Open Policy Analysis for Deworming Interventions

CEGA Staff Meeting

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Motivation 1: Rise Of Alternative Facts

Senator discussing facts on unemployment insurance

Interviewer: "We I have looked at what economist are saying, and [...] there is no measurable evidence that people are staying at home because of [$600 unemp. insurance]"

Congressman: "[scoffs] I don't know which economist you are talking about, but ..."

Motivation 2: Increase Policy Impact Of Development Research

- Focus on impact evaluations
- Research generates knowledge that is both generalizable and specific to a given context.
- **Generalizable knowledge (GK)**: all the major findings (claims) presented in a paper.
  - Examples: treatment effect on main outcomes.

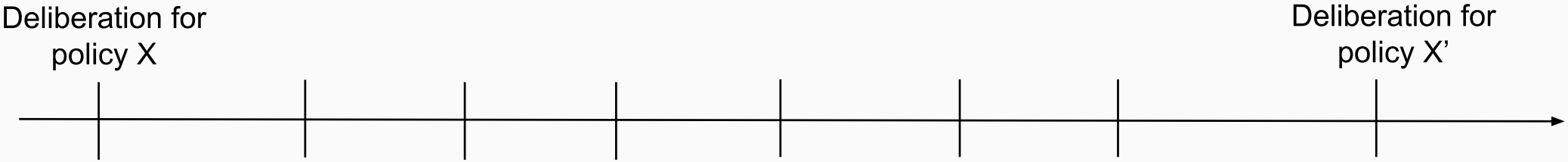
- **Specific knowledge (SK)**: other results and contextual elements discovered during the research steps.

  - Examples: key descriptive statistics (take up of the program, distribution of earnings, etc), how to use the result to inform specific policy debates.

- However, when the research team is primarily foreign, most of the specific knowledge goes away with the them as it is not clearly encoded in documentation.

Motivation 2: Increase Policy Impact Of Development Research

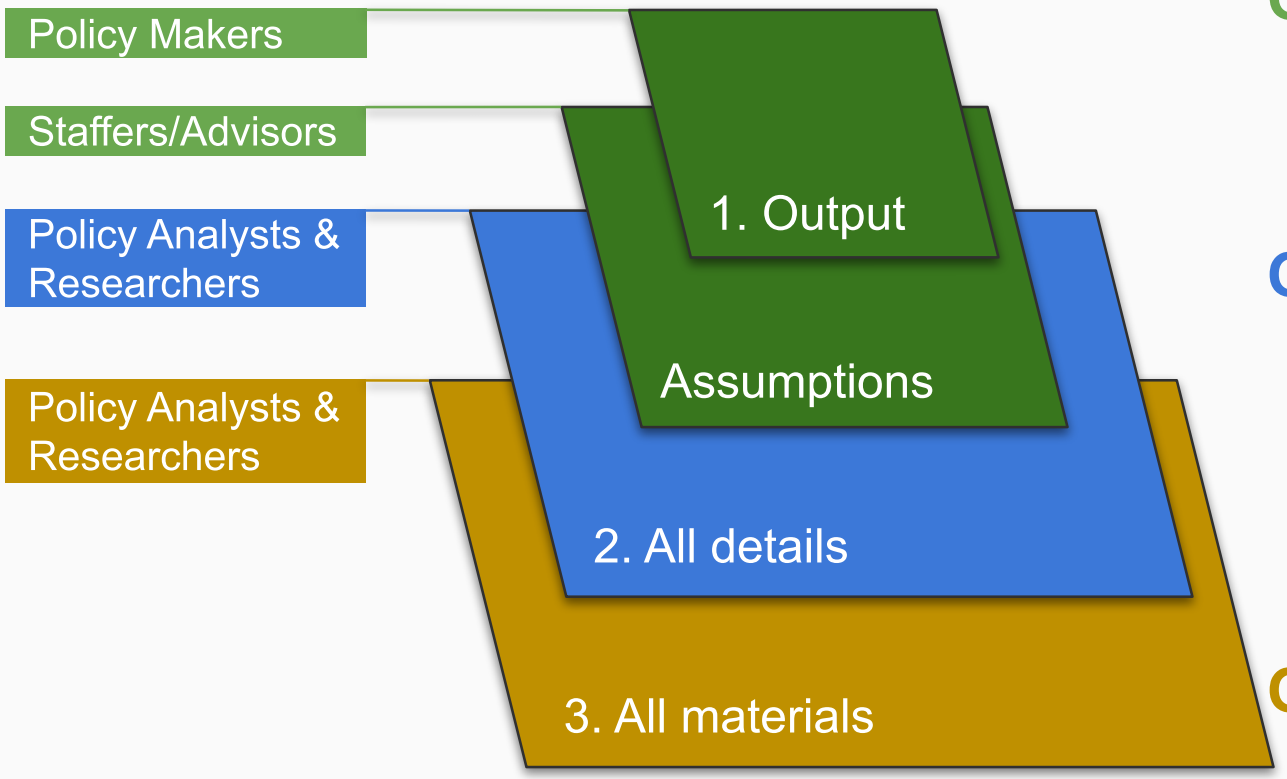
Note: this is the framing from a non-development expert. Welcome references!



