Show Me the Attribution:
Recommended Methods for Finance Programs

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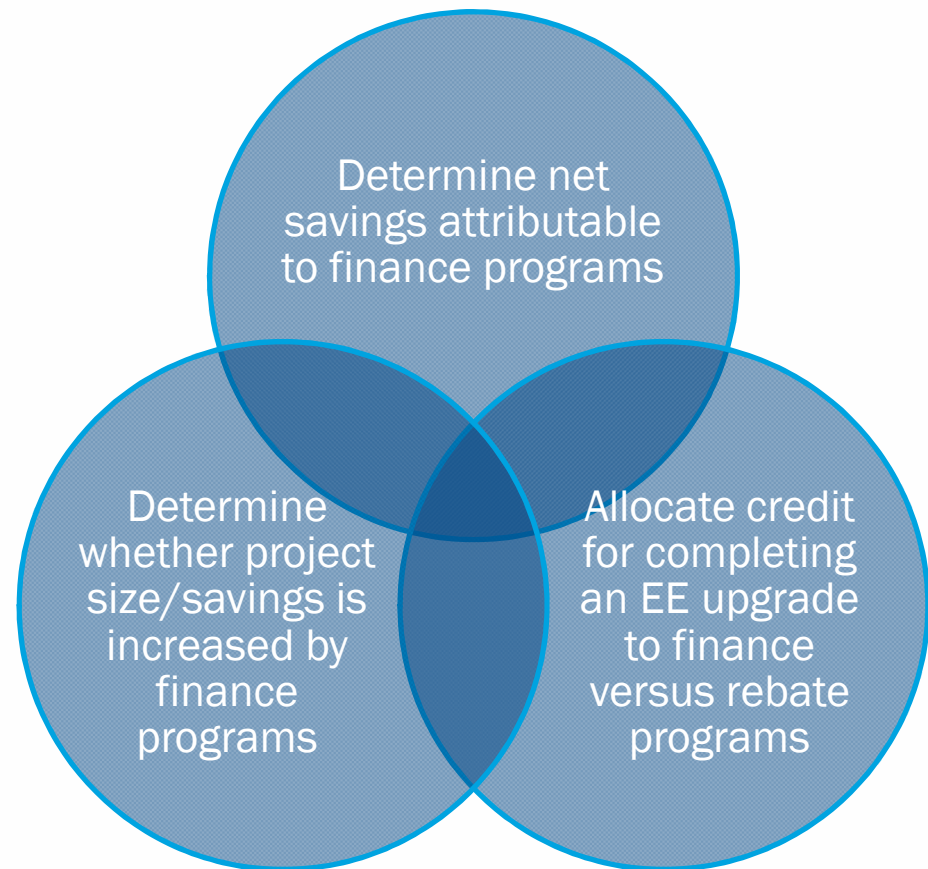Katherine Randazzo

Main goals for finance program evaluators

- The evaluation should address:
  - The relative impact of finance and rebates

  - The incremental impact of finance beyond non-program finance alternatives

Determine net savings attributable to finance programs

Determine whether project size/savings is increased by finance programs

Allocate credit for completing an EE upgrade to finance versus rebate programs

Purpose of the Paper

- Present the key issues that make up the complex marketplace within which finance programs operate

