Modeling in EfD Research

Models with no data

Data analysis with no models

Bringing it all together

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EfD Comparative Advantage and Goals

- People who really know the context
- Skilled fieldwork researchers in right locations
- Connections to policy process
- Methodological expertise

- Goal: policy impact

Role of Models

- Use theory to predict and understand behavior and outcomes
  - Towards generality: not anthropologists
  - Behavior-based: not statisticians
- Models of behavior include policy levers

- Here, discuss the interaction of data and models, examples of models for policy, and opportunities for EfD research

Idealized Project Layout

Focus Groups & Surveys → Model, Solve, Analyze → Collect Data → Model Analysis with Data or Data Analysis with Model → Policy

Starting point

Focus Groups & Surveys → Model, Solve, Analyze → Collect Data → Model Analysis with Data or Data Analysis with Model → Policy

Wrong Model and Wrong Policy!
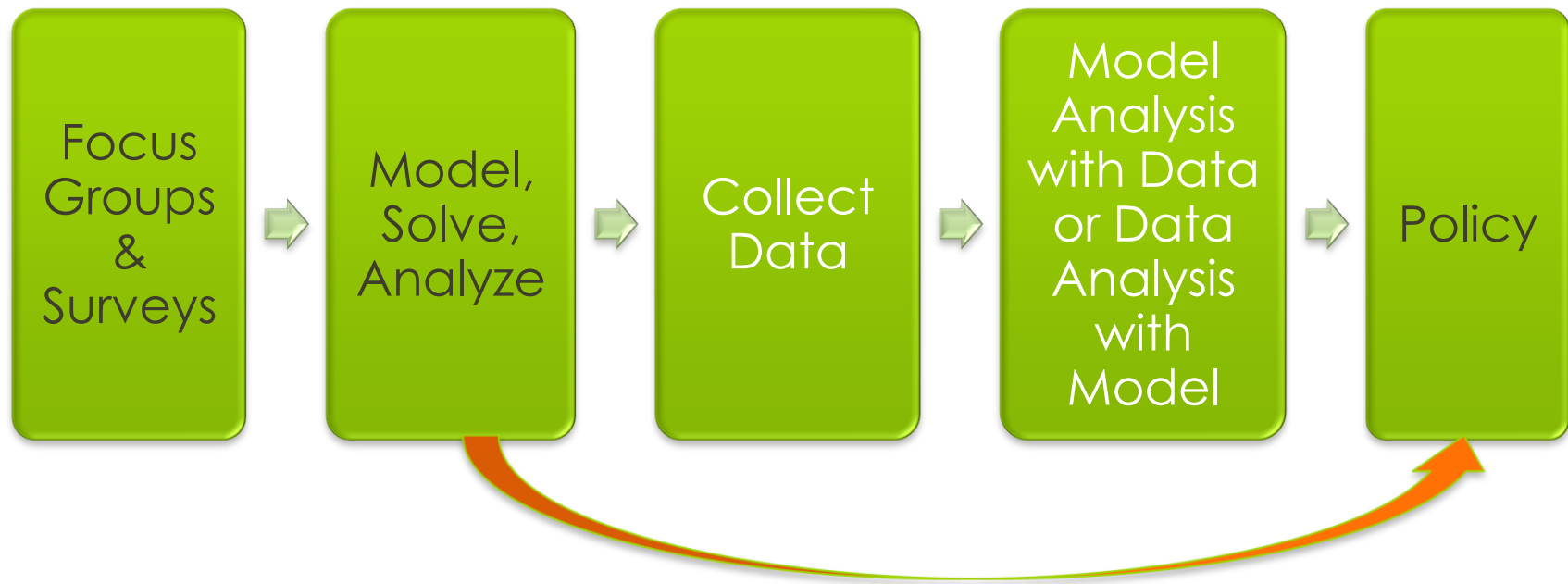
Fieldwork Matters

- Charcoal Extractors
- NTFP Extractors
- Spatial model of extraction under enforcement
- Policy of buffer zones and projects
- BUT: illegal extraction means no enforcement by locals

Experimental Economics

- Testing Models
- Example: S&D

  - People in a room with cost and value information
  - Do they get to the S&D model's equilibrium?

- Developing Models
- Example: public goods

  - Theory says people won't pay for pg
  - Experiment of request for donation shows they will
  - Contradicts theory
  - Develop new theory/model of behavior

My projects: policy influence but where are the data?

| Focus Groups & Surveys | → | Model, Solve, Analyze | → | Collect Data | → | Model Analysis with Data or Data Analysis with Model | → | Policy |

Park Siting/Sizing and Effectiveness

- Decisions about Park:
  - Size
  - Buffer zone size/management
  - Enforcement
  - Location
- Effectiveness determined by response of potential resource degraders
- So, model that response

Extraction Decision with Buffer Zone

- Villager extracts over a distance with:
  - Distance costs
  - Intensity at a location
  - Resource density
  - Expected extraction after enforcement
- Villager may choose to extract:
  - In the buffer zone only (legal)
  - In the buffer zone and core zone (illegal)

Results: Extraction Pattern

- For a size and enforcement level: pattern of resource extraction/degradation
- Can explore:
  - Park effectiveness
  - Best size of park and buffer zone
  - Location and amount of leakage
  - Buffer zone management's impact on core
  - Degree of pressure on core/potential for conflict
  - Benefits to villagers
  - Role of market setting
- Can use general framework to prioritize policy considerations
- Need data for context-specific policy

Models of Behavior with Data

- Model informs data collection and empirical analysis

- Often, data aren't collected with behavioral model in mind
    - Statistical rather than econometric analysis
    - Econometric backbends to tease out behavior
    - Site-based models; implicitly behavioral

Models in Econometric Park Effectiveness Analyses?

