USAID
FROM THE AMERICAN PEOPLE

Causal Modeling

USAID MENA Advanced MEL Workshop

Session Objectives

- Understand USAID practice around causal modeling
- Introduce new analytical developments that can extend USAID practice of causal modeling and link it to impact evaluation and learning agendas
- Identify management opportunities to incorporate best practice and new trends into activity implementation

Level Set

How does USAID do causal modeling?

- ADS 201
- How-To Note: Developing a Project Logic Model
- Technical Note: The Logical Framework
- In Defense of Logic Models

Logic Model

- A graphic or visual depiction of a theory of change that illustrates the connection between what a strategy, project, or activity will do and what it hopes to achieve
- There are a wide range of logic models
  - Results Framework
  - LogFrame
  - Causal loop diagram

Results Framework

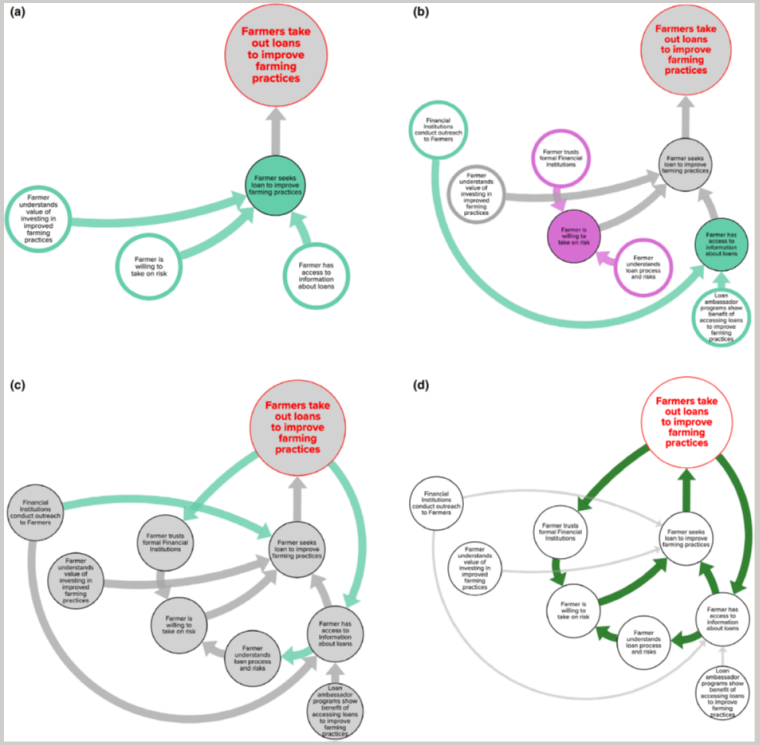
- A type of logic model representing the development hypothesis of a USAID mission's strategy
- Diagrams the causal links between the strategy's Goal, Development Objectives (DOs), and Intermediate Results (IRs)

LogFrame

- Complements the CDCS Results Framework by carrying the development hypothesis through from the overall program/project to the supporting activities
- LogFrame replicates the causal linkages, but starting from a Development Objective and ending with activity inputs
- While the Results Framework is a strategic planning tool, an activity's Logical Framework defines exactly what resources are needed to achieve results

Causal Loop Diagram

- A logic model that emphasizes feedback loops and includes notation for polarity of relationshpis



Understanding Smallholder Access to Finance, USAID/Uganda Feed the Future Market System Monitoring Activity

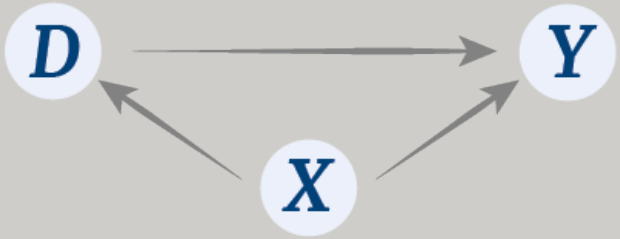
New Directions

Directed Acyclic Graphs (DAGs)