- Discuss method attributes that help address the issues

- Offer recommended methods to estimate attribution for finance programs
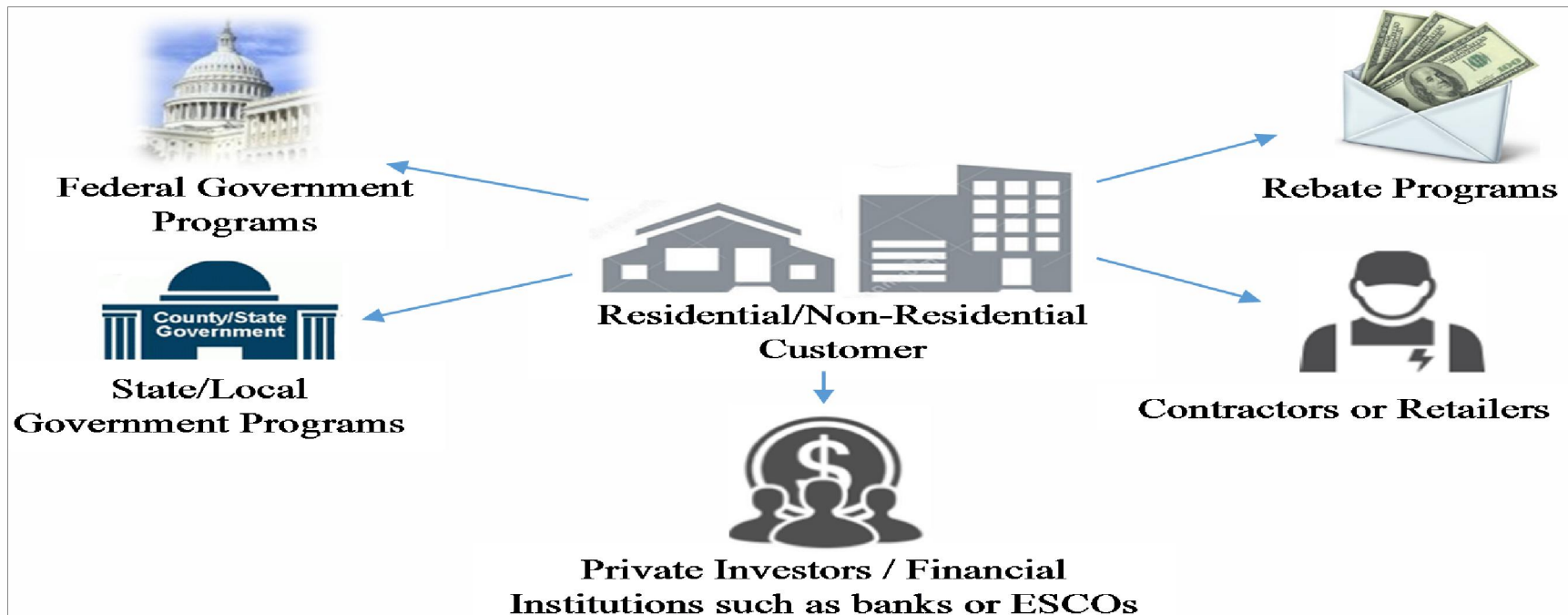
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Key Issues when Studying Attribution for a Finance Program

- Multiplicity of finance options, alternatives, and combinations

- Program scale and objectives

- Occurrence of multiple touch points

- Stage of program development

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Financing has always been available, though not tied to energy efficiency, and not usually run by utilities

Federal Government Programs

State/Local Government Programs

Residential/Non-Residential Customer

Private Investors / Financial Institutions such as banks or ESCOs

Rebate Programs
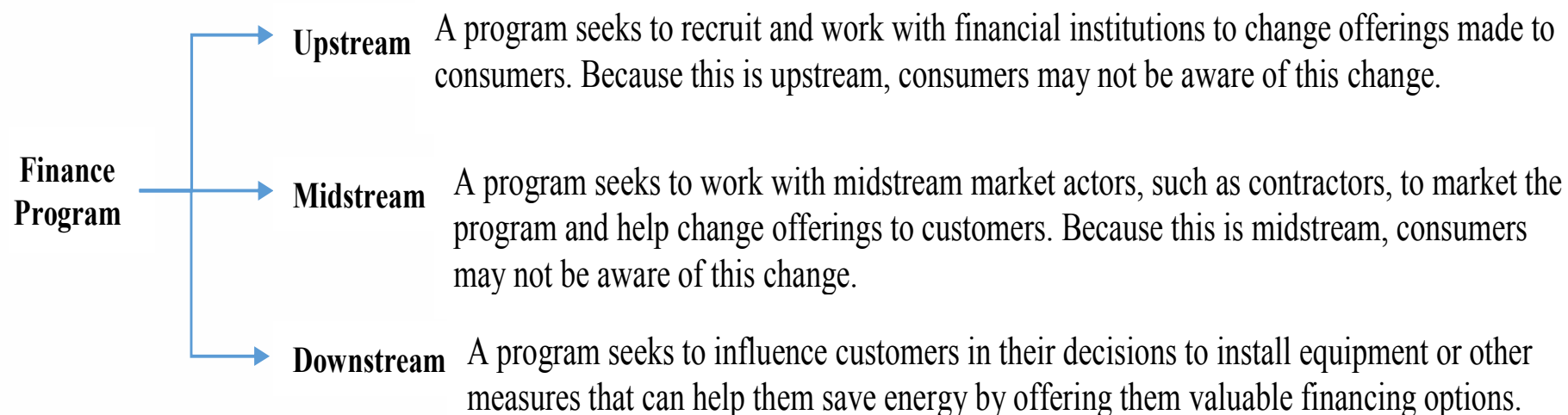
Contractors or Retailers

