Topics on Health Economics

Maria Errea, Ph D.

Universidad Publica de Navarra

Economics Department
General Outline

• Topics of interest in Health Economics
  • What kind of research we do/can be done?
  • What is Health Economics useful for?
  • What is Health Economics being used for?

• Health Economics and Evaluation
  • Health Technologies Evaluation Methods
  • Policy Evaluation Methods

• Ongoing Research
What kind of research can be done?

- Theoretical and Experimental Research seeking to explain behaviour

  Behavioral and Experimental Economics emerging and very popular

  Richard H. Thaler, Cass R. Sunstein (The Nudge)

  Alvin Roth & Lloyd Shapley (New England Program for Kidney Exchange)
What kind of research can be done?

- **Empirical Research**
  
  - Qualitative vs. /combined with Quantitative studies
    - Surveys
    - Observational data from reliable sources
  
  - Big data
    - Advantages: Bigger samples allow for representativity of populations and therefore more accurate studies
  
    - Disadvantages: Difficulties to manage big datasets with resources
What is Health Economics useful for?

“Health economics is a branch of economics concerned with issues related to efficiency, effectiveness, value and behavior in the production and consumption of health and healthcare.”

In broad terms, health economists study the functioning of healthcare systems and health-affecting behaviors.
What is Health Economics being used for?

• Evaluation:
  • Programs (Policies)
  • Health Technologies
  • Drugs, Treatments
  • What else?

• We evaluate costs and benefits to give advice to policy makers to take decisions.

• Other studies to observe health of the population, projections, evolution
Health Economics and Evaluation

• We have to distinguish between:
  • **Policy Evaluation** => What is the impact of a policy change?
  • **Economic Evaluation** => What are the costs and benefits of a new healthcare technology?

• Different methods for analysis
  • Difference in difference, regression discontinuity, instrumental variables…and other econometric methods for Impact Evaluation.
  • Cost-Benefit Analysis, Cost-Effectiveness and Cost-Utility Analysis.
Health Economics and Evaluation

• Policy Evaluation

Evaluate the impact of a new program / policy

• Before – After

• Treatment (Treated) – Control (Non-treated)

Examples you can think?
Policy Evaluation vs. Economic Evaluation

- Policy Evaluation

- We compare an outcome $Y$ before and after a policy

$$\alpha_i = (Y_{it} \mid P=1) - (Y_{i,t-1} \mid P=0)$$

- We need to estimate a counterfactual

$$(Y_{i,t-1} \mid P=0) = (Y_{i,t} \mid P=0)$$

- Problem: Time varying factors not controlled!
• **Example: Health insurance**

Research Objective: Compare the use of health services of those individuals who have enrolled in a health insurance plan and those who haven’t enrolled.

- **Who buys health insurance?**: individuals expecting needing higher use and probably more expensive services!
- **Who doesn’t buy?**: the healthy or the poor.
  - Healthy: Individuals who don’t buy having enough money to do it because they don’t expect high medical expenses.
  - Poor: Don’t enroll in health insurance because they just can’t afford it.

**Counterfactual** estimates may not be accurate: there might be a selection bias and a problem of lack of information about the non-participation reasons.
Policy Evaluation

- We need to know why individuals are in the treatment / control group

- If the reason why they belong to one group or the other are correlated with the result, then:
  - We won’t be able to isolate the impact of the program
  - There will be additional reasons influencing the new outcome!

=> Need to guarantee the comparability of both groups
Policy Evaluation - Methods

• Quasi-Experimental studies:
  • DID
  • Regression Discontinuity
  • Instrumental Variables

• These solution imply random sampling of individuals between groups
  • Every individual has the same probability of belonging to the treatment or control group

• The differences in the outcome between both groups is only due to the program!!
Economic Evaluation

Compare the effectiveness introducing a new drug/treatment/technology with the current drug/treatment/technology.
Economic Evaluation

• Cost-Benefit Analysis (B-C = ? )

Cost-benefit analysis (CBA) offers a method of economic evaluation that values all benefits against all costs. The resulting cost-benefit ratio gives an indication of whether or not the benefits outweigh the costs of an intervention, and hence provides a decision-making tool with a broad societal perspective.
Economic Evaluation

• Cost-Effectiveness Analysis

Cost-effectiveness analysis (CEA) is one tool that policy-makers, trying to make a choice between different health interventions, can use to assess which interventions provide the highest "value for money". CEA can thus help them choose the interventions and programmes which maximize health for the available resources. WHO-CHOICE (CHOosing Interventions that are Cost Effective) has developed the tools and methods for a generalized CEA.

\[
\Delta \text{ HEALTH OUTCOME} \]
Economic Evaluation

• Cost-Utility Analysis

CUA is to estimate the ratio between the cost of a health-related intervention and the benefit it produces in terms of the number of years lived in full health by the beneficiaries.

