

# An Open Policy Analysis for Deworming Interventions

## BITSS Annual Meeting

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Fernando Hoces de la Guardia, BITSS  
11 February 2022 | [slides](#)

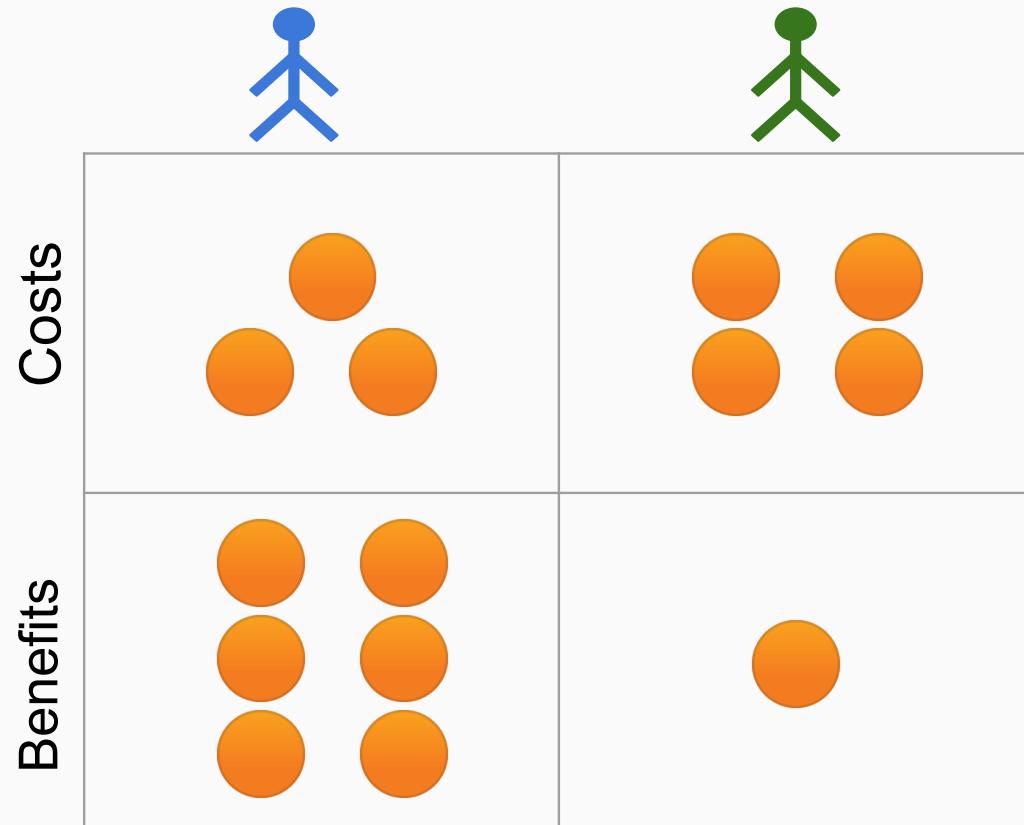
# Structure of the Presentation

- The case for transparency in policy analysis
- An application of the Open Policy Analysis framework into a deworming intervention policy

# Ideal Policy Analysis Report

- Developed to inform a specific policy debate
- Main populations are clearly identified
- Costs and benefits are measured for each population
- All policy estimates are in comparable units

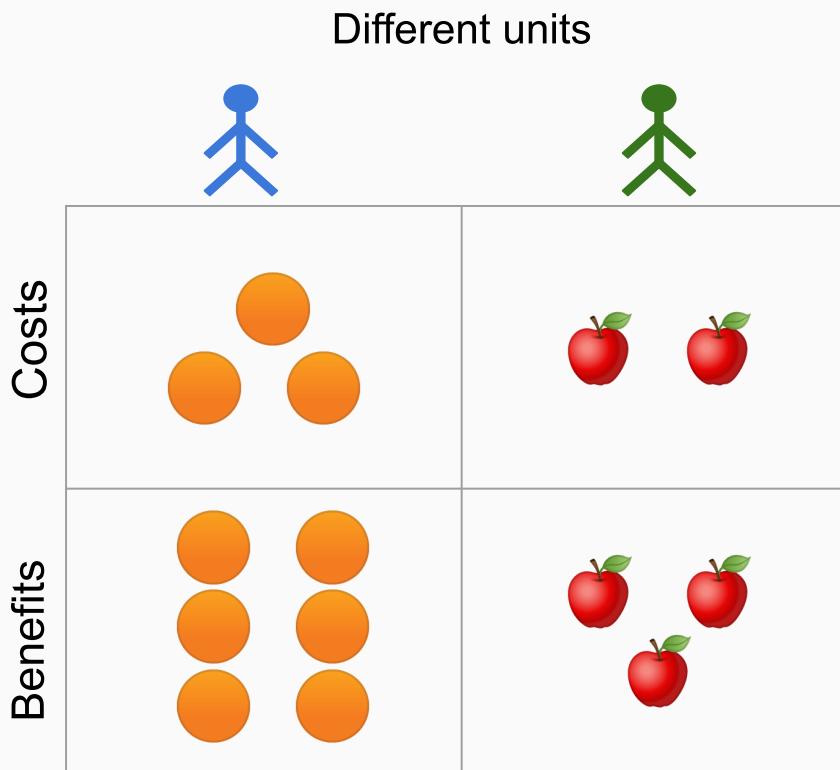
Distributional Effects of Policy X



Support for policy X  $\Rightarrow$  Higher normative valuation of blue population