- Early: compare forest in and out of parks
- Our work: can't use area near park as control due to spatial decisions
- Recent econometric work: careful choice of control
  - Find matching sites for control
  - Park's impact: compare forest cover in park to matching site
  - Lower estimates of park's effectiveness

Where are the people?

- Deforestation models are based on site characteristics
  - Only implicitly a function of behavior
  - Many issues with von Thunen
- No explicit consideration of behavior with
  - Enforcement
  - Market setting
  - Leakage
  - Dynamics of forests
  - Development
  - Uncertainty

Drawbacks of implicit behavior model

- Current econometrics: how effective is a park?
  - Like Peter's chicken pox example
  - But parks are not chicken pox!
- No or few policy levers
  - Enforcement
  - Size
  - Buffer zone policy
- Policy effectiveness is a function of behavioral response

Related comments

- Spatial econometrics with spatial processes
- Remember your actor!
- Issue of scale of economic data in GIS
  - Appropriate data collection
  - Can experimental economics help link models of behavior to data?

- EfD's data collection and policy expertise paired with models: policy relevance

REDD

- Reducing Emissions from Deforestation and Forest Degradation

- Degradation commonly ignored despite importance
  - Difficult to monitor/assess

- UN's approach: use statistical models to predict avoided forest degradation

REDD

- Our models of degradation instead of von Thunen-based models:
  - Spatially explicit
    - including leakage and leakage location
  - Dynamic issues (cycles)
  - Market-case sensitive
- Basing avoided degradation in model of behavior

Behavior in a Developing Country Context

- Remember the developing country context
- EfD: excellent descriptive work on settings

- 2 problems:
  - Data analysis without development context
  - Resource economics models without development economics

- Of importance: property rights/community management, market setting, ag hh models

Developing Country Context

- Market Setting
  - Behavior depends on market setting
  - Heterogeneity in one location
  - Policy changes market setting
  - Policy: extraction in response to road?
- Property Rights/Community Resource Management
  - Gains from imperfect community institutions
  - Necessary CRMI declines with space
  - Policy Problem: Property Rights enforcement costs in India

Developing Country Context

- Agircultural Household models
  - Link production and consumption
  - Include market setting
  - Labor allocations
  - Policy: using such model to interpret Roger's data
- Model the context because it contributes to behavior
  - How to incorporate this info in data analysis?
  - Is distance enough?

Behavior with the Resource Setting

- Tropical forest characteristics
  - Forest plantations and rotations not general
  - Standing, mixed forests
  - irreversibility
  - Policy without model: too much harvest
- Wildlife
  - Migrations, predation ,grazing, mating patterns
    - Impact on livestock and agriculture
  - Policy: park management can encourage predators in villages
  - Policy: Ngorongoro no-ag; impoverishes people with no evidence of impact on wildlife

Wrong Resource Model, Wrong Policy!

- Shifting cultivation
  - Decision: when to shift?
    - Based on ag production, as function of soil fertility
    - Create temporary deforesstation
- Soil dynamics:
  - fertility degrades quickly
  - Regeneration of soil fertility is forest-based
- Forest dynamics
  - Regrow over time if win species competition
  - If lose species competition, grass dominates

Model the resource!

- Policy without model: Viet Nam subsidized fertilizers
  - Not enough subsidy to convert to permanent agriculture
  - Lengthened cropping period within shifting cultivation
  - Short run decrease in temporary deforestation
  - But: altered species competition so grass invades
  - Increase permanent deforestation

Models Needed!

- Are spatial games adequately addressing location choices?
  - EfD spatial analysis paired with observation?
  - Experimental approaches?

- Ecological production functions
  - EfD work with SESYNC?

- Individual incentives within community management and benefits sharing
  - Link Ostrom-inspired work to models of individuals while reflecting real institutions

Models in EfD Research

- Build models that reflect field observations
  - Models are only useful when they reflect the important issues – so need eyes in the field

- Analyze models for general policy advice

- Link models to data collection for
  - Improved econometrics and case study work
    - Behavioral models with policy levers
  - Improved policy advice
    - Data allow general insights to become specific

EfD: going forward

- Develop data sets with models in mind
  - Spatial and temporal data
  - Relevant economic scale
  - Link to biophysical data

- Engage prior to policy implementation
  - General advice to define policy
  - ID pilot locations and do "before" data collection

A New Type of EfD Collaborative: Bringing Different Skills Together

| Focus Groups & Surveys | → | Model, Solve, Analyze | → | Collect Data | → | Model Analysis with Data or Data Analysis with Model | → | Policy |

Fund the arrows – support the connections between researchers with different expertise

got model?

Combine forces to:

- Develop more useful data
- Model informs data analysis
  - Interpret regression analysis based on economic theory of behavior
  - Parameterize model with case study data
  - Incorporate policy levers from behavior

➔ Inform specific and general policy

Questions and Comments?