- A logic model with probabilities attached
- Causal influence revealed through ancestor/descendant relationships
- Directed = one way only!
- Acyclic = no feedback loops! Arrows cannot backtrack

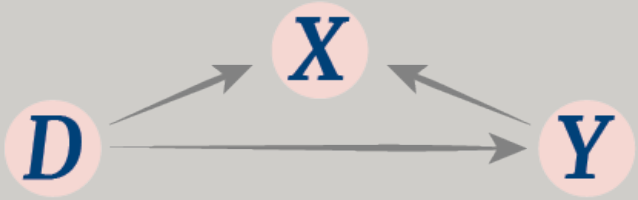
The Four Confounds

The Fork

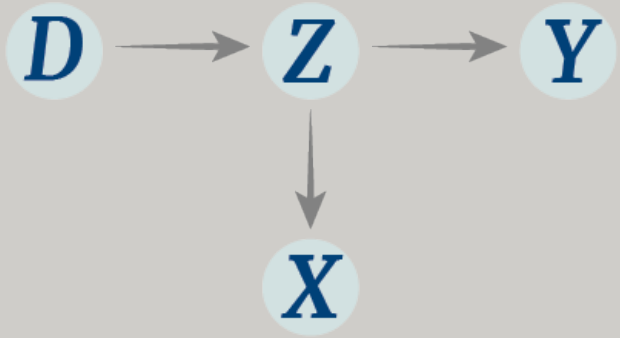


The Pipe

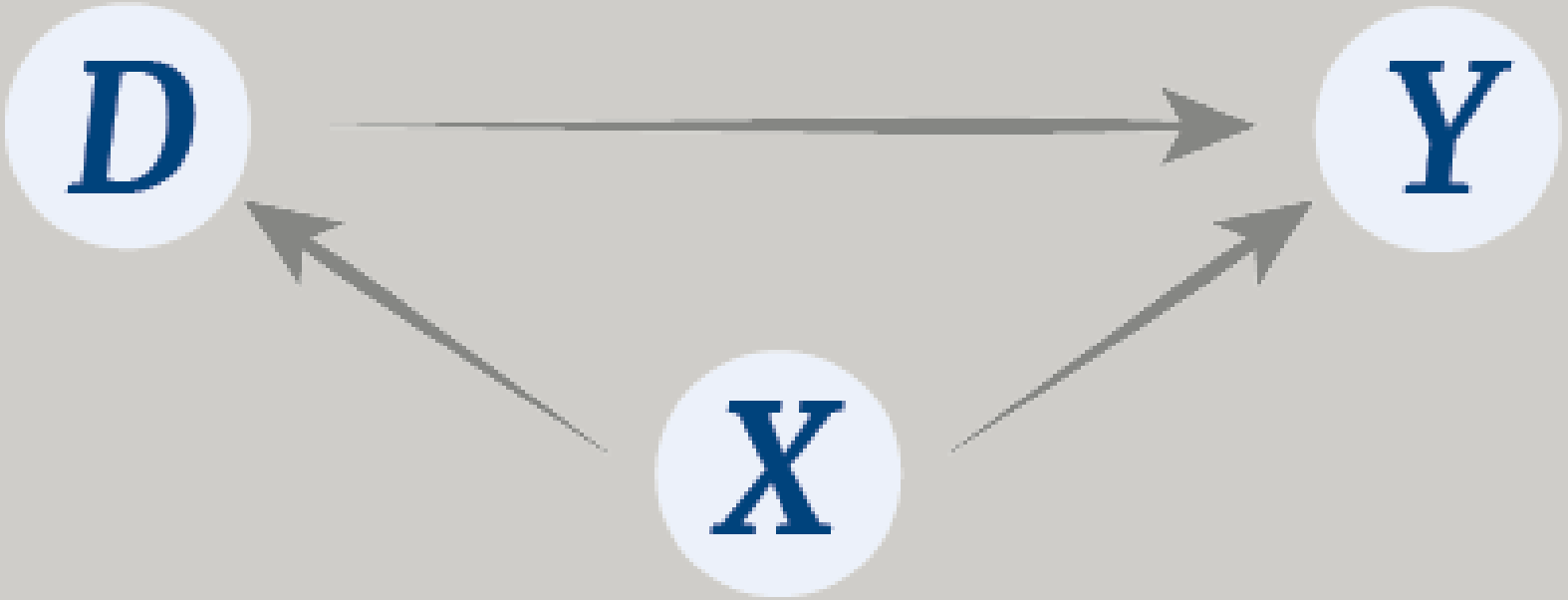