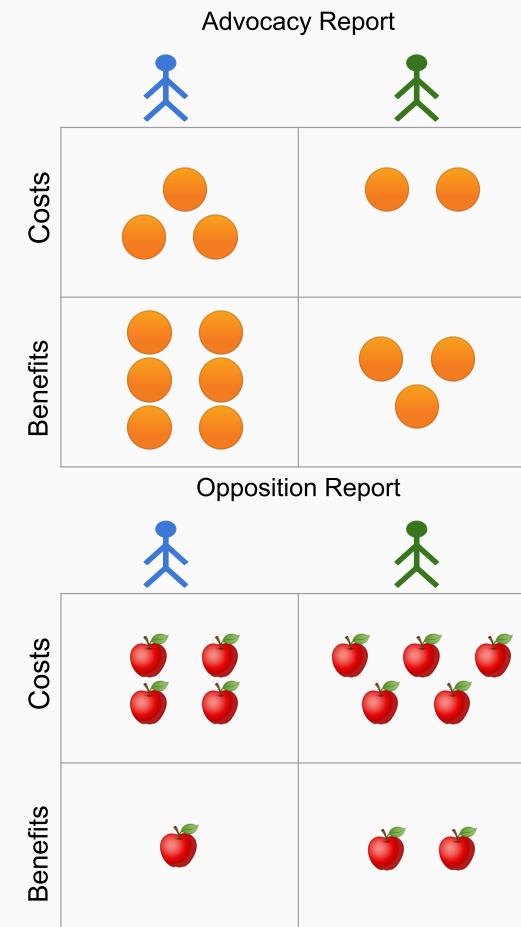
# Departures From the Ideal Analysis

- Non-comparable reports



Examples:

- Dueling Certitudes/Report Wars (Manski 2013, Wesselink et al, 2013)



# Policy makers can pick their own analysis

Senator 1 *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]"

Senator1: "[scoffs] I don't know which economist you are talking about, but ..."

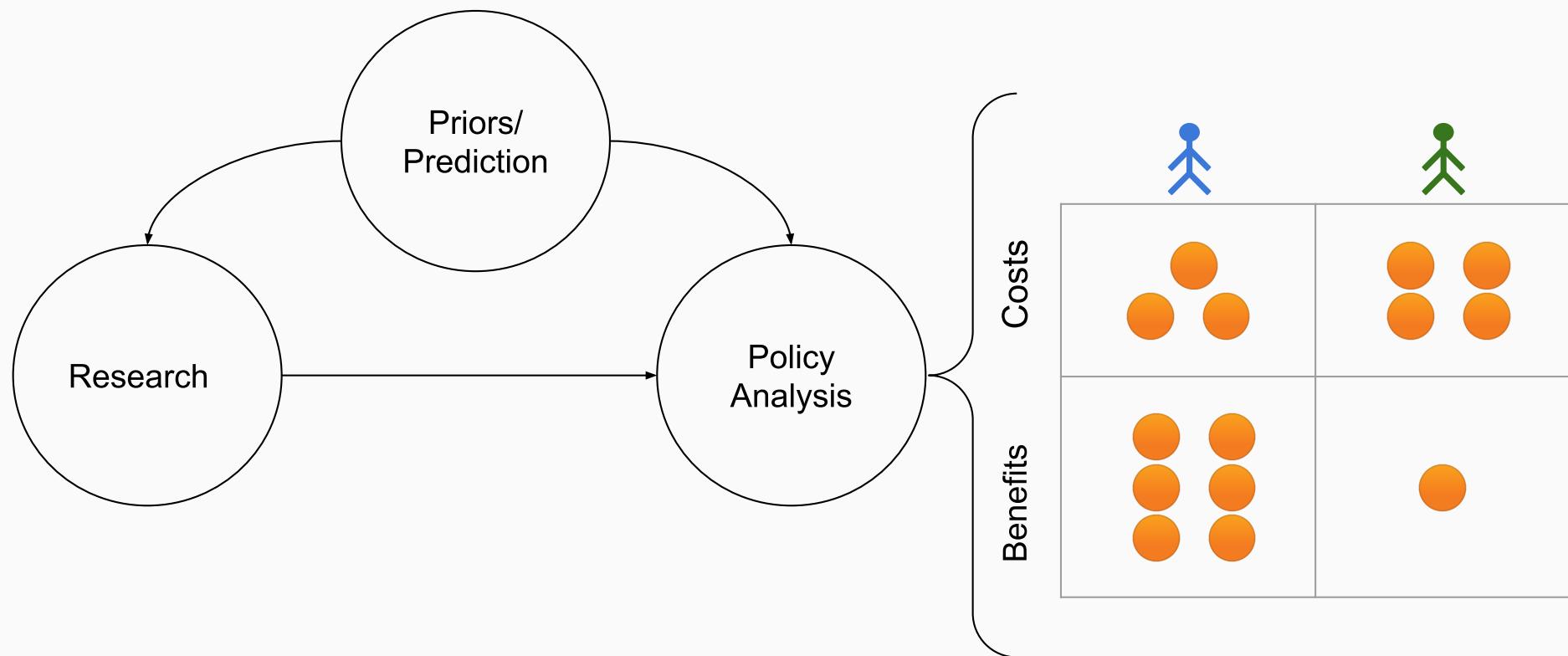


Senator 2 *discussing facts* on costs of healthcare reform

Senator2: "...I don't think there is a study out there that does not suggest suggests that [proposed reform] is far less expensive than [status quo]"