Program Scale and Objectives

- Program scale can mean:

  - number of participants,

  - level of savings, and/or

  - program budget

- Program objectives can refer to:

  - individual project sizes or
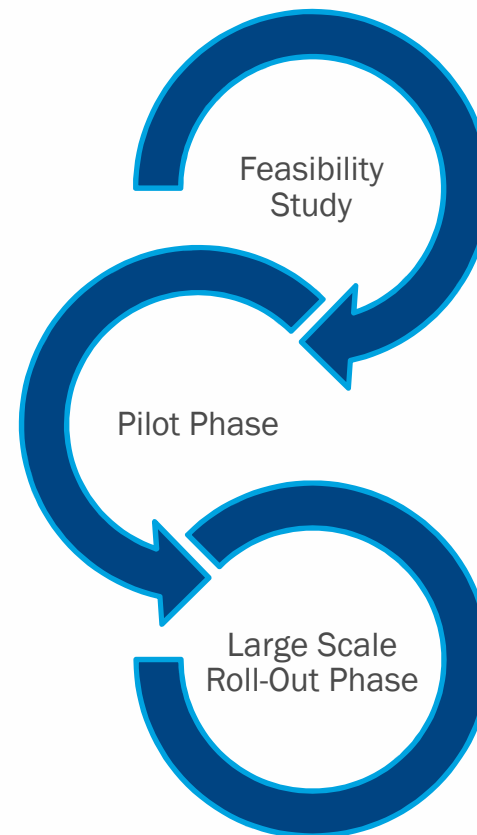
  - overall program participation

Different touch points sometimes imply different methods

- Programs seek to influence upstream and midstream actors, not just the ultimate customer

Finance Program

Upstream A program seeks to recruit and work with financial institutions to change offerings made to consumers. Because this is upstream, consumers may not be aware of this change.

Midstream A program seeks to work with midstream market actors, such as contractors, to market the program and help change offerings to customers. Because this is midstream, consumers may not be aware of this change.

Downstream A program seeks to influence customers in their decisions to install equipment or other measures that can help them save energy by offering them valuable financing options.

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Stage of Program Development

- Early evaluation risks reliance on small sample sizes or early participants—may be different than later ones

- Later evaluation allows use of revealed preferences and a broader mix of participants

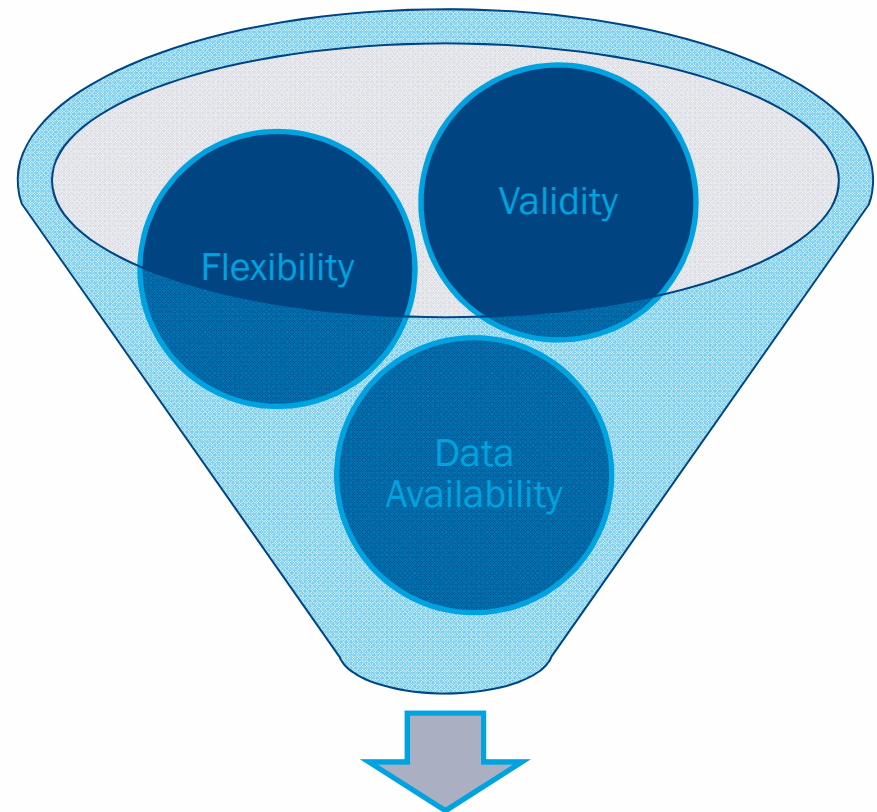- Combination allows early feedback but a full mix of participants