Hence it can be considered a special case of Cost-Effectiveness Analysis, and the two terms are often used interchangeably.
CEA and CUA: Incremental Cost-Effectiveness Ratio

• For $C_1$ and $E_1$ the cost and effectiveness of providing the new technology

• For $C_0$ and $E_0$ the cost and effectiveness of the current technology

$$\text{ICER} = \frac{(C_1 - C_0)}{(E_1 - E_0)} = K \, \text{$/QALY}$$

PROBLEMS?
CEA and CUA: Incremental Cost-Effectiveness Ratio

• Costs are *a priori* easier to measure (although still there are some hidden costs that we may miss, error on how costs may be registered…)

• What about Effectiveness?
  • Subjective
  • There might be several ways to measure effectiveness for one treatment
  • Sometimes we cannot find a way to measure effectiveness
  • Other times we may have endogeneity problems being our effectiveness measure actually a cost reduction. WRONG!! But it has been done…
Exercise

• Think of a context, propose a treatment and a measure of effectiveness and give different scenarios in which you would introduce or not the new treatment in the market.

• Explain to the class what you discussed with your group

• Debate
How do we represent results?
Cost-Effectiveness Plane
Introducing risk & uncertainty

- Sensitivity analysis
Introducing uncertainty

Confidence ellipses

¡Introducing confidence level of our estimates may lead to difficulties on the final decisión!
Introducing uncertainty

Acceptability Curves

The CEAC indicates the probability that an intervention is cost-effective compared with the alternative, given the observed data.
Instruments to get HRQoL effectiveness measures

• Generic Instruments -> Quantity + Quality of life = e.g QALYs
  • EQ-5D-5L instrument

• Specific Instruments -> Mapping to generic instruments to get QALYs
The EQ-5D-5L instrument

<table>
<thead>
<tr>
<th>Under each heading, please tick the ONE box that best describes your health TODAY.</th>
<th>The best health you can imagine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MOBILITY</strong></td>
<td><strong>1. We like to know how is your health today.</strong></td>
</tr>
<tr>
<td>I have no problems in walking about</td>
<td>100</td>
</tr>
<tr>
<td>I have slight problems in walking about</td>
<td>95</td>
</tr>
<tr>
<td>I have moderate problems in walking about</td>
<td>90</td>
</tr>
<tr>
<td>I have severe problems in walking about</td>
<td>85</td>
</tr>
<tr>
<td>I am unable to walk about</td>
<td>80</td>
</tr>
<tr>
<td><strong>SELF-CARE</strong></td>
<td><strong>2. This scale is marked from 0 to 100.</strong></td>
</tr>
<tr>
<td>I have no problems washing or dressing myself</td>
<td>75</td>
</tr>
<tr>
<td>I have slight problems washing or dressing myself</td>
<td>70</td>
</tr>
<tr>
<td>I have moderate problems washing or dressing myself</td>
<td>65</td>
</tr>
<tr>
<td>I have severe problems washing or dressing myself</td>
<td>60</td>
</tr>
<tr>
<td>I am unable to wash or dress myself</td>
<td>55</td>
</tr>
<tr>
<td><strong>USUAL ACTIVITIES (e.g., work, study, housework, family or leisure activities)</strong></td>
<td><strong>3. 100 means the best health you can imagine.</strong></td>
</tr>
<tr>
<td>I have no problems doing my usual activities</td>
<td>50</td>
</tr>
<tr>
<td>I have slight problems doing my usual activities</td>
<td>45</td>
</tr>
<tr>
<td>I have moderate problems doing my usual activities</td>
<td>40</td>
</tr>
<tr>
<td>I have severe problems doing my usual activities</td>
<td>35</td>
</tr>
<tr>
<td>I am unable to do my usual activities</td>
<td>30</td>
</tr>
<tr>
<td><strong>PAIN/DISCOMFORT</strong></td>
<td><strong>4. Mark an X on the scale to indicate how is your health today.</strong></td>
</tr>
<tr>
<td>I have no pain or discomfort</td>
<td>25</td>
</tr>
<tr>
<td>I have slight pain or discomfort</td>
<td>20</td>
</tr>
<tr>
<td>I have moderate pain or discomfort</td>
<td>15</td>
</tr>
<tr>
<td>I have severe pain or discomfort</td>
<td>10</td>
</tr>
<tr>
<td>I have extreme pain or discomfort</td>
<td>5</td>
</tr>
<tr>
<td><strong>ANXIETY/DEPRESSION</strong></td>
<td><strong>5. Now, please note the number you marked on the scale in the box below.</strong></td>
</tr>
<tr>
<td>I am not anxious or depressed</td>
<td>0</td>
</tr>
<tr>
<td>I am slightly anxious or depressed</td>
<td>The worst health you can imagine</td>
</tr>
<tr>
<td>I am moderately anxious or depressed</td>
<td></td>
</tr>
<tr>
<td>I am very anxious or depressed</td>
<td></td>
</tr>
<tr>
<td>I am extremely anxious or depressed</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1** – EuroQOL-5 Dimensions score. To the left, the descriptive system that defines the health-related quality of life in five dimensions (HRQoL) and to the right, the visual scale in which the patients indicate the perception of their health status (Visual Analog Scale – VAS).
The EQ-5D-5L instrument

• What do we get?