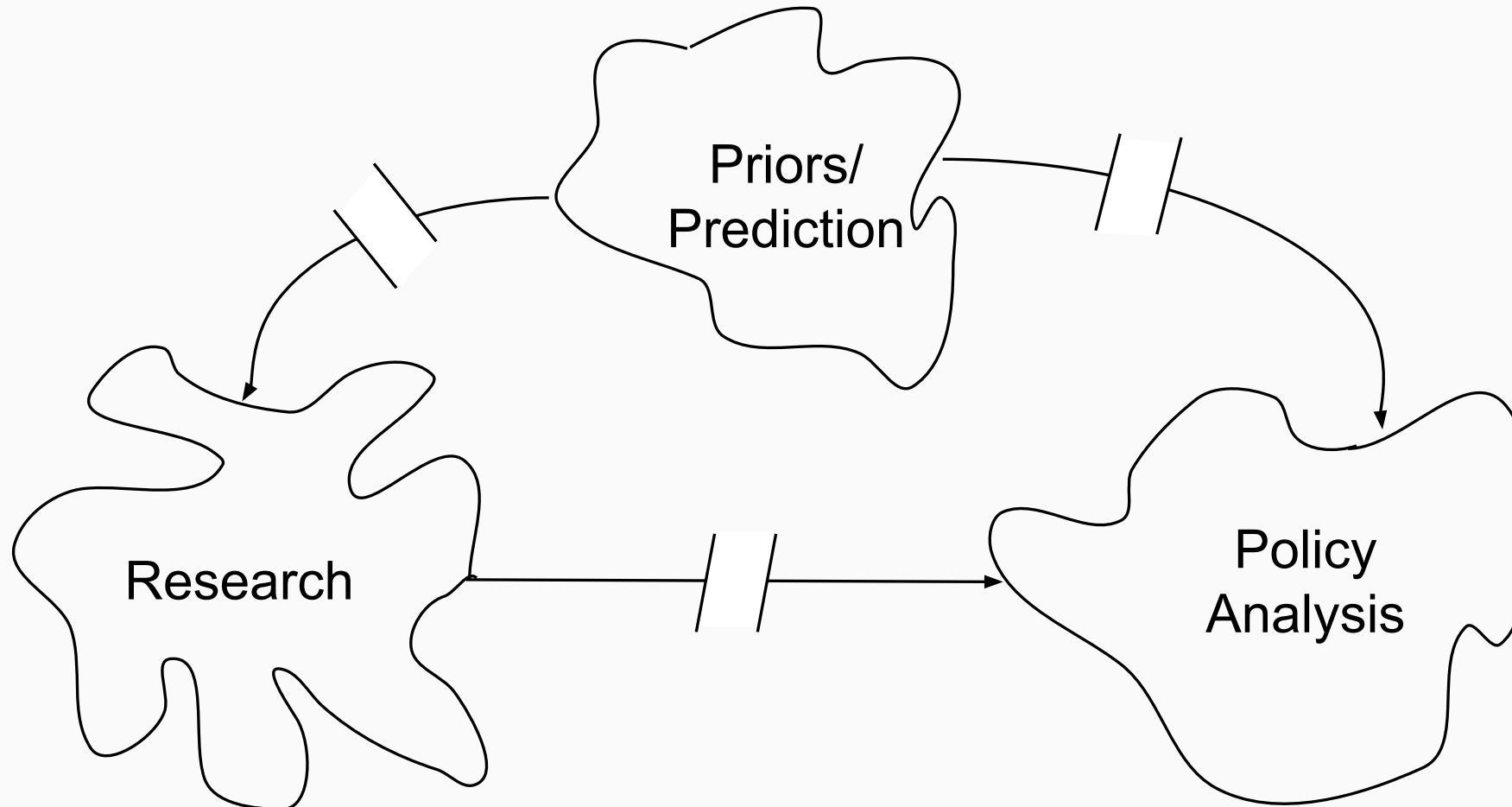
# What's wrong with the Evidence-to-Policy Pipeline?

Ideal connection between research and policy analysis



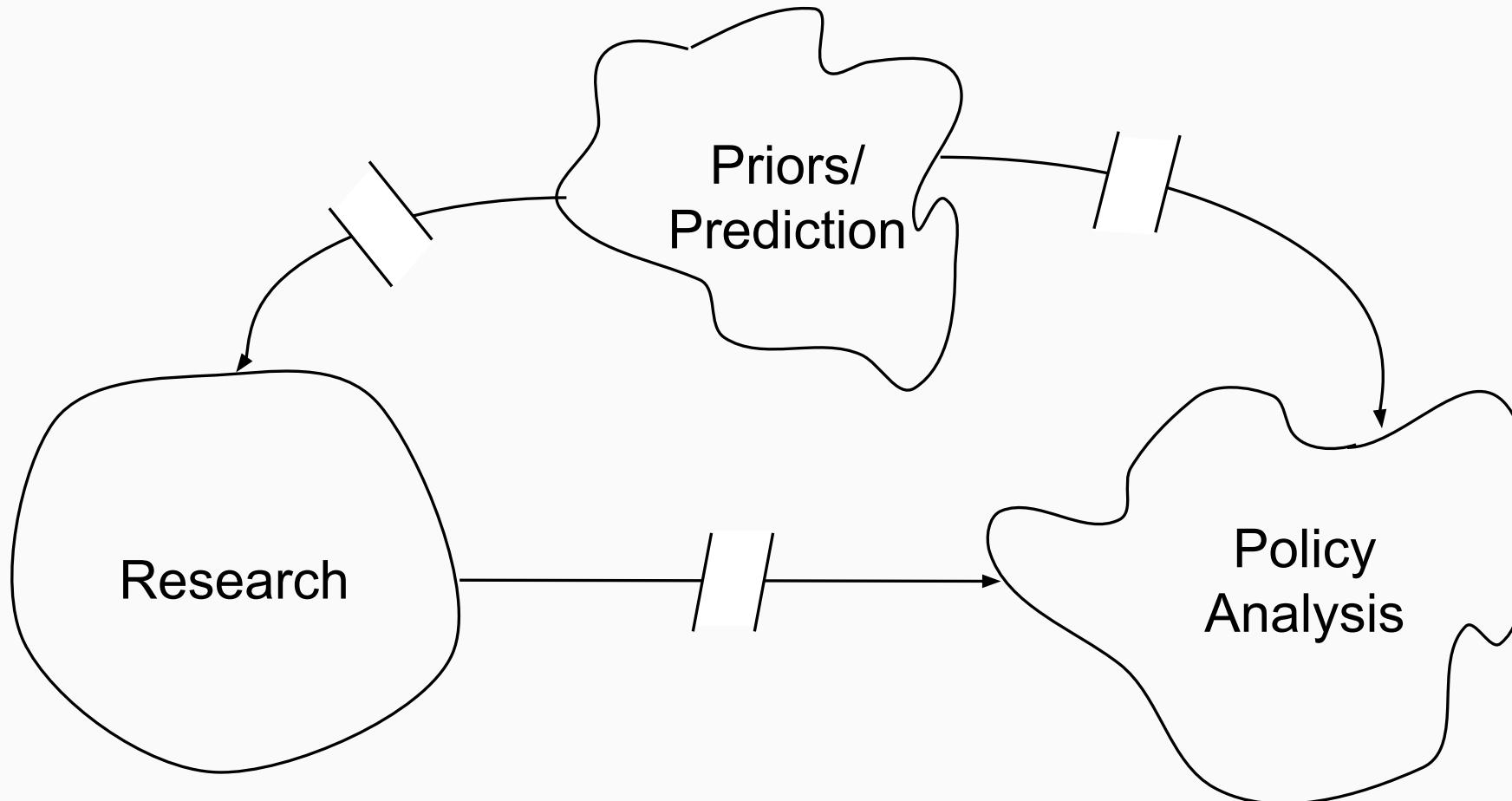
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**Pre-Credibility** -- Cred. Revo. (1990s) -- Open Science+ (2010s) -->