The Collider



The Descendant



The Fork



- X causes both treatment and outcome
- Must control for X (backdoor criterion)

D is NOT $\perp\!\!\!\perp$ Y

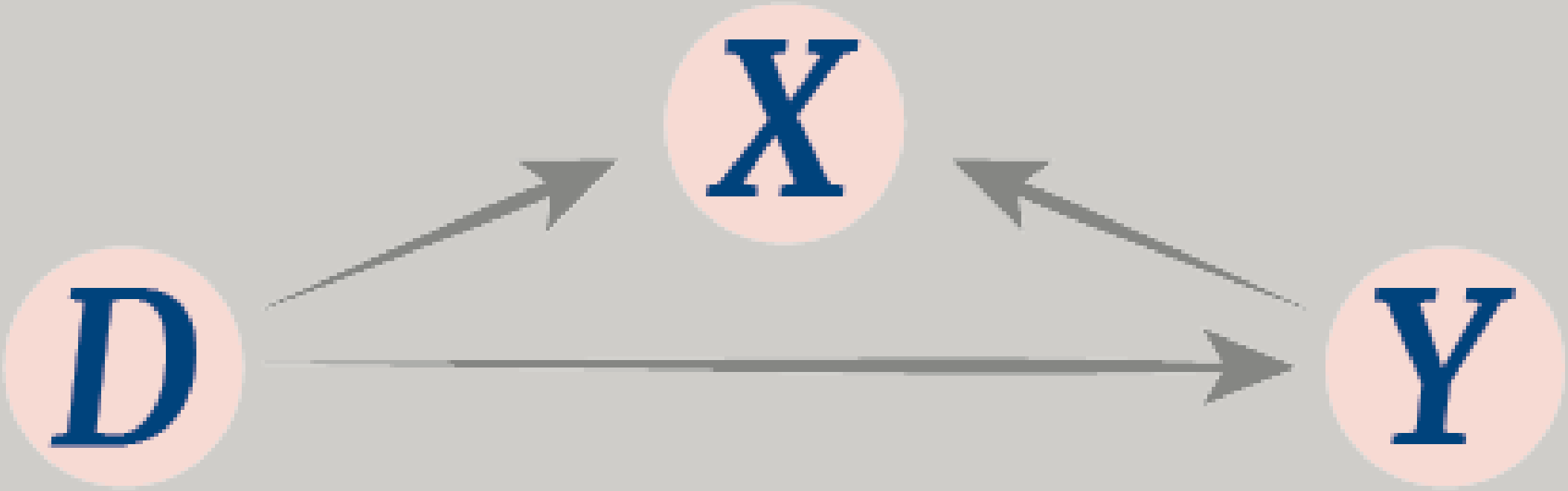
$D \perp\!\!\!\perp Y \mid X$

The Pipe

- X is a post-treatment outcome
- Knowledge, Skills, Attitude, Practices
- DO NOT control for X !!

