



Who Dunnit? Determining Savings Attribution When Both Rebates and Financing Are Available



Stephen Grover, PhD
Jenny Fraser
Evergreen Economics
IEPEC Long Beach 2015



CA Finance Attribution Background

Multiple financing options:

- California is in the process of implementing 7 Energy EE Financing Pilot Programs through the IOUs
- Other non-IOU programs such as HERO/PACE are also offering financing for efficiency upgrades
- Traditional credit sources (HELOC, credit cards, etc.) can also be used to fund efficiency improvements



CA LAO Directive: Wants the finance evaluations to determine how cost-effective each financing method is, and the degree to which these programs are overlapping.



Attribution Question Variations

Possible ways to pose the attribution question:

“Does financing increase the number of EE projects?”

“Does utility-sponsored financing increase the # of EE projects?”

“Does financing increase the amount of savings from EE projects?”

“What is the net effect on rebate programs if financing is also available?”

Attribution Methods

The Usual Suspects

- Self Report Method
- Discrete Choice
Nested Logit
- Other modeling
(billing regressions, other stated preference)





Self Report Method

Series of questions designed to help establish a baseline (stated preferences).

Customers are asked what they would have purchased in absence of the program:

- Type of equipment that would have been purchased if program did not exist
- Timing of purchase without program

Responses weighted to create free ridership score



Self Report Method (cont.)

Advantages:

- Can be applied to any situation
- Relatively simple to administer

Disadvantages:

- Danger of bias due to hypothetical nature of questions
- Arbitrary weighting schemes



Nested Logit Model

The nested logit model is based on a Random Utility Model:

$$U_{ij} = V_{ij} + \varepsilon_{ij}$$

Where the benefit (utility) of each choice has a deterministic, observable component (V_{ij}) and a random, unobserved component (ε_{ij}).

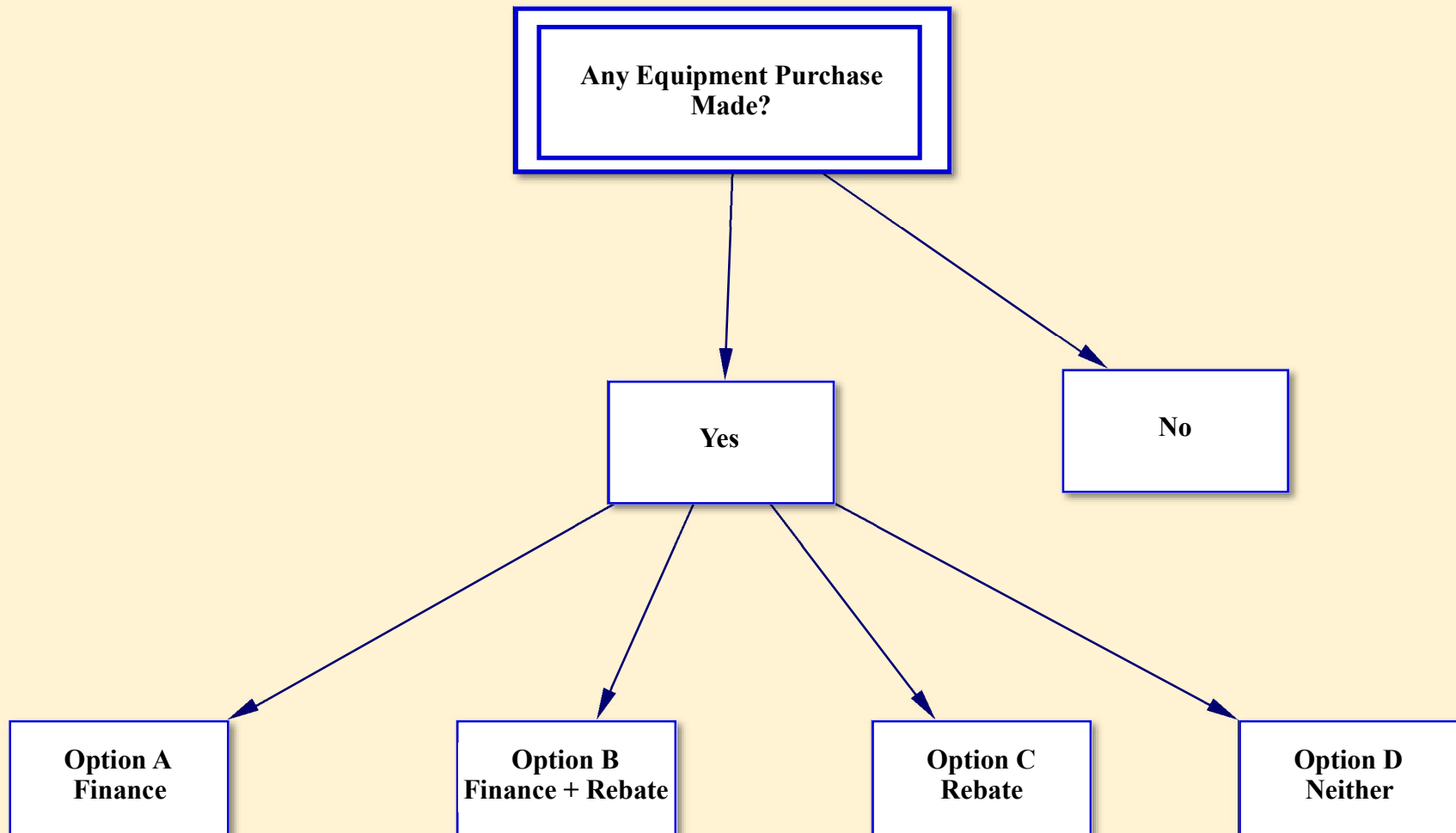
Each option is defined by the observable characteristics of each choice.