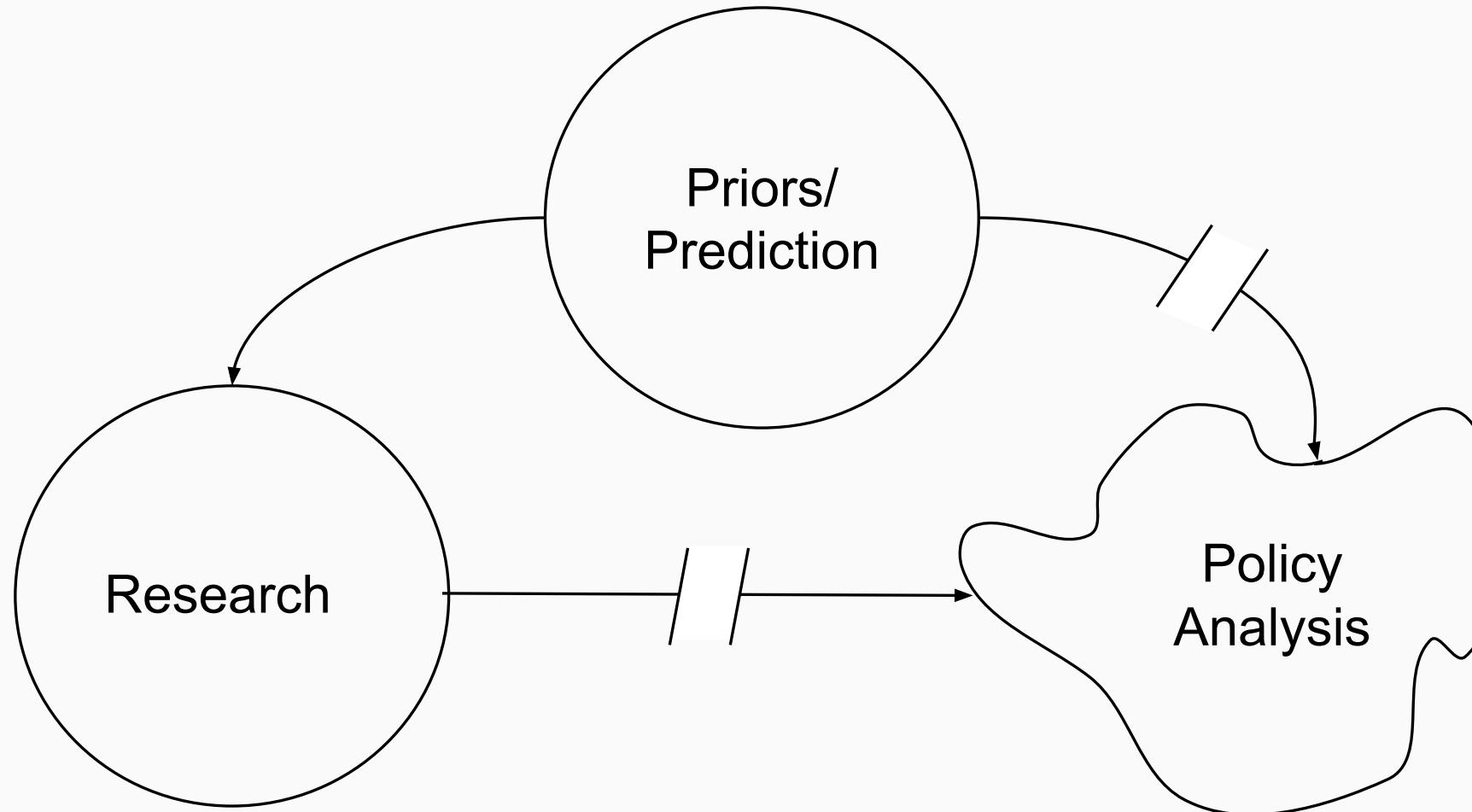
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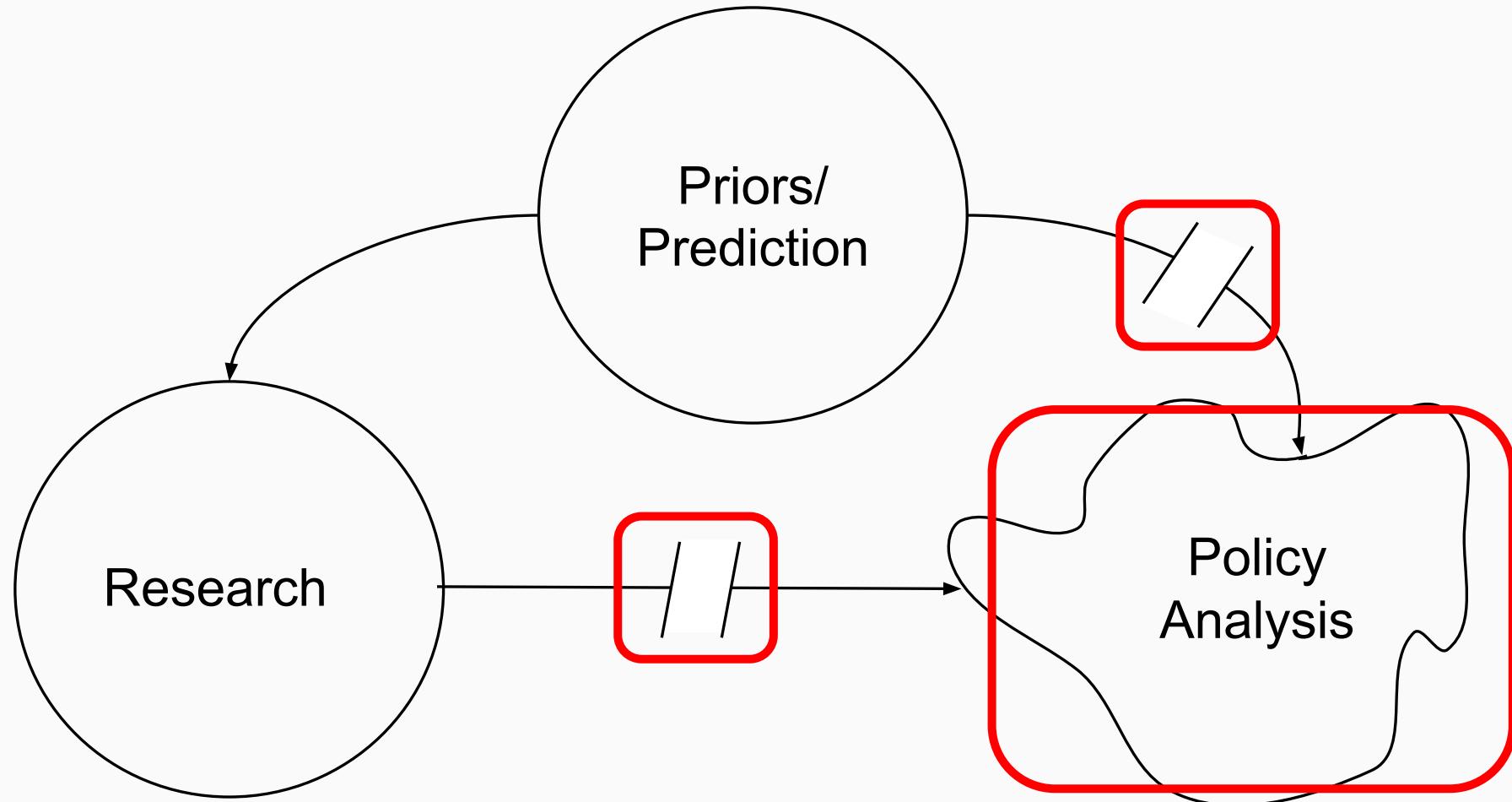