Feasibility Study

Pilot Phase

Large Scale Roll-Out Phase

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What is needed to address this very complex situation?

- Flexibility of method means:
    - Ability to test impact of differences in geographic availability
    - Ability to adapt to the program's timing or scale
    - Ability to test multiple program attributes & attribute levels against others for determining what customers value
    - Ability to incorporate and represent the influences of various touch points
- Method should provide valid results (internal and external validity)
- Appropriate data must be available for method
- Method should be able to separate finance from other influences
    - Ability to separate out the effects of rebates vs. finance on influence on customer decisions to use finance
    - Ability to separate finance programs from market alternatives
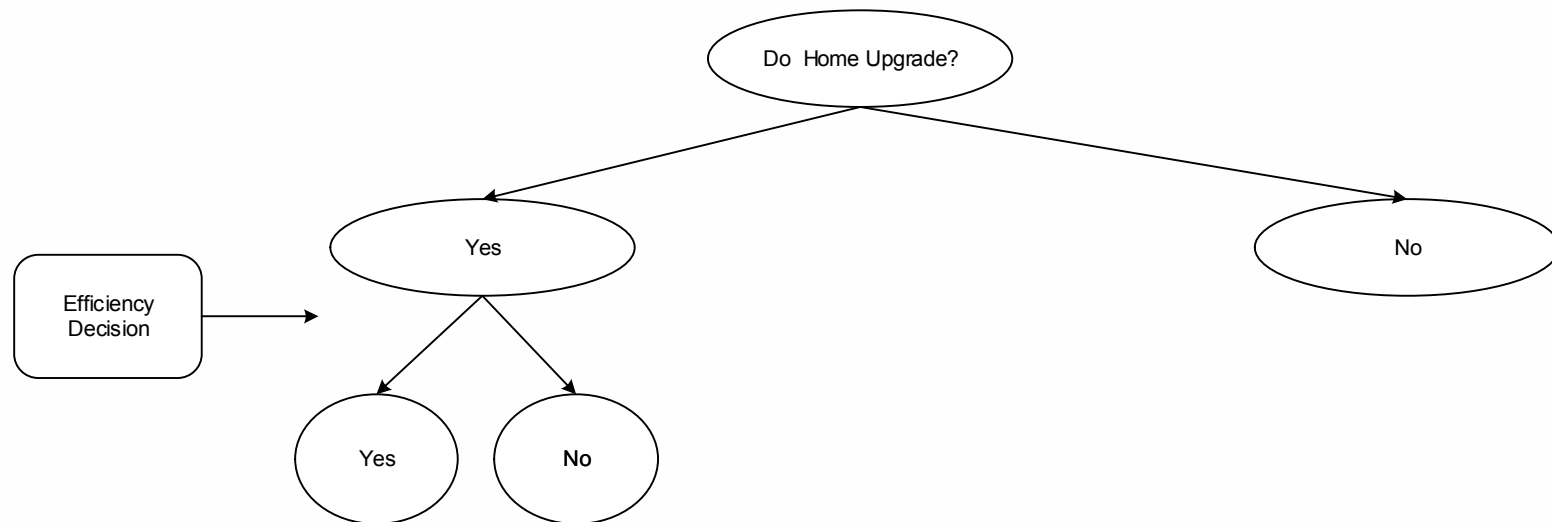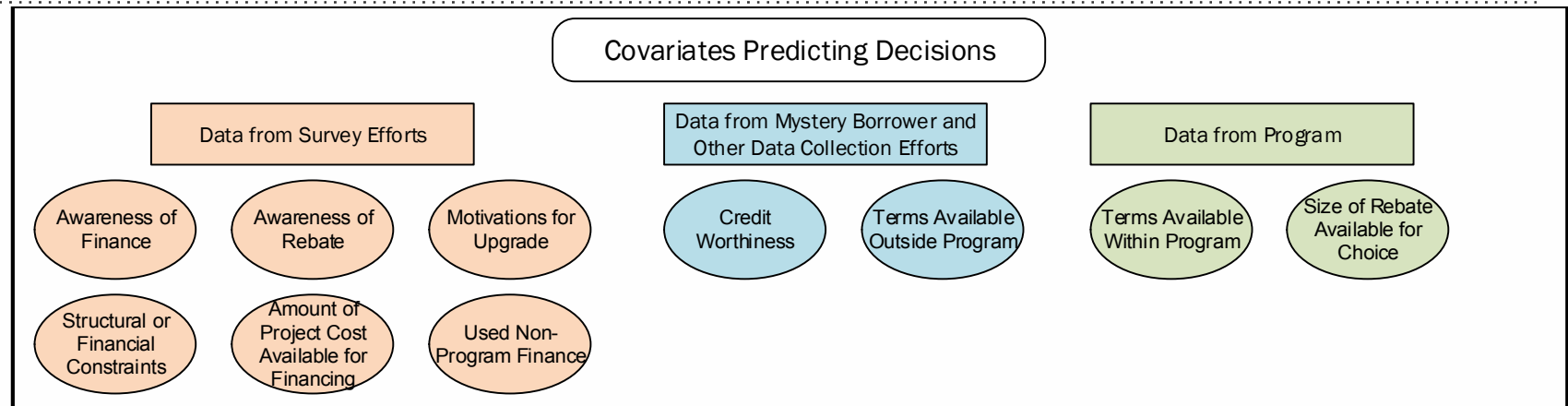
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Using the various attributes to select the best method