Policy	Policy logic Policy analysis ↑ GK, SK	Policy design ↓ SK'_P	-	Implement ation ↓ SK'_P	Completion ↓ SK'_P	-	-	Policy logic Policy analysis ↑ Dev: GK', SK'_P Non - Dev: GK', SK'_P, **SK'_R**
Research	-	Evaluation design ↓ SK'_R	Baseline ↓ SK'_R	-	-	Follow up ↓ SK'_R	Preliminary Results ↓ GK', SK'_R	-

GK: General knowledge; SK: Specific knowledge (P:policy, R:research)

A Framework For Open Policy Analysis



Open Output

- Unified output
- Clear output-input link

Open Analysis

- Open Code
- Open Report
- Label data, research & guesswork

Open Materials

- Common file structure
- Open Data (raw & final)
- Make code/spreadsheets reproducible
- Use version control

Hoces, Grant and Miguel 2020

Deworming Interventions

- Parasitic worm infections are endemic in many countries, disproportionately affecting the poor
- They interfere with regular bodily processes by decreasing nutrient uptake and can thus lead to serious consequences on human health, education outcomes, and long-term economic well being
- Mass deworming interventions, at school level, have been propose as a cost-effective approach to tackle this problem

Different settings for deworming

- Context of original study (Kenya, 1998-99) had very high prevalence rates of worm infections
- Implementation costs where very low ($0.42 per round of treatment)
- Length of treatment was relatively short (2.4 years)
- Current deworming settings have lower prevalence rates, varying implementation costs and length of treatments

Strong debate around initial results

- Ozier (2020) summarizes differences between original findings (Miguel and Kremer 2004) and a re-analysis (Aiken et al, 2015). Emphasizes the role of communication of results in a reanalysis.
- This type of debate (result/re-analysis) can be seen in several other topics. For example: minimum wage, immigration, taxation.
- OPA need not guaranty agreement on key research finding, but should help avoid multiple policy reports

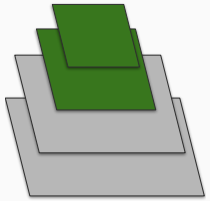
OPA On Deworming Interventions (Kenya+)

Contributions of OPA to deworming:

1. Selected one policy estimate among several alternatives and establish a clear link between it and underlying assumptions
2. Added documentation to increase reproducibility
3. Created a public repository with all materials for one-click reproducibility