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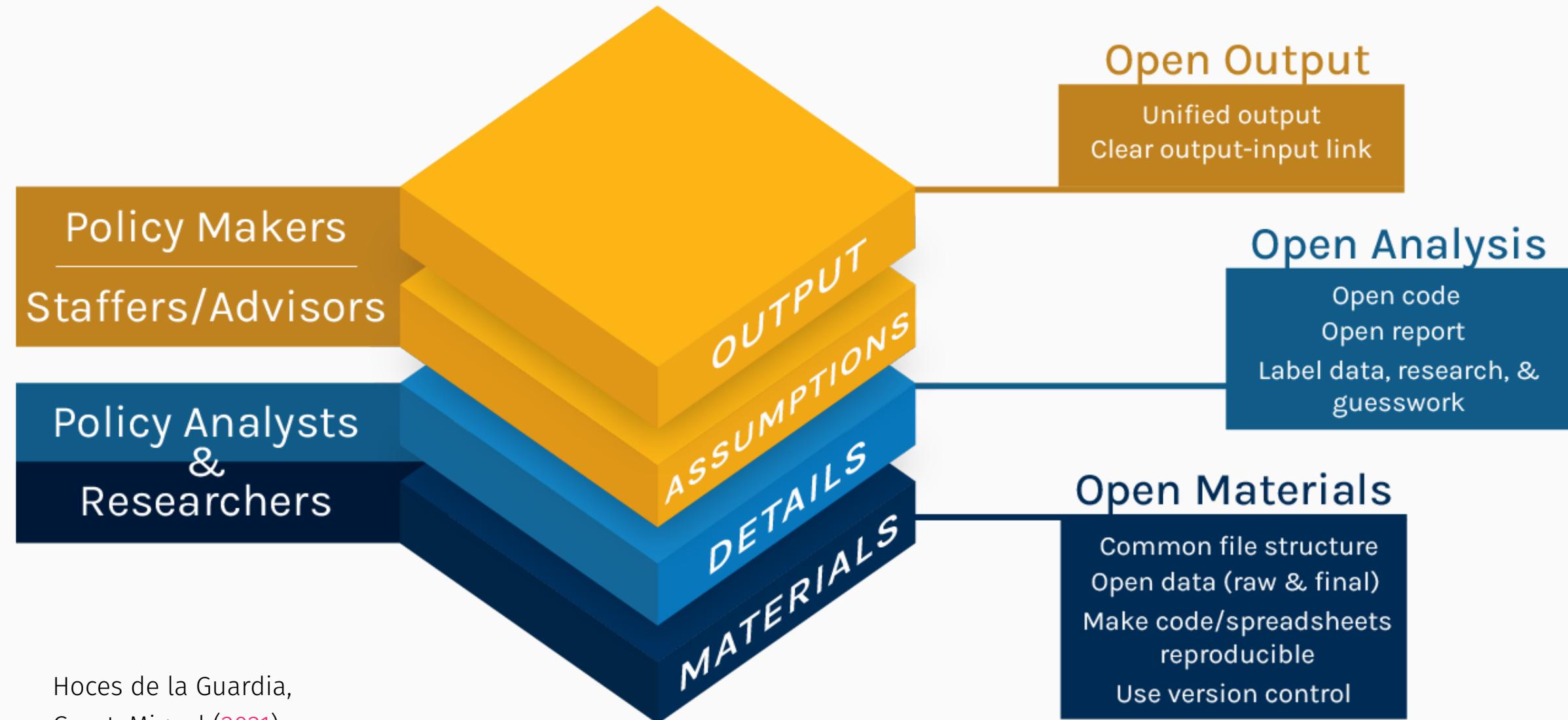