- Consider methods that take into account customer-level variables, such as awareness, attitudes etc.

- Consider methods that offer the best chance for other finance evaluations to use similar methods, facilitating comparisons

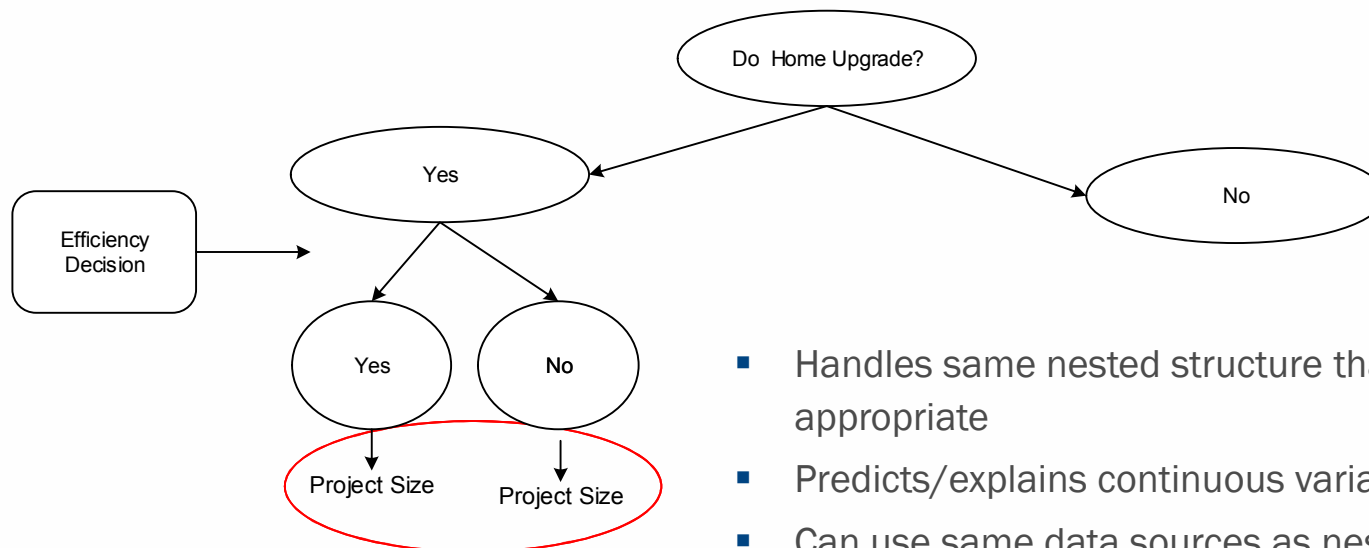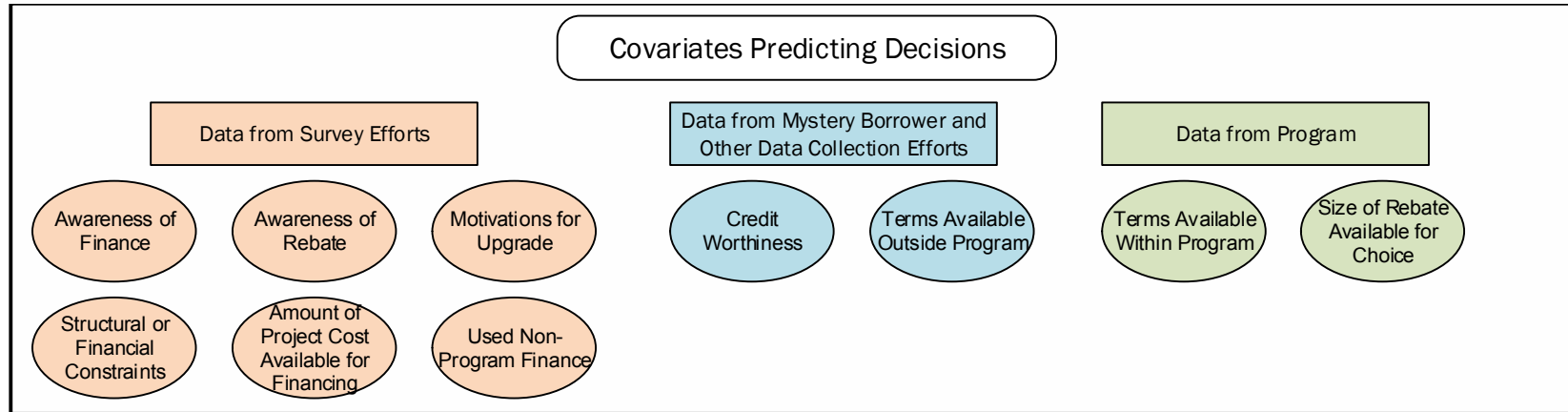- Consider using multiple methods that complement each other

