General “Practical” Issues in Using Cost Accounting Data

Potential Techniques:
1. Time and motion (component enumeration) [Bottom up or bean counting]
2. Resource-based relative values or adjusted price or cost accounting data [Top down]
   - Cost Records
   - Estimates
   - Payment Schedules
3. Multivariate techniques [Top down]

Hospital Cost
Readily Available U. S. Data

- Cost to Charge Ratios (Medicare Cost Report)
  - Advantages
    * Readily available from all hospitals
    * Uniform methodology
  - Disadvantages
    * Works on averages (how bad is that?)
    * Includes fixed cost
    * Not easy to estimate costs of intermediate products (i.e., bundles of services such as a procedure)

Physicians Services Cost
Readily Available U.S. Data

RBRVS (Physician Services)

- Advantages
  * Readily available
  * Uniform methodology
- Disadvantages
  * May be difficult to identify services provided in individual physician/patient encounters
  * In what sense does MD “work” x conversion factor (which one?) represent MSOC?
  * Would marginal cost in a salaried group practice be better?

Accounting Approaches

- Tradeoff between levels of specificity and data/analysis requirements
  - Average Daily Cost/Average cost per visit (All services bundled together)
  - Average Daily Cost/Department of Ward (All Departmental or Ward Services) or average cost by type of visit.
  - Fixed vs. Variable Costs and Accounting Data
  - Ancillary Services Cost Estimation

Average Daily Cost (Hospital)

- Advantage
  - Relatively easy to calculate
- Disadvantages
  - Does not distinguish between different intensities of hospitalization/physician visits
  - To have measurable effects on resources, health technologies must affect length of stay or number of physician visits.
### Average Daily Cost/Department

- **Advantages**
  - Not substantially more difficult than average cost/day, and more able to distinguish intensities of care

- **Disadvantages**
  - To have measurable effects on resources, health technologies must affect either the site of care or the length of stay. Ancillary services from other departments are not included in estimate

- **Potential Difficulties**
  - Same as average cost per day

### Time and Motion

- **Enumerate Services**
  - Identify and define each activity (Iglar)
  - Determine the exact production process (Finkler)

- **Define a time standard for each service**
  - Self estimation (Kinosian, TPN)
  - Observer measurement (Iglar)

- **Define a frequency measure for each service**

- **Define the supplies and equipment utilized by each service**

- **Identify fixed and variable costs by service**

### Time and Motion Issues

- Sample Size (two stage cluster sampling?)
- Variability (Coefficient of variation)
- Patient type (Iglar: seven patient types)
- Boundaries between activities
- Starting and stopping an activity
- Joint time

### Disadvantages

- May not provide estimates of individual services (e.g., different laboratory tests, imaging studies, etc.) which may be needed for an evaluation if there is no output measure for these services. May not provide diagnosis-specific estimates.

- Requires many observations of same production function. To the extent production functions differ among hospitals (cross-sectional) or over time (time-series), it may not be appropriate to pool the data used in the analysis

- May not allow control of all relevant covariates (e.g., patient severity)

- Use of all outputs, input prices, and interactions leads to multicollinearity, yielding estimates that are unbiased but also imprecise
Weisbrod et al. on transfers

- “Maintenance payments themselves do not involve the using of real resources but rather the transfer of money from one group to another. However, we include these transfers payments as costs because they were subsequently used for maintenance (food, shelter, etc.) which does involve real costs.” They go on to talk about what happens if maintenance costs change as a result of the program.
- Do you agree that these lower maintenance costs in E ($564 lower) are a reduction in cost for a program that would then yield $400 more in net benefits?

Must Future Health Effects be Discounted at the Same Interest Rate as Costs?

- $1 now is worth $(1+r)^t$ at time $t$
- So $1$ at time $t$ has a present value of $\frac{1}{(1+r)^t}$

**Keeler-Cretin Argument**
- Assume that $10,000$ now can be invested in Program A and save one life year now.
- Suppose there is program B which also costs $10,000$ now but can save $1+e$ life years in 40 years. If you didn’t discount effects, you would prefer program B to A.
- But suppose $r = 0.05$, invest for 40 years, and you would have about $70K$. Then consider program C representing a “seven-fold” version of program A. Would save seven life years: it would be preferred to B. In another 40 years, there is another program C' preferred to C.