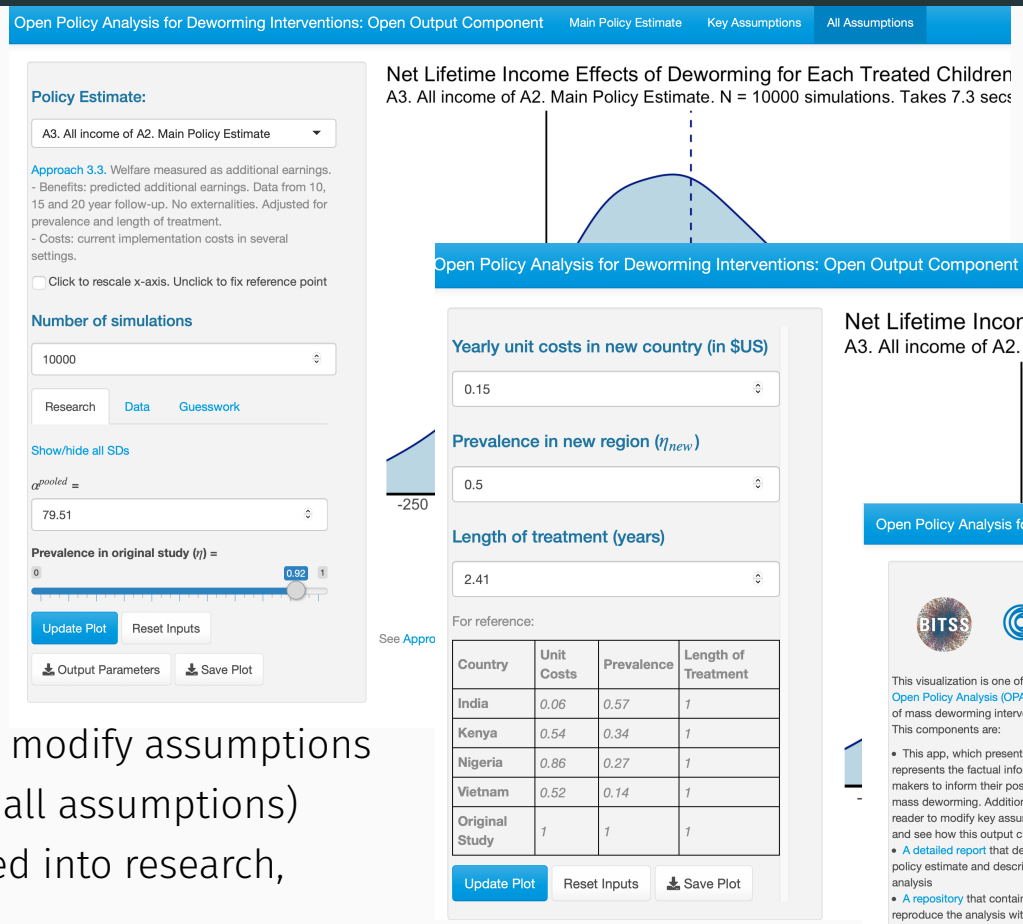
Open Output

Demo



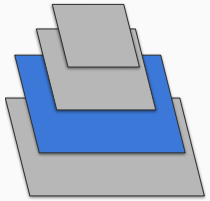
Main features

- One clear output previously agreed in consultation with policy partner
- Two additional tabs to modify assumptions (key assumptions and all assumptions)
- Each source is classified into research, data, or guesswork
- High level equations added to illustrate location of components
- Added feature to modify standard deviations
- Track values of each component



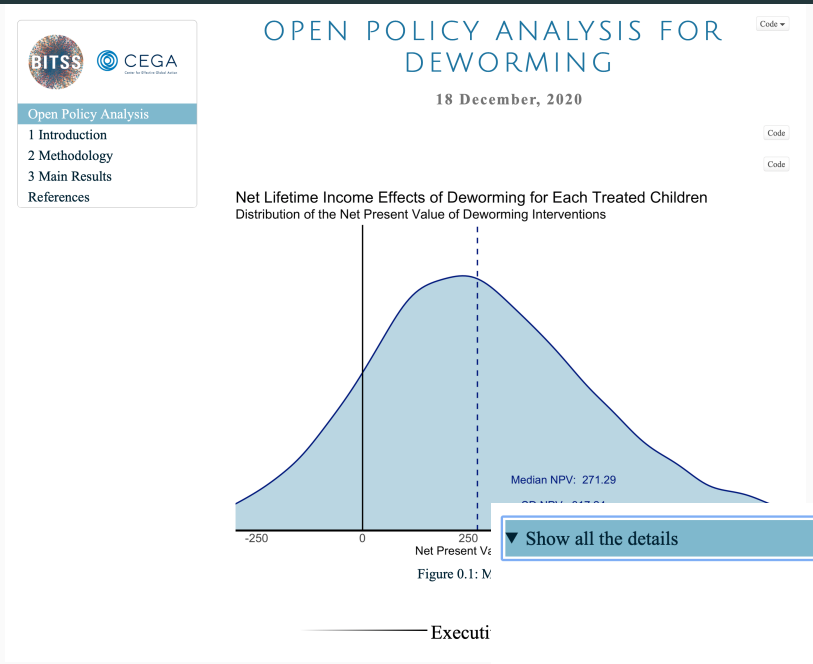
Open Analysis

Demo



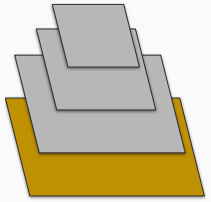
Main features

- Complete narrative description of the methodology
- Translation of each narrative step into an equation
- Implementation of each equation into code
- Combine all of the above into using a dynamic document (RMarkdown)
- Presentation of narrative, equations, and code in layered fashion to avoid overwhelming the reader