Validity

Flexibility

Data Availability

Selection of Method

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Recommended Methods—Nested Logit

Going one step further with Multi-Level Modeling

Covariates Predicting Decisions

Data from Survey Efforts
- Awareness of Finance
- Awareness of Rebate
- Motivations for Upgrade
- Structural or Financial Constraints
- Amount of Project Cost Available for Financing
- Used Non-Program Finance

Data from Mystery Borrower and Other Data Collection Efforts
- Credit Worthiness
- Terms Available Outside Program

Data from Program
- Terms Available Within Program
- Size of Rebate Available for Choice

Do Home Upgrade?
- Yes
  - Efficiency Decision
  - Yes → Project Size
  - No → Project Size
- No

- Handles same nested structure that makes nested logit appropriate
- Predicts/explains continuous variables like project size
- Can use same data sources as nested logit

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Recommended Methods—Latent Class Discrete Choice

Recommended Methods—Self-Report

- We are all familiar with the method

- We ask participants directly how influential the finance program was in the decision to do the upgrade with energy efficiency, and the size and timing of the project

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How do these three methods compare and complement?

Weaknesses ← → **Methods to Help**

Nested Logit:
- Can be hard to fill design cells
- Difficult/impossible to separate rebate from finance influence
- Some not aware of alternatives–making it difficult to study trade-offs

LCDC:
- Balanced design assures full coverage of all program attributes and levels
- Random assignment of attributes/levels allows pure separation of finance influence vs rebate

Nested Logit:
- Explains only discrete choices

Multi-Level Modeling:
- Explains continuous outcome variables (e.g. project size and cost)

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How do these three methods compare and complement?

