

OPNS 523 Assignment 2

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Hendel and Nevo (2006)

1. How does Hendel and Nevo (2006)'s Three Step Procedure relate to a nested logit? What are the λ_k 's in this case? How does this procedure simplify the estimation?

Nested logit model groups alternatives into nests and agent first pick a nest and then pick a choice within that nest. Hendel and Nevo (2006)'s Three Step Procedure follows the same logic where their model assumes that consumers first pick a size and given the size they choose what brand to buy.

λ_k 's equal 1 in Hendel and Nevo's model.

This procedure simplifies the estimation because it reduces the dimension of state space dramatically. Before, they have to take into account all combination of sizes and brands. Now, the model only needs to keep track of size.

2. Why does this nested logit make the quantity the outer choice and the brand the inner choice? Could Hendel and Nevo have made the brand the outer choice, and the quantity the inner choice?

The reason that this nested logit makes the quantity the outer choice and brand the inner choice because they claim that the dynamic nature of this model comes from size not brand. They have assumed that the per period utility u depends only on the quantity of the good consumed and not on the brand. Brand-specific preferences can be estimated using a static discrete choice model given the choice of size. If they made the brand the outer choice and the quantity the inner choice then they have to keep track of the inventory for all the brands which creates computational burden.

Erdem et al. (2003)

1. Could you estimate Erdem et al.'s (2003) model with Hendel and Nevo's (2006) approach?

We could estimate Erdem et al. (2003) model with observed consumer heterogeneity by interacting the brand dummy variables with the demographic variables to generate different "types" of households. However, Erdem et al. (2006) incorporates a richer unobserved consumer heterogeneity in their model.

2. What classic operations models do Erdem et al. (2003) allude to on page 15?

They allude to the economic order quantity model(EOQ) in paragraph 4 and the Newsvendor Model in paragraph 5.

3. What makes their model dynamic?

The dynamic nature of their model not only comes from the stock-piling behavior and price variation but also unobserved heterogeneity in brand preferences. They gave an example of how consumer heterogeneity plays a role in this dynamic model: a "loyal" consumer to a particular name brand when faced with a situation where current prices are high for the preferred brand will have an incentive to buy a small quantity of the inexpensive store brand to tide himself over until a future time when the price of the preferred brand is lower. While a "non-loyal" consumer who prefers all brands equally would not buy the store brand as a stop gap measure unless all name brand prices were high.

4. Erdem et al. (2003,17) explain that "without consumption data, we felt that identification of the extent to which households react to price changes by altering consumption along the intensive and/or extensive margin would, at best, be very tenuously identified." And Hendel and Nevo (2006, 1653) explain that "We have no reason to believe that costs and preferences are identified nonparametric late or even that flexible functional forms can be estimated." Why is this the case? (Hint: See Bray et al. (2019, p. 461).)

a. They do not observe order-up-to level (S_t) and they do not incorporate any inventory management models like EOQ and Newsvendor to estimate (s_t, S_t).

b. They do not have enough products and time-periods to be able to identify the parameters.