$D \perp\!\!\!\perp Y$

The Collider

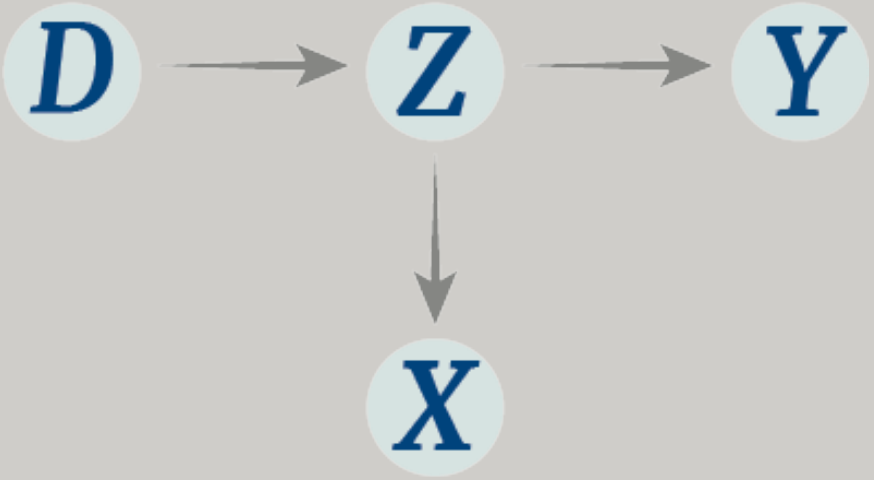


- DO NOT control for X !!

$D \perp\!\!\!\perp Y$

D IS NOT $\perp\!\!\!\perp Y \mid X$

The Descendant



- Z is not a post-treatment outcome, but a downstream unmeasured confounder
- Control for proxy variable X
- If X a strong enough proxy:

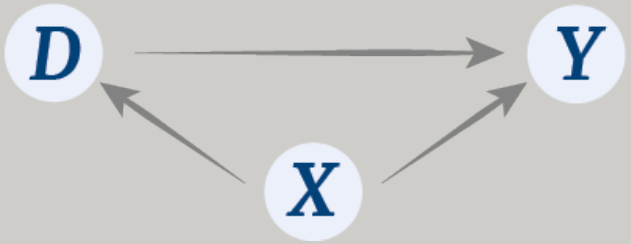
$$D \perp\!\!\!\perp Y \mid X$$

Evaluation Designs as DAGs

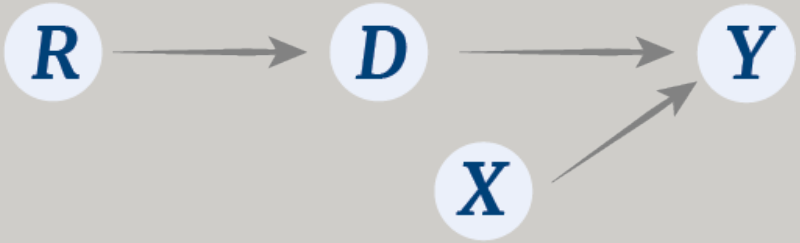
- Randomized Controlled Trial (RCT)
- Instrumental Variables estimation (IV)
- Regression Discontinuity (RD)