Key Advantage: Model based on actual purchase behavior (revealed preferences)



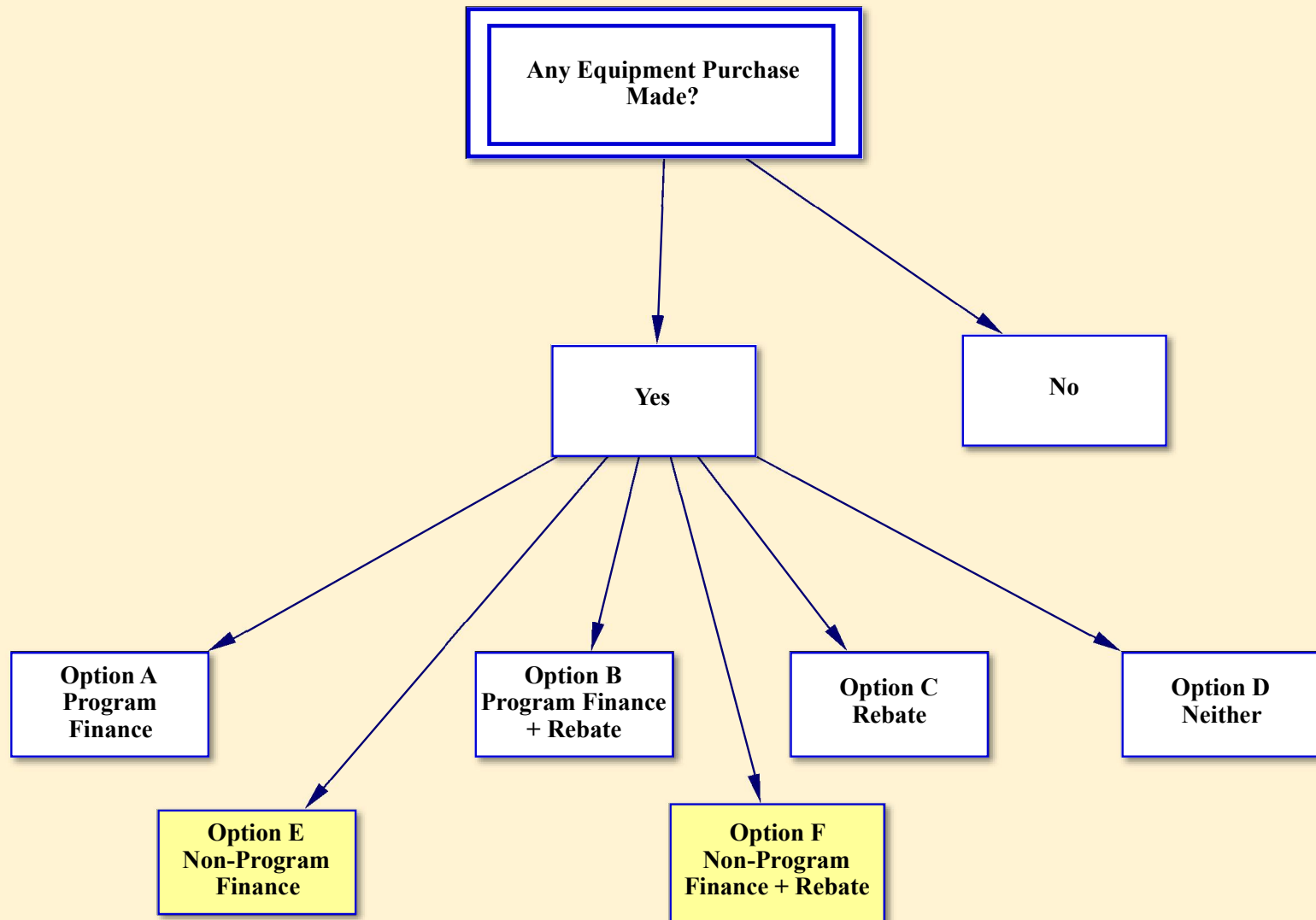


Sample NL Decision Tree #1





Sample NL Decision Tree #2



Considerations for Estimating the Nested Logit Model



Consideration #1

#1: Variables that do not vary across options will drop out of the model



- Typically choices are defined by equipment characteristics (price, savings, rebate, finance terms) that vary across options
- Customer characteristics need to be incorporated through choice-specific dummy variables

Consideration #2

#2: Values for all choices must be provided or else imputed for each customer choice opportunity.



- Customers are assumed to have information on all options before making their actual choice
- For each non-chosen alternative, values for each variable (e.g., cost, savings, rebate, financing) need to be estimated and included in the model dataset

Consideration #3

#3: Customer awareness of program options is an important factor that should be included in the model simulations