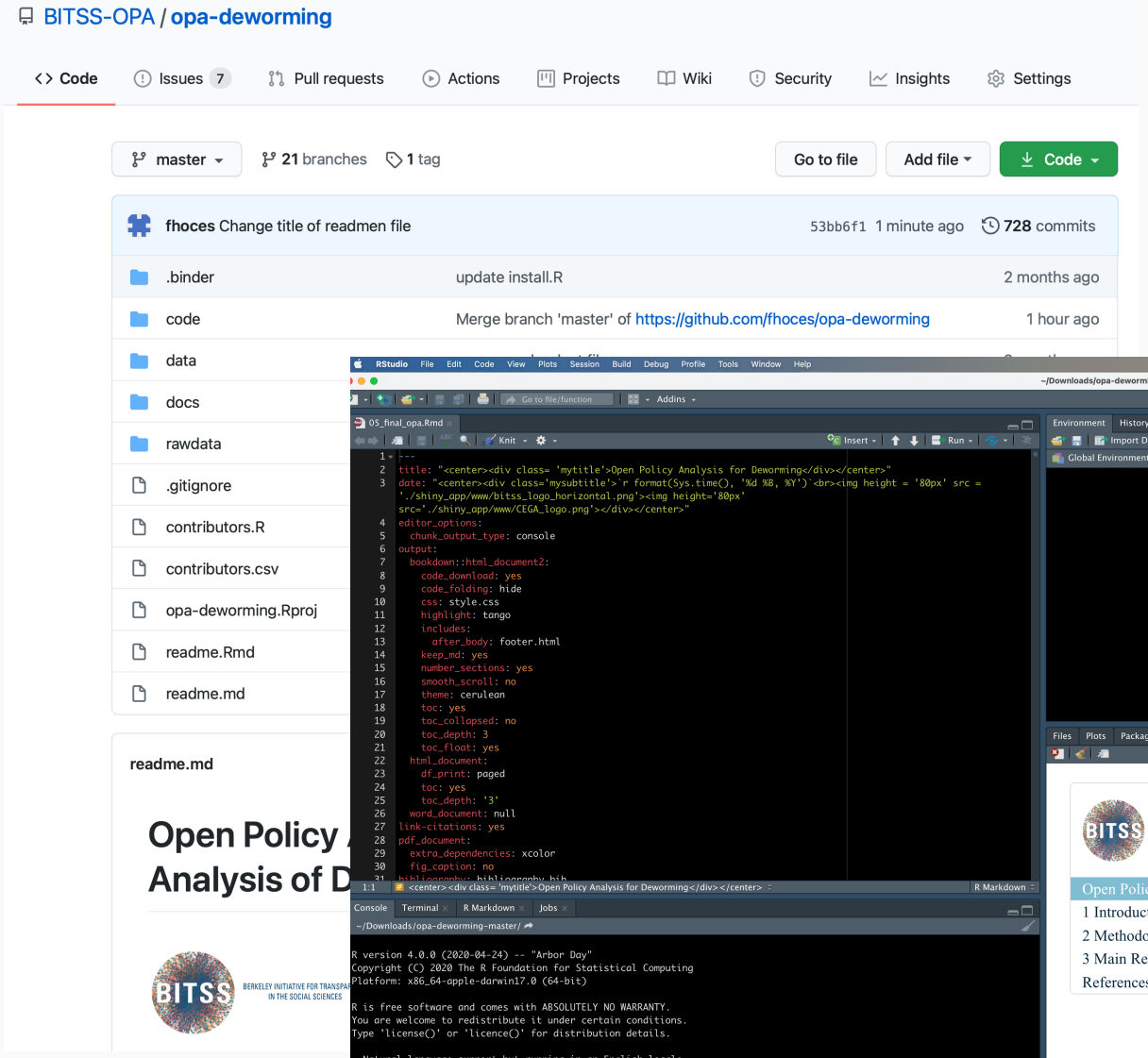
Open Materials

Demo



Main features

- One-click reproducible documentation and app
- Extensive readme files
- Clear folder structure
- Version controlled
- Open data
- Acknowledgment to all contributors

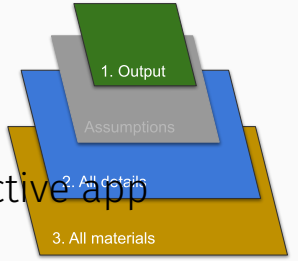


What About The Motivation?

