Discrete Choice model for the CPS fishery

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July 27, 2021

1 Introduction

- Research question:
  - **Big question:** What is the effect of climate change on fish patterns.
  - **Narrow question:** How does changes in the presence of CPS affect species and location choices by vessels registered in the US west coast?
- Contribution:
  - SDM projections to forecast fisher behavior
  - Better understanding of fishers species portfolio
  - Policy analysis
- Method
  - Mixed logir model:
    - Mixed logit? (A mixed logit (or random-coefficient logit) avoids assuming IIA allowing for marginal utility varies between individuals)
    - Relax the independence of irrelevant alternative assumption: Coeficient vary randomnly across vessels, and "Variance in the unobserved vessel-specific parameters induces correlation over alternatives in the stochastic portion of utility." Revelt and Train [1998]
    - Account for correlation in unobserved utility between repeated choices Revelt and Train [1998]. The estimations is efficient.

2 Species/location choice model for the CPS fishery

- Choices:
  - Set of location/specie
  - Number of choices can vary between vessels, as well as the number of periods or choice situtations Revelt and Train [1998].
  - Use Hicks et al. [2020] methodology to select the choice set:
    - Crucial for the model the selection of the choice set. If is erroneous, our estimates would be biased.
    - We don't observe fishers complete set of alternatives.
    - They propose a method to construct alternative choices when alternative are effectively infinite *we just observe a point where vessel fish over a very large open ocean area).
    - What is wrong with aggregating fishing areas? -> "areas may encompass highly heterogeneous fishing locations in terms of species composition and density or feasibility of fishing (e.g.unfishable rocky areas)".

    * How this work: "Sample points from a fine scale grid of specific locations." It is a point-based approach for choosing the choice set.
    * Shpuld improve modeling in setting with fine-scale spatial heteogeneity.

- Explanatory variables:
  - Species value? This assumes fisher that has rational preferences and maximizes utility. It might be that they harvest a species as they have been doing it for a long time. Landings;
  - Vessel characteristics (Note: Not all vessels go to the exact location, so that decisions might depend on their characteristics).
  - Expected catch / species abundance?
- Data
  - CDWF logbooks and landings (Caitlin)
  - PacFIN landings by vessel & logbooks (try to connect to Global Fishing Watch).
  - SDM's from Barb
- Consideration:
  - Choice set important (locations and species).
  - Outside option?

Graphs

Robert L Hicks, Daniel S Holland, Peter T Kuriyama, and Kurt E Schnier. Choice sets for spatial discrete choice models in data rich environments. *Resource and Energy Economics*, 60:101148, 2020.

David Revelt and Kenneth Train. Mixed logit with repeated choices: Households' choices of appliance efficiency level. *Review of economics and statistics*, 80(4):647–657, 1998.