# What's wrong with the Evidence-to-Policy Pipeline?

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# Our Proposal: A Framework for Open Policy Analysis



# Application to Deworming Interventions

## Policy issue and proposed policy

- Parasitic worm infections are endemic in many LMICs
- Decrease nutrient uptake and can thus lead to serious consequences on human health
- Analyze Policy of mass deworming interventions, at school level

## Extrapolating from research

- Findings come from intervention in Kenya in 1998-99 (Miguel and Kremer 2004, Baird et. al. 2016, Hamory et. al. 2020)
- Current settings around the world vary in prevalence rates, implementation costs, and length of treatments



## 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

# Barriers to scaling-up: Incentives, incentives, incentives

No single agent/stakeholder has incentives to individually increase transparency.

## **Policy Markers:**

- Better off having a menu of reports.

## **Policy Analysts:**

- Constantly putting down fires, no time to thoroughly improve documentation.
- Opacity in policy analysis increases the value of reputation. Hence, high credentialed analysts have the negative incentives to increase transparency.

## **Researchers:**

- Incentive to generate novel and rigorous findings trumps everything else.
- No incentive to increase the rigor of extrapolation exercises ("quick and dirty", "back of the envelope")
- Widespread contempt from academia to policy analysis.

# Next Steps for OPA

## Dewroming OPA v2.0

- Incorporate intergenerational effect on children mortality

## Unemployment Insurance OPA v0.3 (w/BIFYA)

- Review and improve Open Materials component

## Promote transparency in policy analysis

- Find and support policy entrepreneurs for transparency in policy analysis (e.g. Santiago Levy for Impact Evaluations)

# Thank You

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openpolicy@berkeley.edu

# Back-up Slides

# 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 Policy Analysis for Deworming Interventions: Open Output Component Main Policy Estimate Key Assumptions All Assumptions

**Policy Estimate:**  
A3. All income of A2. Main Policy Estimate

Approach 3.3. Welfare measured as additional earnings.  
- Benefits: predicted additional earnings. Data from 10, 15 and 20 year follow-up. No externalities. Adjusted for prevalence and length of treatment.  
- Costs: current implementation costs in several settings.

Click to rescale x-axis. Unclick to fix reference point

**Number of simulations**  
10000

Research Data Guesswork

Show/hide all SDs

$\alpha^{pooled} =$   
79.51

Prevalence in original study ( $\eta$ ) =  
0 0.92 1

Update Plot Reset Inputs

Net Lifetime Income Effects of Deworming for Each Treated Children  
A3. All income of A2. Main Policy Estimate. N = 10000 simulations. Takes 7.3 secs

Open Policy Analysis for Deworming Interventions: Open Output Component Main Policy Estimate Key Assumptions All Assumptions

Yearly unit costs in new country (in \$US)  
0.15

Prevalence in new region ( $\eta_{new}$ )  
0.5

Length of treatment (years)  
2.41

For reference:

Country	Unit Costs	Prevalence	Length of Treatment
India	0.06	0.57	1
Kenya	0.54	0.34	1
Nigeria	0.86	0.27	1
Vietnam	0.52	0.14	1
Original Study	1	1	1

Update Plot Reset Inputs Save Plot

Net Lifetime Income Effects of Deworming for Each Treated Children  
A3. All income of A2. Main Policy Estimate.

Open Policy Analysis for Deworming Interventions: Open Output Component Main Policy Estimate Key Assumptions All Assumptions

CEGA Center for Effective Global Action

This visualization is one of three key components of an [Open Policy Analysis \(OPA\)](#) on the costs and benefits of mass deworming interventions in various settings. This components are:

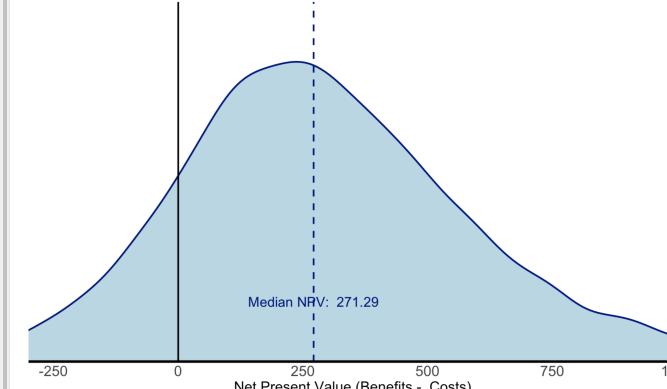
- This app, which presents a single output that best represents the factual information required by policy makers to inform their position regarding a policy of mass deworming. Additional two other tabs allow reader to modify key assumptions and components and see how this output changes
- A [detailed report](#) that describes how to obtain the policy estimate and describes each component of the analysis
- A [repository](#) that contains all the materials needed to reproduce the analysis with minimal effort (report and interactive app).

The app is the result of a collaboration between the [Berkeley Initiative for Transparency in the Social Sciences](#) and [Evidence Action](#).

See a full contributors list [here](#).  
See the dynamic document of this shiny app [here](#).  
See more OPA projects done by BITSS [here](#).