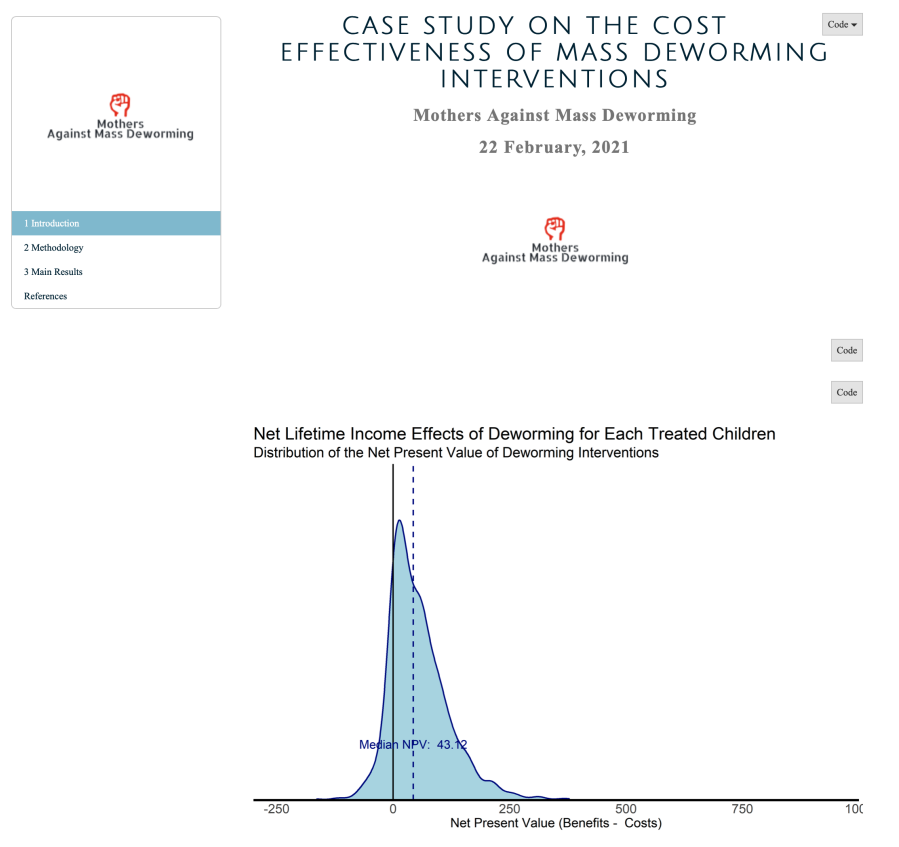
How does this OPA help to stop the raise of alternative facts?

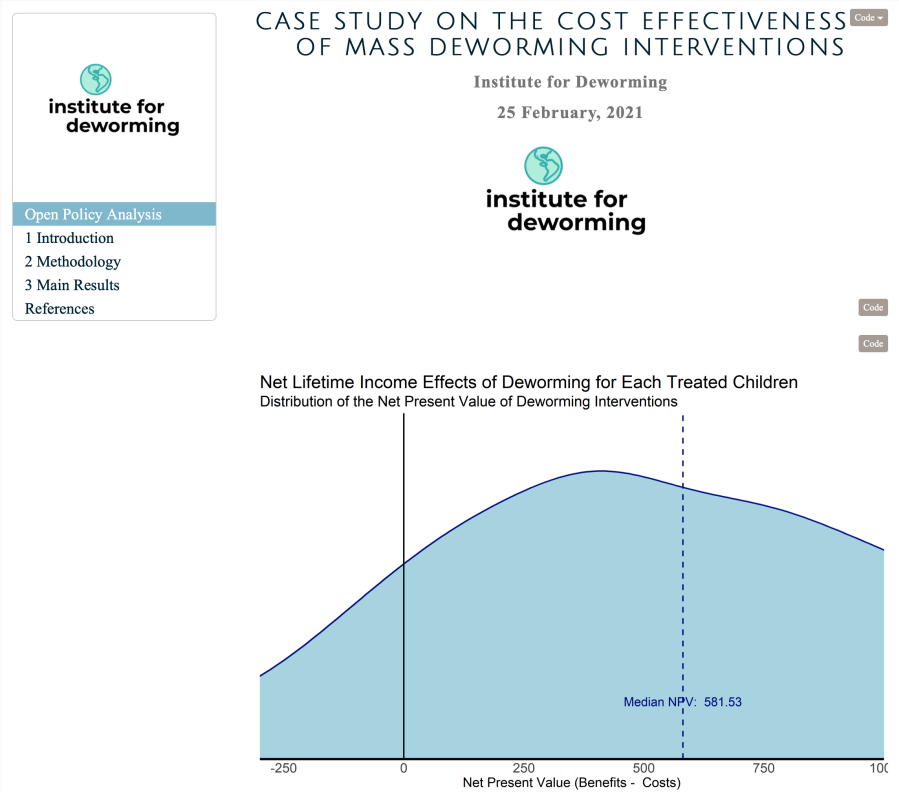
How does this OPA increases the policy impact of development research?

