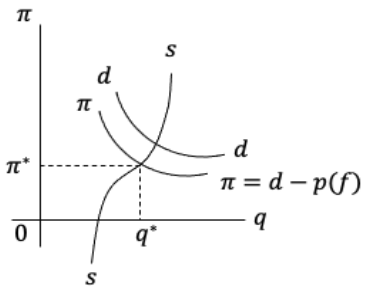
1.2 Program & Policy Evaluation Summary

Cause $\longrightarrow$ Intermediaries $\longrightarrow$ Effect

1. Omitted Variable Bias
    - Selection Bias: e.g. grades, income, area of ogigin
    - Selection Bias 2: e.g. effort, determination, stamina
2. Randomized Control Trial
    - Unbiased Estimator: $\bar{x} \longrightarrow \bar{\mu}$ (LLN)
    - Unbiased Estimator: randomization
    - σ^2: "how much of the result is due to chance?"
    - t-tests: causal effect; $(\bar{Y}^T - \bar{Y}^C)$
3. Regression
    - Dummy Variables: causal variable / group
    - Instrumental Variables: omitted variables (α corr. w/ ε)

1.3 Crime & Punishment Summary

1. Supply: $\pi_t = \pi_i - c_i - w_i - p_i(f_i)$
    - i = Individual
    - π_t = Net Total Payoff of Crime
    - π_i = Expected Payoff Per Offense (Minus Costs)
    - c_i = Cost Incurred if Caught
    - w_i = Wage Rate From Non-Criminal Work
    - p_i = Probability of Aprehension & Conviction
    - f_i = Punishment in Convicted
2. Normal Distribution
    - Req. $\uparrow \pi$, $\uparrow \delta$, $[\bar{x} \rightarrow$ (Right of Mean)]
    - Req. $\downarrow \pi$, $\downarrow \delta$, $[\leftarrow \bar{x}$(Left of Mean)]
    - Morals, enjoyment, risk, some demand for significantly higher payoffs etc. effect decision
3. Demand: $e_i f(v_r, v_l); q$
    - e_i = Expenditure on Protection
    - v_r = Risk of Victimization
    - v_l = Loss of Victim
    - q = Total Crime
4. Derivatives
    - $\frac{\partial e_i}{\partial v_i} > 0$: Risk $\uparrow$, Expenditure $\uparrow$
    - $\frac{\partial c_i}{\partial e_i} < 0$: Expenditure $\uparrow$, Cost $\uparrow$
    - $\frac{\partial \pi_i}{\partial c_i} < 0$: Cost $\uparrow$, Payoff $\downarrow$
5. Supply / Demand

- 

- ss = Supply of Crime
- dd = Initial Demand
- $\pi\pi$ = Demand After Government Intervention (T)
- MC of Catching Last Criminal $> MB$ $[\leftarrow \pi^*,\ q^*]$
- MC of Catching Last Criminal $< MB$ $[\pi^*,\ q^* \rightarrow]$

1.4 Exam Arithmetic Summary

1. $\pi_A = x_A p_A(x_A + x_B) - x_A$
2. $J = \pi_A + \pi_B$; $\frac{\partial J}{\partial x_A} = \frac{\partial \pi_A}{\partial x_A} + \frac{\partial \pi_B}{\partial x_B}$
3. Externalities: $\frac{\partial \pi_A}{\partial x_B}$
   - > 0: Positive: "you do ↑, my π ↑"
   - < 0: Negative: "you do ↑, my π ↓"
4. Strategic Nature: $\frac{\frac{\partial \pi_A}{\partial x_A}}{\partial x_B}$
   - > 0: Complements: "you do ↑, I do ↑"
   - < 0: Substitutes: "you do ↑, I do ↓"
5. Grim Trigger Strategy
   - 40, 50, 30
   - $\frac{40}{(1-\delta)} \geq 50 + \frac{30\delta}{(1-\delta)}$
   - $40 \geq 50 - 50\delta + 30\delta$
   - $\delta \geq \frac{1}{2}$: cooperation possible

   Tit-for-Tat Strategy
   - 40, 50, 20
   - $\frac{40}{(1-\delta)} \geq \frac{50}{(1-\delta^2)} + \frac{30\delta}{(1-\delta^2)}$
   - $40 + 40\delta \geq 50 + 20\delta$
   - $\delta \geq \frac{1}{2}$: cooperation easy