**Description of Results**  
We simulate finding the lifetime income effects on treated

Net Lifetime Income Effects of Deworming for Each Treated Children  
Distribution of the Net Present Value of Deworming Interventions



# 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

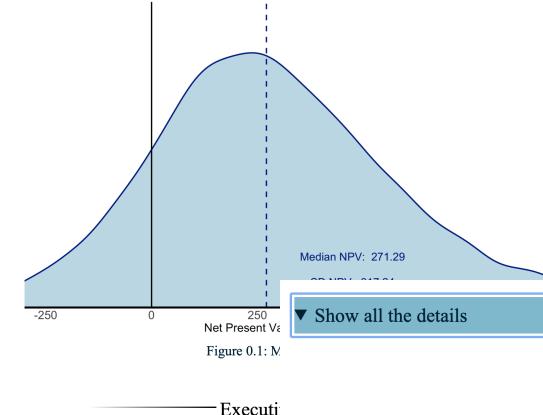
BITSS CEGA  
Open Policy Analysis

- 1 Introduction
- 2 Methodology
- 3 Main Results
- References

### OPEN POLICY ANALYSIS FOR DEWORMING

18 December, 2020

Net Lifetime Income Effects of Deworming for Each Treated Children  
Distribution of the Net Present Value of Deworming Interventions



$$B = \sum_{t=0}^{50} \left( \frac{1}{1+r} \right)^t E_t \quad (1)$$

Where:

- $E_t$ : earnings individuals are expected to generate at period t
- $r$ : real interest rate as the discounting rate
- $t$ : period t. Period 0 represents time of intervention. Individuals are assumed to enter the labor market 9 years after treatment.

```
# - inputs: stream earnings, discounting rate, number of periods
# - outputs: function that computes the present value of benefits
chunk_benefits <- function(){
#####
pv_benef_f <- function(
  earnings_var = earnings_in,
  interest_r_var = interest_in,
  periods_var = periods_so
) {
  index_t <- 0:periods_var
  res1 <- sum( ( 1 / (1 + interest_r_var) )^index_t * earnings_var )
  return(res1)
}
```

# 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

BITSS-OPA / [opa-deworming](#)

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

master 21 branches 1 tag Go to file Add file Code

fhoces Change title of readmen file 53bb6f1 1 minute ago 728 commits

.binder update install.R 2 months ago

code Merge branch 'master' of <https://github.com/fhoces/opa-deworming> 1 hour ago

data

docs

rawdata

.gitignore

contributors.R

contributors.csv

opa-deworming.Rproj

readme.Rmd

readme.md

RStudio File Edit Code View Plots Session Build Debug Profile Tools Window Help

OS\_final\_opa.Rmd

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1 ---  
2 title: "<center><div class= 'mytitle'>Open Policy Analysis for Deworming</div></center>"  
3 date: "<center><div class='mysubtitle'>r format(Sys.time(), '%d %B, %Y')<br><img height='80px' src = '<img src = 'https://shinyapp/www/bitsys_logo_horizontal.png'>'<br><img height='80px' src = '<img src = 'https://shinyapp/www/CEGA_logo.png'>'</div></center>"  
4 editor_options:  
5 chunk_output_type: console  
6 output:  
7 bookdown::html_document2:  
8 code_download: yes  
9 code_folding: hide  
10 css: style.css  
11 highlight: tango  
12 includes:  
13   after_body: footer.html  
14 keep_md: yes  
15 number_sections: yes  
16 smooth_scroll: no  
17 theme: cerulean  
18 toc: yes  
19 toc_collapsed: no  
20 toc_depth: 3  
21 toc_float: yes  
22 html_document:  
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26 word_document: null  
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28 pdf_document:  
29 extra_dependencies: xcolor  
30 fig_caption: no  
31 bibliography: bibliography.bib
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readme.md

Open Policy Analysis of Deworming

BITSS BERKELEY INITIATIVE FOR TRANSPARENCY IN THE SOCIAL SCIENCES

R version 4.0.0 (2020-04-24) -- "Arbor Day"  
(Copyright (C) 2020 The R Foundation for Statistical Computing  
Platform: x86\_64-apple-darwin17.0 (64-bit)

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Natural language support but running in an English locale

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'citation()' on how to cite R or R packages in publications.)

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Open Policy Analysis

1 Introduction  
2 Methodology  
3 Main Results  
References

Net Lifetime Income Effect  
Distribution of the Net Present Value

19 / 23

# What happens if one principle fails: Opaque Output

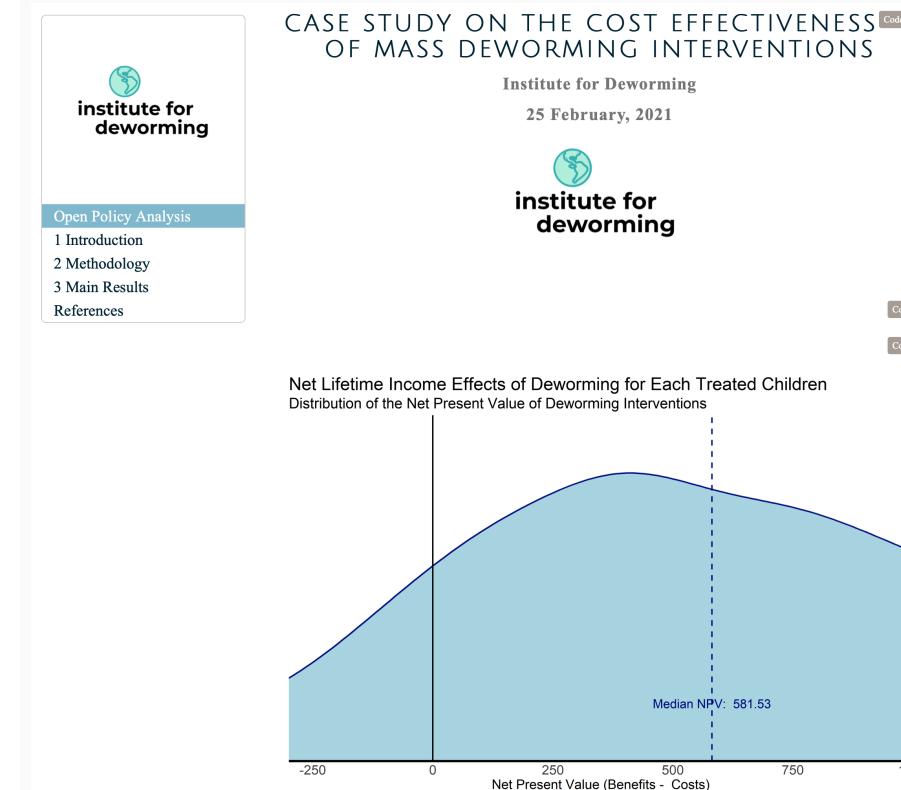
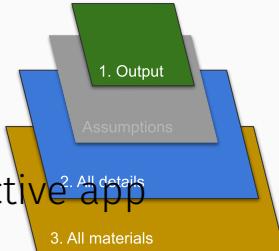
- Policy estimates of approach 2 of deworming (Baird et al, 2016)
- Assume Open Analysis and Open Materials
- Good for researchers
- Unclear for policy analysts
- Allows policy makers to cherry pick results
- Does not disclose uncertainty
- Unclear separation of roles between policy analyst and policy maker (Truman's request for a "one-handed" economist)

