EXPLAINING HETEROGENEITY IN RESPONSES TO SEAFOOD INFORMATION CAMPAIGNS

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March 22, 2017

BACKGROUND

- Recently economists have focused their efforts on evaluating consumer health risk and benefit perceptions on food consumption
  - (Shogren et al. 1999; Lusk et al. 2004; Lusk and Coble 2005; Rousu and Shogren 2006; Huffman et al. 2007; Teisl and Roe 2010; Heiman and Lowengart 2011)
- Aside from contributing to the realm of academia, the goal of these studies is to inform the development of programs that promote healthy food consumption
  - Past research has provided limited insight on whether information impacts consumer choices and by what means

SEAFOOD MARKET

- The market for seafood has been flooded with information related to health risks and benefits on seafood consumption
  - Public and Private sources
- While there have been studies on consumer preferences, knowledge, and behavior related to other food products, the application of these results to seafood is limited (Johnston and Roheim 2006)
- National Academies study concluded that "research is needed to develop and evaluate more effective communication tools for use when conveying the health benefits and risks of seafood consumption" (Uchida et al. 2015; Nesheim and Yaktine 2007)

MOTIVATION

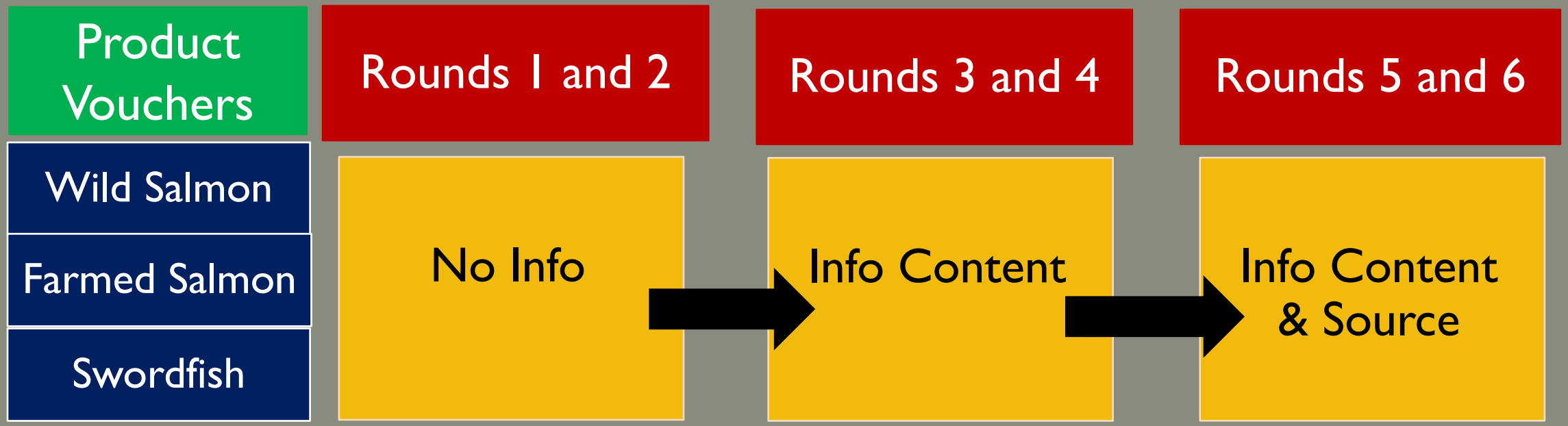
- Uchida et al. (2015) conducted a series of experiments with the goal of answering the following: *is the information currently provided to the public effective at motivating changes in seafood consumption?*
- The model used in Uchida et al. (2015) included a parameter representing individual heterogeneity
- The significance of this parameter is the springboard for pursuing further work in order to *explain* the heterogeneity

RESEARCH QUESTION

- What types of consumers are represented in our sample and how do they respond to information treatments related to seafood health benefit/risk information?
  - We use a *finite mixture model* in an attempt to classify auction participants by their bidding behavior
- In particular, in the context of USDA/HHS goal of promoting seafood consumption by women and children.

AUCTION EXPERIMENT (UCHIDA ET AL. 2015)

We are interested in the *change* in bid between round 2 and round 6, which represents the premium a participant may assign after receiving full information treatment



WHY AN AUCTION?

- *Second-price* sealed-bid format, with the binding auction round randomly chosen at the end of the experiment(Fox et al. 1998; Lusk et al. 2001; Lourerio, Mcluskey, and Mittelhammer 2002)

- This format is designed to be *incentive compatible*, and counters potentially upward biased WTP values elicited using contingent valuation methods (Fox et al. 1998)

INFORMATION TREATMENTS

Table 2. Number of participants receiving each information treatment and type

Information treatment	Frequency	Type	Salmon	Swordfish
FDA	56	Risk	No	Yes
Industry	57	Benefit	Yes	No
FDA/Industry	59	Balanced	Yes	Yes
University	52	Balanced(R)	Wild and Farmed	Yes
NAS	64	Balanced(B)	Wild and Farmed	Yes
No Information	52	-	-	-
Total	340			