What If The Policy Analysis Does Not Have Open Output?



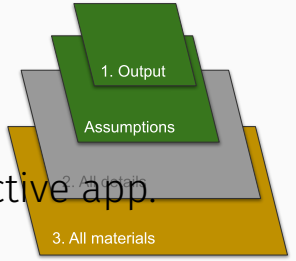
- Two fictitious policy analyses
- The connection between all assumptions and final output has been hidden
- Both claim to report on the same fact (policy estimate). Code is available, reproducible, and each as an interactive app and dynamic document.
- Wildly different results by choosing a different policy approach (and not reporting)

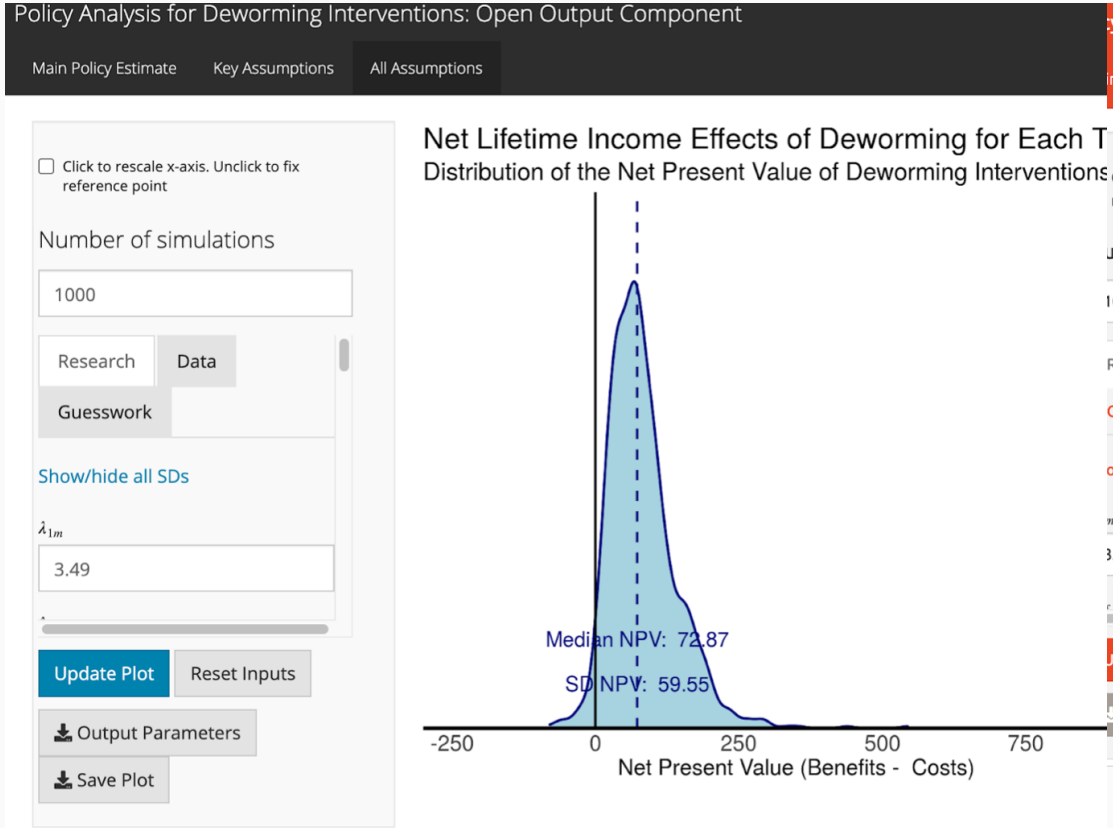


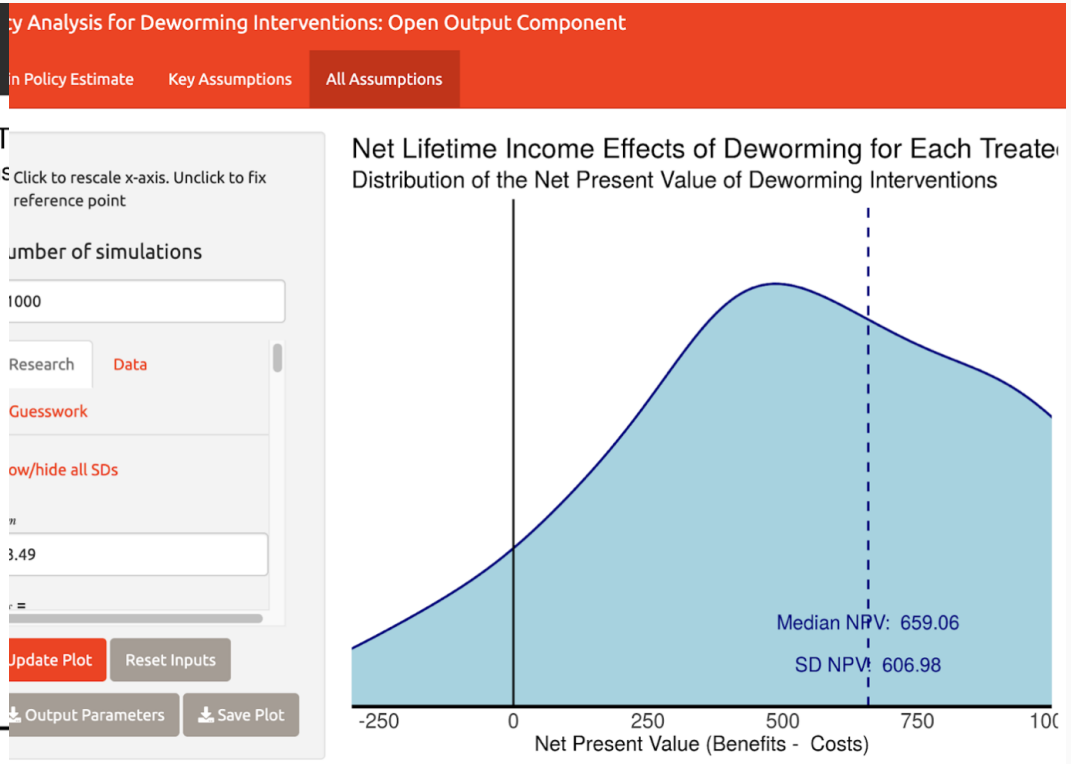


What If It Does Not Have Open Analysis?

- Two fictitious policy analyses
- The connection between all assumptions and final output has been hidden
- Both claim to report on the same fact (policy estimate). Code is available, reproducible, and each as an interactive app.
- Wildly different results by slightly modifying the underlying assumptions in the desired direction







How Does This OPA Increases The Policy Impact Of Deworming Research?

Examples of specific knowledge:

- How to use the results main result in an adjusted CBA (add printout of table 5)
  - How to compute costs, benefits.
  - What are the relevant prevalence rates, take-up rates.
- How do results change when including/excluding analysis of externalities
- What is the best representation of the facts given for a new setting
- How some specific computations are performed (simple averages, definition of discount rates)

General knowledge:

- Effect of deworming on earnings
- Effect of deworming on per-capita consumption
- Effect of deworming on per-capita household earnings