Health profiles

From: 11111  -> No problems in any dimensión
To: 55555  -> Extreme problems in every dimensión

$5^5 = 3125$ possible health states
End of Session 1

To be continued.
EQ-5D: WAYS OF COLLECTING DATA

• There are different ways of collecting and modelling data from EQ-5D
  • Self-reported questionnaire itself (PROMs, National Surveys…)
  • Time Trade Off (Elicitation)
  • Discrete Choice Experiments (Elicitation)
  • …

It will depend on the research question the way of collecting and modelling
Time Trade-Off

• Compare two lives:

  • Time ill is exchanged for time healthy

  • How long would you be willing to live in a particular (hypothetical) health state compared with X years in full health, both before dying?

  • Problem: Health states are given (Semi-randomly) but some of them are very difficult to imagine
Time Trade-Off & Discrete Choice Experiments

- [UK TTO mock up here]
¿Qué es mejor, la vida A, la vida B, o son las dos más o menos lo mismo?

Salud perfecta

10 años

5 años

15 años

- problemas graves para caminar
- sin problemas para lavarme o vestirme
- sin problemas para realizar mis actividades cotidianas
- sin dolor ni malestar
- extremadamente ansioso/a o deprimido/a

A y B son más o menos lo mismo
El número de años "con buena salud" ha disminuido para la vida B. ¿Qué es mejor, la vida A, la vida B, o son las dos más o menos lo mismo?

A y B son más o menos lo mismo
El número de años "con buena salud" ha aumentado para la vida B. ¿Qué es mejor, la vida A, la vida B, o son las dos más o menos lo mismo?

10 años

Salud perfecta

6 años

7 años

Salud perfecta

- problemas graves para caminar
- sin problemas para lavarme o vestirme
- sin problemas para realizar mis actividades cotidianas
- sin dolor ni molestas
- extremadamente ansioso/a o depresivo/a

A y B son más o menos lo mismo
Discrete Choice Task (Spanish Main Study)

En todas las preguntas siguientes, se mostrarán dos estados de salud diferentes. Piense sobre ellos detenidamente. Seleccione el que sea mejor, en su opinión, pulsando el botón “A” o “B”.

- problemas graves para caminar
- no puedo lavarme o vestirme
- problemas leves para realizar mis actividades cotidianas
- dolor o malestar fuerte
- muy ansioso/a o deprimido/a

- no puedo caminar
- sin problemas para lavarme o vestirme
- no puedo realizar mis actividades cotidianas
- dolor o malestar leve
- levemente ansioso/a o deprimido/a
¿Qué le parece mejor, el estado A o el B?

- problemas moderados para caminar
- problemas leves para lavarme o vestirme
- problemas moderados para realizar mis actividades cotidianas
- dolor o malestar leve
- levemente ansioso/a o deprimido/a

- sin problemas para caminar
- problemas graves para lavarme o vestirme
- problemas leves para realizar mis actividades cotidianas
- dolor o malestar leve
- muy ansioso/a o deprimido/a
How do we put together all the information?
Many countries, including Spain, have already developed a new Index that can be used for the obtention of QALYs to do Economic Evaluation.

Representativeness ensured in each country

We obtain weights for each level in each dimension of the EQ-5D-5L

\[ Y_i = f(\beta_0 + MO_1 \beta_1 + SC_2 \beta_2 + UA_2 \beta_3 + PD_2 \beta_4 + AD_2 \beta_5 + \ldots + MO_5 \beta_{16} + SC_5 \beta_{17} + UA_5 \beta_{18} + PD_5 \beta_{19} + AD_5 \beta_{20}) + u_i \]

We can use those weights to estimate an index for a given sample!
What do we use QALYs for?

- Cost-Effectiveness analyses in Economic Evaluations
  - EQIS 2.0 -> Software available (freeware)

- Measuring health of the populations
  - The impact of chronic diseases over the stock of Health
EQIS 2.0

http://www.econ.unavarra.es/~eqis
EQIS 2.0

• Development of a software that is indeed a tool to calculate HRQoL estimates

• Hypotheses
  • Need of a standardized rule.
  • Need of a user-friendly software.
  • Need for a tool to calculate HRQoL indices for a certain population at a certain moment in time

• Limitations
  • EQ-5D by now
  • Still need to introduce 5L versión weigths
EQIS 2.0

• Demo EQIS

  • Show how Indices are obtained
    • Exercise: EQindex for European Countries

  • Show how an Economic Evaluation is performed
THANK YOU VERY MUCH!

maria.erre@unavarra.es