- Awareness is used in the program/no program scenarios to simulate the 'no program' case.
- Provides a means for supply side factors to enter the model

Consideration #4

#4: Neither the nested logit model nor the self-report approach will provide reliable results if customers are always using both financing and rebates for equipment purchases

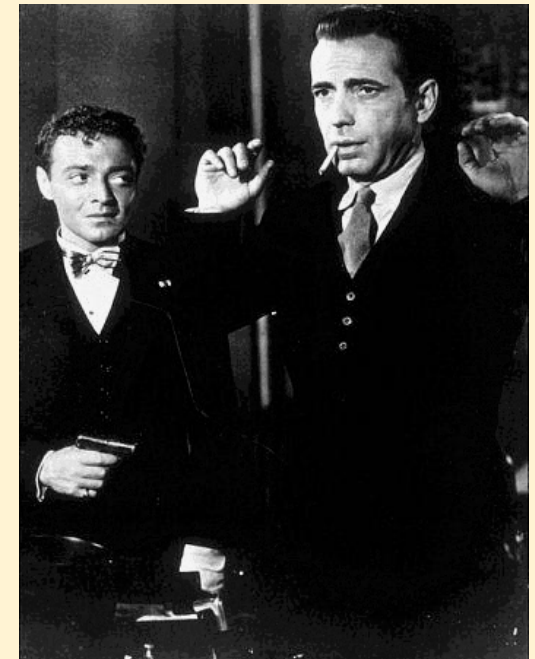


- Some variation in the data is needed where customers only use finance or only use rebates

Consideration #5

#5: Most model specifications will need to have data on non-participant equipment purchases

- To have a model that really addresses the attribution question, non-participant purchase data must be included
- The data collection effort needed to identify these customers will likely be significant, but...
- **Any** comprehensive attribution method should include data on non-participant purchases





Final Scene

Contact Info:



Steve Grover, President
Evergreen Economics
grover@evergreenecon.com
(503) 894-8676

www.evergreenecon.com