Weaknesses ⟵ | ⟶ Methods to Help

LCDC:

- Possible hypothetical bias

- Does not estimate impact of awareness

Nested Logit:

- Based on revealed preferences—no hypothetical bias
- Directly estimates impact of awareness

Self-Report:

- Potential social desirability bias
- Potential recall bias
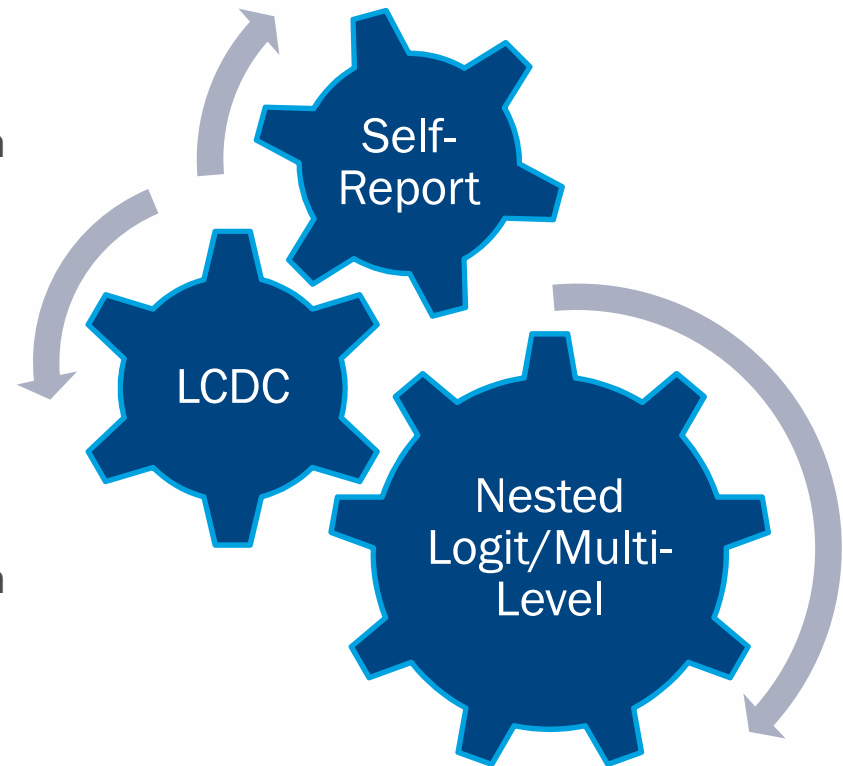- Limited number of alternative finance choices covered

LCDC:

- Self-enhancing choices are not obvious
- No recall involved-all present choices
- Alternatives embedded in choices-no need to ask about each separately

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We recommend.....

- Using **nested logit/multi-level** because of its:
  - real-world anchoring
  - flexibility for incorporating many program/non-program alternatives & touch points, and
  - statistical properties re nested structures
- Using **LCDC** because of its:
  - ability to model trade-offs without confounds, and
  - flexibility in incorporating many program/non-program alternatives & touch points
- Using **self-report** method because of its:
  - flexibility in sample size needs & questions asked, and
  - ability to incorporate all direct influences

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Questions and Comments

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Removed Slides

Optional

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Three Suggested Methods

Nested Logit Modeling
- Able to model multiple finance options, alternatives, and combinations
- Mainly for larger scale programs
- Can incorporate various touch points
- Mainly for later stages of program development

Latent Class Discrete Choice Modeling
- Able to model multiple finance options, alternatives, and combinations
- Mainly for larger scale programs
- Can incorporate various touch points
- Mainly for earlier stages of program development

Self-Report
- Able to ask about multiple finance options, alternatives, and combinations
- Can be used for all scales of programs
- Can incorporate all touch points
- Can be used for any stage of program development

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Nested Logit Modeling

- Uses revealed preference data

- Flexible in capturing customer decision points

- Models whole choices rather than individual choices

- Accounts for some customer decisions being dependent on others

- Can incorporate the various touch points

- Estimates program attribution, net of other options

- Requires sufficient participants and non-participants who did EE projects

- Limited by natural covariation of options

- Not ideal for predicting continuous variables— project size

  - Thus need to supplement with Multi-level modeling

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Latent Class Discrete Choice

- Flexible in capturing customer decision points

- Models choice sets that can be randomly assigned

  - Allows clean separation of finance/rebate effects

- Simulator can calculate expected NTGRs for any

  - Program configuration and/or

  - Customer segment

- Based on stated preferences,

  - But can be calibrated to revealed preference outcomes

  - Customers who have revealed their choices can be included

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Self-Report Method

- Most commonly used method for attribution
- Based on direct responses
- Can reach all touch points
- Flexible on:
    - Program and project options influencing decisions measured,
    - When to begin collecting data

- Responses may be biased
- Evaluators can assign different weights and algorithms
- Separate program and program configurations require separate samples for estimates

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