TABLE V  
FISCAL IMPACTS OF DEWORMING SUBSIDIES

	No subsidy	Partial subsidy	Full subsidy	Notes
<b>Panel A: Calibration parameters</b>				
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 $\times$ take-up rate
Mean per person increase in work hours/week: $\lambda_1$	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) $\times$ Coverage of treatment school students within 6 km ( $R$ , 68.1%) $\times [Q(S)$ 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) $\times$ 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) $\times$ externality increase in secondary schooling). Partial subsidy multiplied by $\frac{Q(S)}{Q(\text{full})}$ .
<b>Panel B: no health spillovers</b>				
Annual increase in per person earnings	\$0.00	\$3.91	\$15.44	$\lambda_1 \times$ starting wage $\times$ 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 $\times$ 16.575% tax rate – Direct schooling costs
<b>Panel C: With health spillovers</b>				
Annual increase in per person earnings	\$0.00	\$26.77	\$83.11	$(\lambda_1 + \frac{p}{R} \lambda_2) \times$ starting wage $\times$ 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 $\times$ 16.575% tax rate – (Direct externality schooling costs)

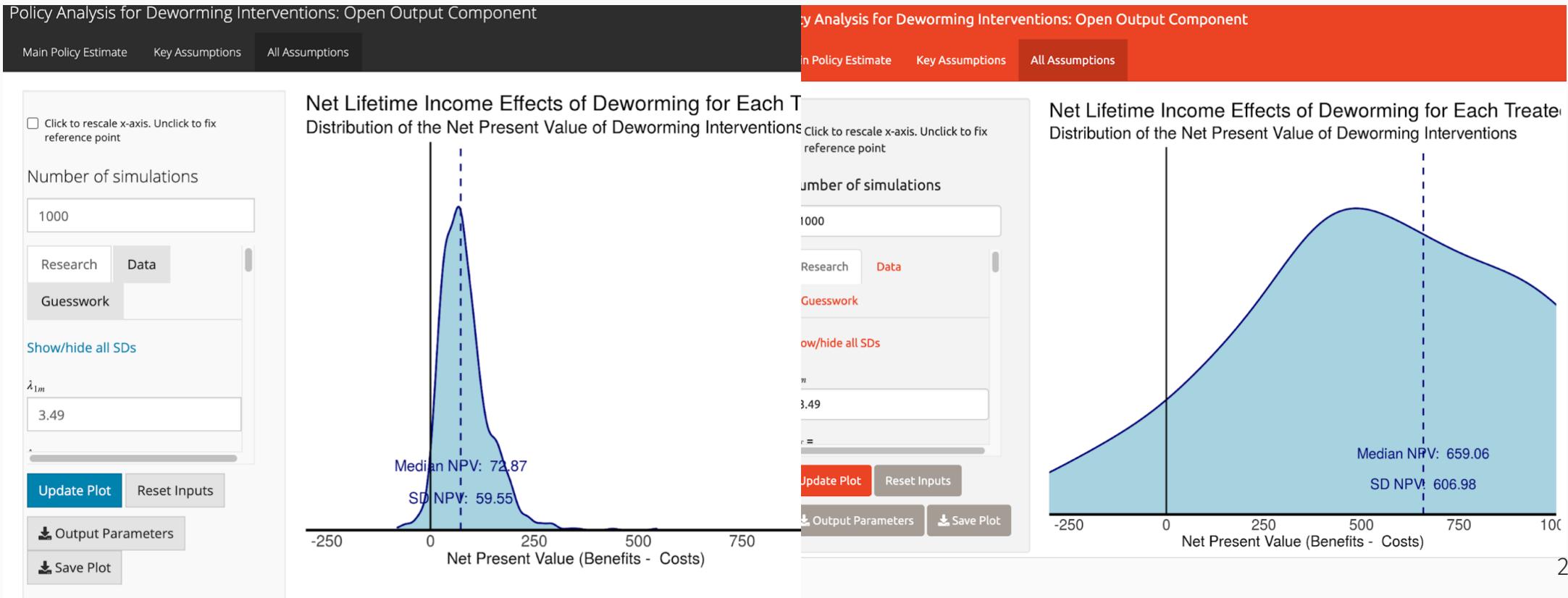
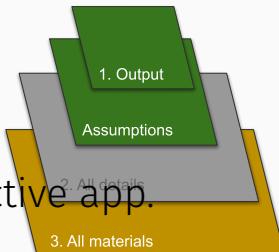
# What If The Policy Analysis Does Not Have Open Output?

- 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



# Opaque Analysis/Materials

- Assume open output and open materials
- In this scenario we can have two policy analyses: one from advocates and one from opponents
- Each analysis can claim to be open source. Code is available, reproducible, and each as an interactive app.
- But each analysis can bury in their code analytical choices that move the final policy estimate in their favor
- Same though exercise can be done with opaque materials