We would always choose to wait

The Effects of Overhead Costs: Estimates of “Cost” for OP Dialysis

- US $140
- UK $248**
- Spain 131
- NZ 142
- Germany 171
- Canada 138
- Sweden 300 or more**

* ** = Dialysis paid as part of hospital budget

Discounting in CB and CE analysis

- What discount rate to use?
- Do you have to discount effects in CE analysis at the same rate as costs?
- Why discount money amounts?
- What rate?
  - $i =$ rate of health costs
  - $r =$ rate for health consequences
  or
  - $i =$ marginal productivity of $1$ of capital = market rate of (pretax) interest
  If no taxes or other distortions, $r = i$
  If interest earnings are taxable $i = r$
  Which one to use?

Old theory: Use weighted average social cost of capital depending on where the resources came from.

Key Assumptions

- Programs are divisible and multiplicable
- Options are always available

- **Stason-Weinstein "Consistency" argument is similar**
  - Issues:
    - Would an identified individual want choices to be made under discounted effects?
    - The problem goes away if money benefits are measured

New Theory

- **Arrow-Lind-Viscusi: 2 steps**
  1) Convert costs and benefits into (net) consumption flows
  2) Discount both at social rate of time preference $r$.

Example for costs

- $r = 0.05$
- $i = 0.1$
- Want to show that we should favor projects funded by consumers, not by saver/investors,
Consumption Flows

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<thead>
<tr>
<th>Time</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proceeds</td>
<td>D</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tax “investors”</td>
<td>0</td>
<td>0</td>
<td>-D(l+i)</td>
</tr>
<tr>
<td>Tax “consumers”</td>
<td>D</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: \( \frac{D(1.1)^3}{(1.05)^3} = D \)

The same argument applies to uses or benefits: Favor projects providing health benefits to “savers/investors.”
Gold: SRTP = 3% (or less)

Case A: Variation in Subjective Disease Cost C, so some people buy S and others do not.

**Insurer Effects:**
- Let \( \bar{D} \) be the number of users (demand for preventive service) when insurance of the preventive service is zero (\( K=1 \)) and let \( \bar{D}_0 \) be the number of non-users.
- Then the expected benefits cost is
  \[ \pi = E[D^e P_r + \bar{D}^e P_r] \]
- Let coverage be increased to some \( K<1 \). The change in expected benefits is:
  \[ \Delta \pi = E[D^e + AD)(1-K)P_r - [AD + E[P_r - P_0]] \]
  Where \( AD \) is the number of people induced to use the service by the increase in insurance coverage (moral hazard).

- The greater is \( AD \) for a given change in coverage; the larger the decrease (or the smaller the increase) in insurance outlays.
- The greater is moral hazard, the more likely coverage will lower premiums.

**Assumptions**
- Pauly, Held article on Cost Effectiveness of Insurance (JHE)
- 2 states of (future) Health \( H_1 \) and \( H_2 \)
  - In \( H_1 \) medical expenses are zero
  - In \( H_2 \) medical expenses = \( E \)
- Preventive service \( S \) is available at price of \( P \)
- Discount rate is zero
- Service is cost-effective in a “cost-cost” sense:
  \( (p^-P)E < P \)
- Full insurance coverage of \( E \), no initial insurance coverage of \( S \).
- We ignore risk aversion by demanders.

**Recalculating Medicare Cost**

Per Year of Life Added for Pneumococcal Pneumonia

- 6.6 Million beneficiaries covered when vaccination is free.
- Gross cost of vaccination = $175M
- Net cost is $37M. Cost offset is (175-37) = $138M.
- Cost per person = $175/6.6M = $4.54.
- Years of life added = 8400
- Net cost/year added = $37M/8400 = $4366
- Base Case: No Vaccination

Assume that 40% of 6.6M were induced to use by full insurance

<table>
<thead>
<tr>
<th>Vaccine Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Ins.</td>
</tr>
<tr>
<td>Full Ins.</td>
</tr>
</tbody>
</table>

Medicare cost/life year added: $\frac{(175-55M)}{3360} = $36000

**Future medical costs**

- Drummond suggest separating out “related” future medical costs from unrelated ones.
- But is there a bright line? Effect of high dose EPO—adds years, EPO costs more, but the years are years on dialysis.
- Thinking ahead: The value of future years should be reduced by exogenous high consumption spending (medical care, heating oil), especially if paid for by others.