Randomized Controlled Trial

Unmeasured confounder of treatment and outcome

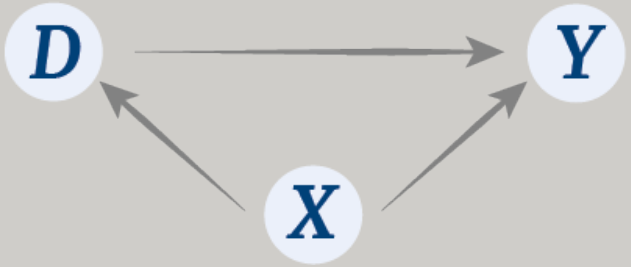


Randomization of treatment

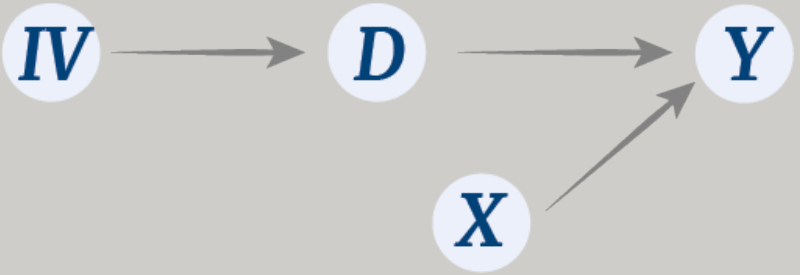


Instrumental Variables Estimation

Unmeasured confounder of treatment and outcome

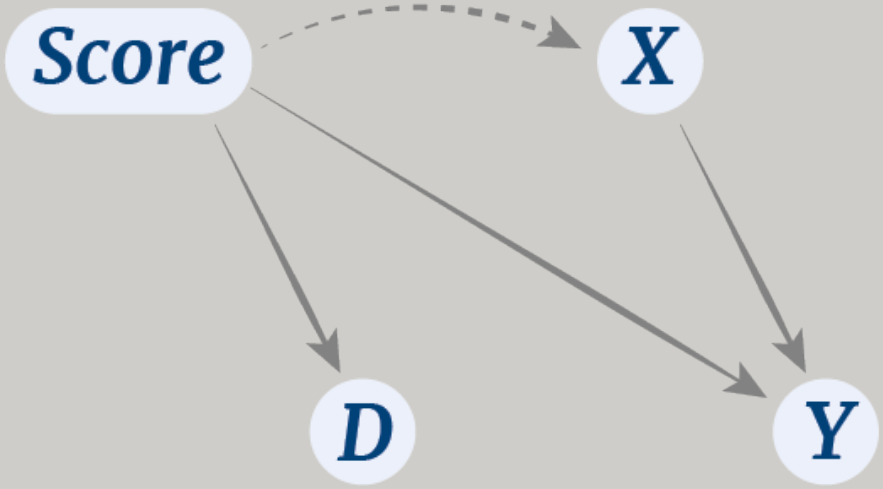


Randomization through instrument

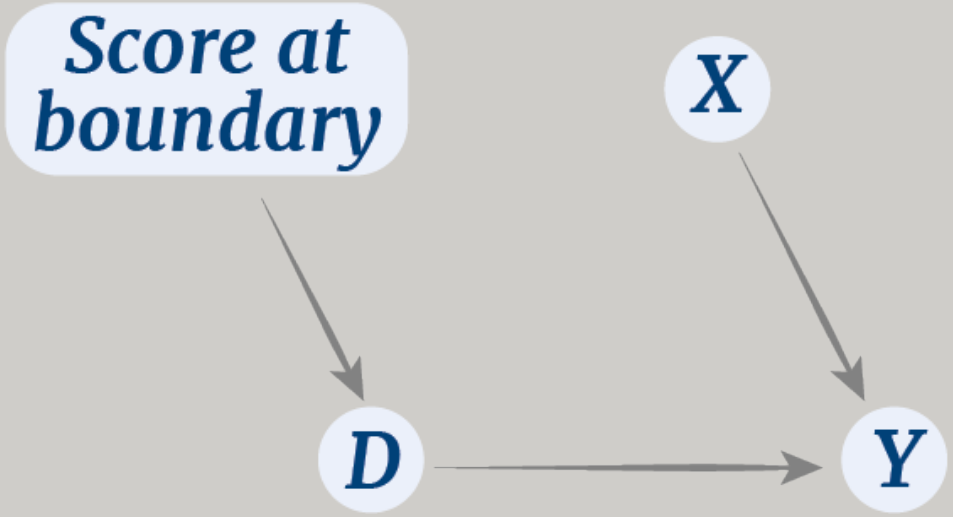


Regression Discontinuity

Score variable allocates treatment



Boundary imposes randomization



Recap

- Logic modeling can be extended to methods such as causal loop diagrams or directed acyclic graphs
- These methods enable the integration of assumptions and hypotheses with data
- USAID must continue to push the boundary of causal modeling and link them to analytical methods

Looking forward

- Stay tuned for sessions on learning agendas, mapping, and Bayesian analysis
- We will attach probabilities to our causal models

Thank you!