TABLE V

FISCAL IMPACTS OF DEWORMING SUBSIDIES

	No subsidy	Partial subsidy	Full subsidy	Notes
Panel A: Calibration parameters				
Size of subsidy: S	\$0.00	\$1.15	\$1.42	From Deworm the World; Kremer and Miguel (2007)
Take-up rate: $Q(S)$	5%	19%	75%	From Kremer and Miguel (2007)
Average per-person cost: $SQ(S)$	\$0.00	\$0.22	\$1.07	Subsidy × take-up rate
Mean per person increase in work hours/week: λ_1	0.00	0.44	1.75	Men: increase of 3.49 hours/week; women: no change (Table III). Partial subsidy multiplied by $\frac{Q(S)}{Q(\text{full})}$
Mean increase in work hours/week from externality: $p\lambda_2$	0.00	1.76	5.21	10.20 (Table III) × Coverage of treatment school students within 6 km (R, 68.1%) × [$Q(S)$ for full subsidy, $\frac{Q(S)}{Q(\text{full})}$ for partial subsidy]
Mean increase in schooling costs	0.00	2.71	10.71	NPV of (additional secondary schooling costs per pupil-year (\$116.85) × direct increase in secondary schooling). Partial subsidy multiplied by $\frac{Q(S)}{Q(\text{full})}$.
Mean increase in schooling costs from externality	0.00	3.40	13.42	NPV of (additional secondary schooling costs per pupil-year (\$116.85) × externality increase in secondary schooling). Partial subsidy multiplied by $\frac{Q(S)}{Q(\text{full})}$.
	subsidy	subsidy	subsidy	Notes
Panel B: No health spillovers				
Annual increase in per person earnings	\$0.00	\$3.91	\$15.44	λ_1 × starting wage × 52
NPV increase in per person earnings (relative to no subsidy)	—	\$36.08	\$142.43	9.85% annual (real) interest rate in Kenya
NPV increase in per person government revenue	—	\$3.27	\$12.90	NPV earnings × 16.575% tax rate − Direct schooling costs
Panel C: With health spillovers				
Annual increase in per person earnings	\$0.00	\$26.77	\$83.11	$(\lambda_1 + (\frac{p}{R})\ \lambda_2)$ × starting wage x 52
NPV increase in per person earnings (relative to no subsidy)	—	\$246.99	\$766.81	9.85% annual (real) interest rate in Kenya
NPV increase in per person government revenue	—	\$34.83	\$102.97	NPV earnings × 16.575% tax rate − (Direct + externality schooling costs)

Lessons For Future OPA projects: Timeline

1. Reviewed existing documentation
2. Review code/spreadsheets and write down missing documentation.
3. Add equations to reflect any additional clarifying steps.
4. Translate analysis to code scripts (ideally open source software)
5. Check for computational reproducibility and consult with original analysts for discrepancies/further questions
6. Discuss with policy partner on target policy estimate
7. Draft doodle of app
8. Incorporate any potential new analysis (repeat steps 1 - 3)
9. Present draft of OPA (DD and doodle of app) to policy partner
10. Incorporate comments into documentation of the OPA
11. Build app based on analysis of dynamic document
12. Incorporate any additional features requested by policy partner
13. Verify that all three components produce the same output
14. Publish v1.0

Lessons For Future OPA projects: Useful Practices

Documentation of analysis and app are connected

- Each analytic step is declared in the documentation and wrapped in a function
- All this steps are used to produce the results in the documentation
- The steps are also stored in a file that is later sourced in the app.
- If something changes in the report, it will update the app.

Style guide

- Group objects according to use: only within the documentation, for simulations, and for the app
- Use diagram trees to depict nested relationships

Lessons For Future OPA Projects: Costs

- Costs (approx bandwidth over a year at full time):
    - Principal Investigator 30-50%
    - Research assistant/programmer 100-150%
    - Program Manager 20%-30%
    - Original researcher: 1-5%
- Not all policy analysis justify this level of effort
- Characteristics that might justify an OPA:
    - Topics with strong disagreement on the facts among analysts
    - Recurrent reports (eg. ex-ante economic analysis from development banks/agencies)
    - Topics that have large expected welfare effects (eg. tax reform, social cost of carbon)
- With each new OPA project, templates will emerge and costs will likely fall
- To do: bare-bones OPA. Probably linked to ACRE guidelines (level 3 - 4?)

Additional Benefits Of OPA

Easy to update and reuse

After deworming OPA is released, anybody can modify and improve into a newer version

Clearer connection of how evidence from research is used in policy analysis

Researchers can see clearly where their estimates are being used in a policy analysis. For example, the OPA can be used to justify power calculations of potential new studies.

Connection with forecasting

When there is little information for a parameter used in an OPA, a forecasting exercise can be carried out to elicit expert knowledge (DellaVigna, Pope, Vivalt 2019).

Challenges From This OPA

- Small costs makes it less controversial to explore trade-offs
- No distributional component
- Well develop policy analysis leave small space for guess work

Next Steps

- Communications and fundraising outreach (Thanks to ...):
  - Blog for development audience (Lauren and EA!)
  - Blog for policy audience (Aleks and Katie!)
  - Media outreach (Lauren & Dustin!)
  - Fundraising outreach (Carson & Katie!)
  - Video (Jui!) and landing page (Aleks!)
- In parallel I will be contacting other researchers and policy analysis to line up more OPA projects