Uncertainty in Evidence-Based Decision Making

1. Problem
2. How to think about uncertain evidence
3. When to think about uncertain evidence
4. Implications
The Problem
The impact of education programmes on learning and school participation in low- and middle-income countries
September 2016
RCTs feasible for few development interventions (Bamberger and White 2007; Stern 2012 citing DFID).
What is a rational approach to evidence-based decision making?

✓ Making the best use of the evidence
✓ Most likely to lead to good decision
How to think about uncertain evidence: consequences and costs
Continuum of Consequences

- We might kill people
- We might waste money
- An arbitrary decision

Unequivocal evidence

Assess imperfect evidence, act and measure
The Consequence of Uncertainty

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<tr>
<th>Drug</th>
<th>Cure Rate</th>
<th>Death Rate</th>
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<tbody>
<tr>
<td>Notsuridox</td>
<td>0-70%</td>
<td>0%</td>
</tr>
<tr>
<td>Uncertanophil</td>
<td>40-50%</td>
<td>0-5%</td>
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<td>Decision Theory</td>
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<td>-----------------------------------------------</td>
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<td>Expected Value</td>
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<td>(realist)</td>
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<td>Maximax</td>
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<td>(optimist)</td>
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<td>Maximizing the maximums</td>
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<td>(best of the best)</td>
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<td>(pessimist)</td>
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<td>Maximum of the minimums</td>
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<td>(best of the worst)</td>
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Harmful

Beneficial

Impact

System Reform  Cash transfers

Optimist (maximax) chooses the highest maximum value – Intervention 1

Realist chooses the highest expected value – Intervention 1

Pessimist (maximin) chooses the highest minimum value – Intervention 2
Message 1: Our approach to an uncertain course of action should be guided by the costs and consequences of that action

- It can be rational to pursue a policy with uncertain outcomes if:
  - Negative effects can be ruled out
  - Large positive effects are plausible
  - Costs are low
Implications

- Systematically consider all negative and unintended outcomes of a policy
- Better cost estimates (less uncertainty in costs)
When to consider uncertain evidence
Attitude to Uncertainty

The Decision
- ‘Focusing Events’ and Policy Windows
- Emergencies
- What is the Alternative?

How Feasible is Better Evidence?
- Complexity
- Ethics
Message 2: Sometimes, acting under uncertainty is better than not acting.
There are more sources of uncertainty than the error bars on the impact estimate.
Learning at Scale: Instruction and Systems Research

- Which instructional approaches improve learning outcomes at scale?
- What aspects of the system support these instructional approaches?

Google: “Learning at Scale CGD Blog”
Uncertainty in Scaling

\[ p(\text{program works at scale}) = p(\text{pilot program works}) \times p(\text{pilot conditions replicated at scale}) \]
Uncertainty in Scaling

\[ p(\text{program works at scale}) = p(\text{pilot program works}) \times p(\text{pilot conditions replicated at scale}) \]
Theory-Driven Approach to Scaling

Teacher Professional Development

Teaching and Learning Materials

Teachers Apply Methods

Children Learn
Uncertainty in External Validity

\[ p(\text{program works here}) = p(\text{program worked there}) \times p(\text{here is similar to there}) \]

\$ for precision, high bar for evidence

Does Reducing Class Size Improve Student Learning?

“A bad estimate from the right place is better than a good estimate from the wrong place”

Pritchett and Sandefur (2013)
Message 3: Uncertainty is the norm

The lure of incredible certitude

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Abstract

Forthright characterization of scientific uncertainty is important in principle and in practice. Nevertheless, economists and other researchers commonly report findings with incredible certitude, reporting point predictions and estimates. To motivate expression of incredible certitude, economists suggest that researchers respond to incentives that make the practice tempting. This temptation is the ‘lure’ of incredible certitude. I appraise some of the rationales that observers may have in mind when they state that incredible certitude responds to incentives. I conclude that scientific expression of incredible certitude at most has appeal in limited contexts. It should not be a general practice.

Keywords: scientific uncertainty; policy analysis; partial identification
Message 4: Identify all sources of uncertainty in a policy decision

Identify them

Measure them

Reduce them (especially those with larger consequences)
Implications
Conclusions

- It can be rational to pursue a policy with uncertain outcomes if:
  - Negative effects can be ruled out
  - Large positive effects are plausible
  - Costs are low
  - A decision is urgent
  - Evidence is hard to improve
  - Uncertainty isn’t mainly about the efficacy of the “intervention”
For Policy Implementation

- Policy Diversification with Small Bets

- Problem-driven iterative adaptation (PDIA)


For Research and Evaluation

- Theory-based approach to identifying where the uncertainty is in a policy decision
- Focus on where data provide the most information (addressing the biggest unknowns with the largest consequences)
- Multidisciplinary research methods to assess and reduce uncertainty (e.g. testing assumptions, threats to validity)
“is evidence informative?”
Thanks!

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• Collaborating, Learning, and Adapting

• Agile M&E
Evidence Hierarchies

- Systematic reviews and meta-analyses of RCTs
- Randomized controlled trials
- Cohort studies
- Case-control studies
- Cross-sectional studies, surveys
- Case reports, case studies
- Mechanistic studies
- Editorials, expert opinion

Quality of evidence: Higher → Lower
Risk of bias: Lower → Higher