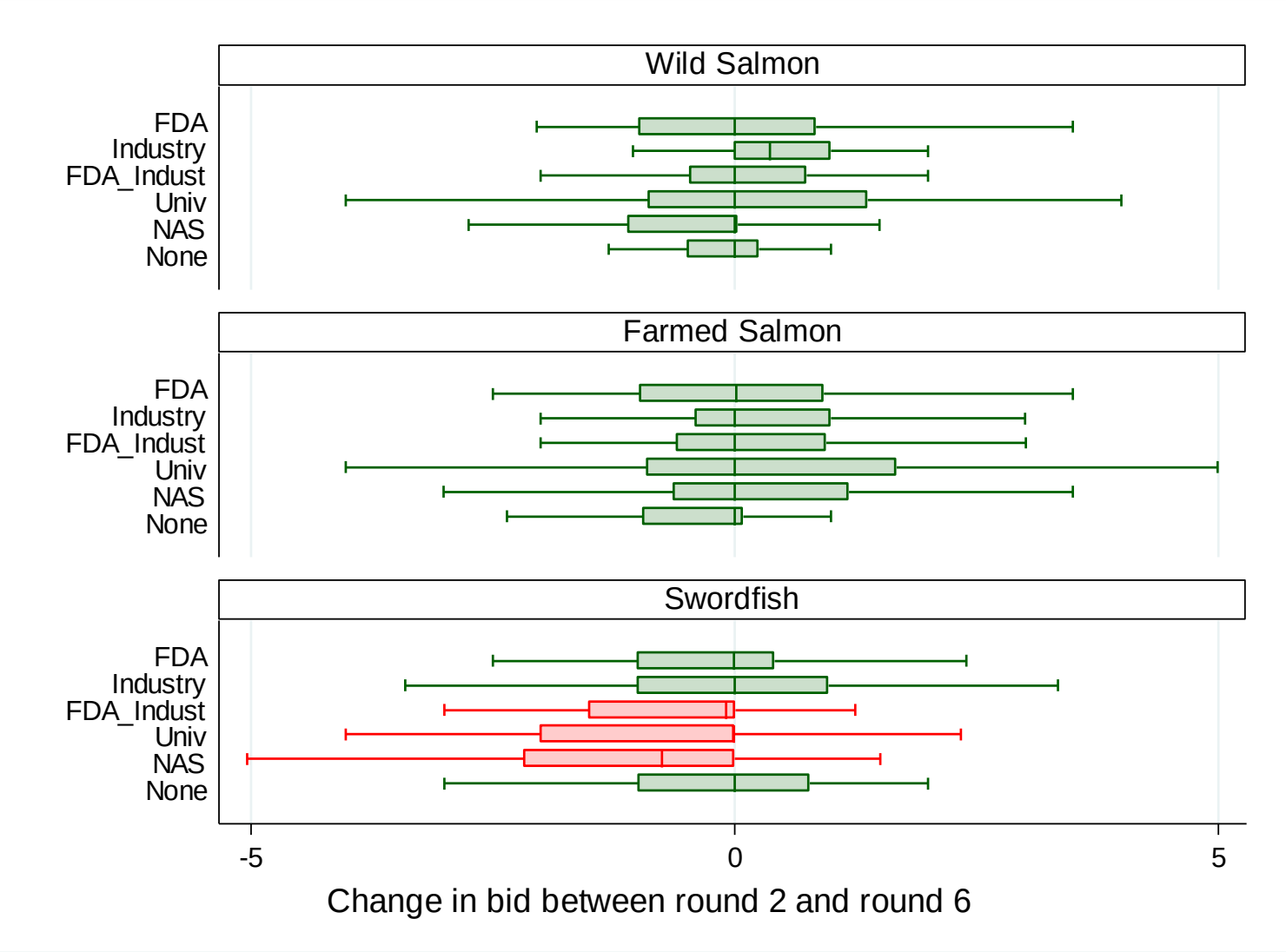
Notes: Adapted from Uchida et al (2015). Balanced(B) denotes a balanced treatment with a slight focus on benefits, Balanced(R) denotes a balanced treatment with slight focus on risks.

AUCTION PARTICIPANTS

Table 1. Descriptive statistics

	N	Mean	Std. dev.
Age (years)	338	38.23	13.22
Gender (= 1 for female)	339	0.59	0.49
Education*	339	3.86	1.38
Household size	340	2.91	1.58
Income*	336	2.32	1.02
Change in bid between rounds 2 and 6 ($)	1020	-0.19	3.49

Figure 1. Summary of change in bids between round 2 and round 6 by product and information treatment



MODEL

- We estimate a *k-component, mixed effects, finite mixture model*
  - Estimates a weighted sum of *k* probability densities,

$$f(\mathbf{y}_j) = \sum_{i=1}^{k} \pi_i f_i(\mathbf{y}_j)$$

- Assume an i.i.d. sample, where pdf is distributed multivariate normal
- Implement EM algorithm (Jededi et el. 1993), as it is ideal in the case of unobserved data

MODEL

Based on models used in Uchida at el. (2015) and Morgan et al. (2015), we assume each observed *change in bid* between auction rounds 2 and 6 is represented by the following,

$$y_{jk} = \mathbf{X}\beta_k + V_{jk} + U_k + \varepsilon_{jk}, \varepsilon_{jk} \sim N(0, \sigma_k^2)$$

We control for demographics, seafood preferences, information treatment received, product, and interaction of product and information treatment and random effects at the participant-level

RESULTS

- Based on a Bayesian Information Criterion (BIC) and Integrated Classification Likelihood (ICL), we identify a k=3 component mixture

- Using ANOVA and Tukey Honest Significant Differences (THSD) we classify these three components as different "types" of seafood consumers
  1. Cautious Target Group
  2. Intended Response Target Group
  3. Rational Consumers

CAUTIOUS TARGET GROUP

- Characteristics
  1. 8.5% of sample
  2. 62% female
  3. Younger ~34 years old
  4. More children between ages 6-18
  5. Eat salmon and swordfish *less*, relative to tuna
  6. Have stronger beliefs that seafood is safe
  7. Relatively more trust in available market information
  8. Largest variance of change in bid ($7.58)

~ USDA Target Group

INTENDED RESPONSE TARGET GROUP

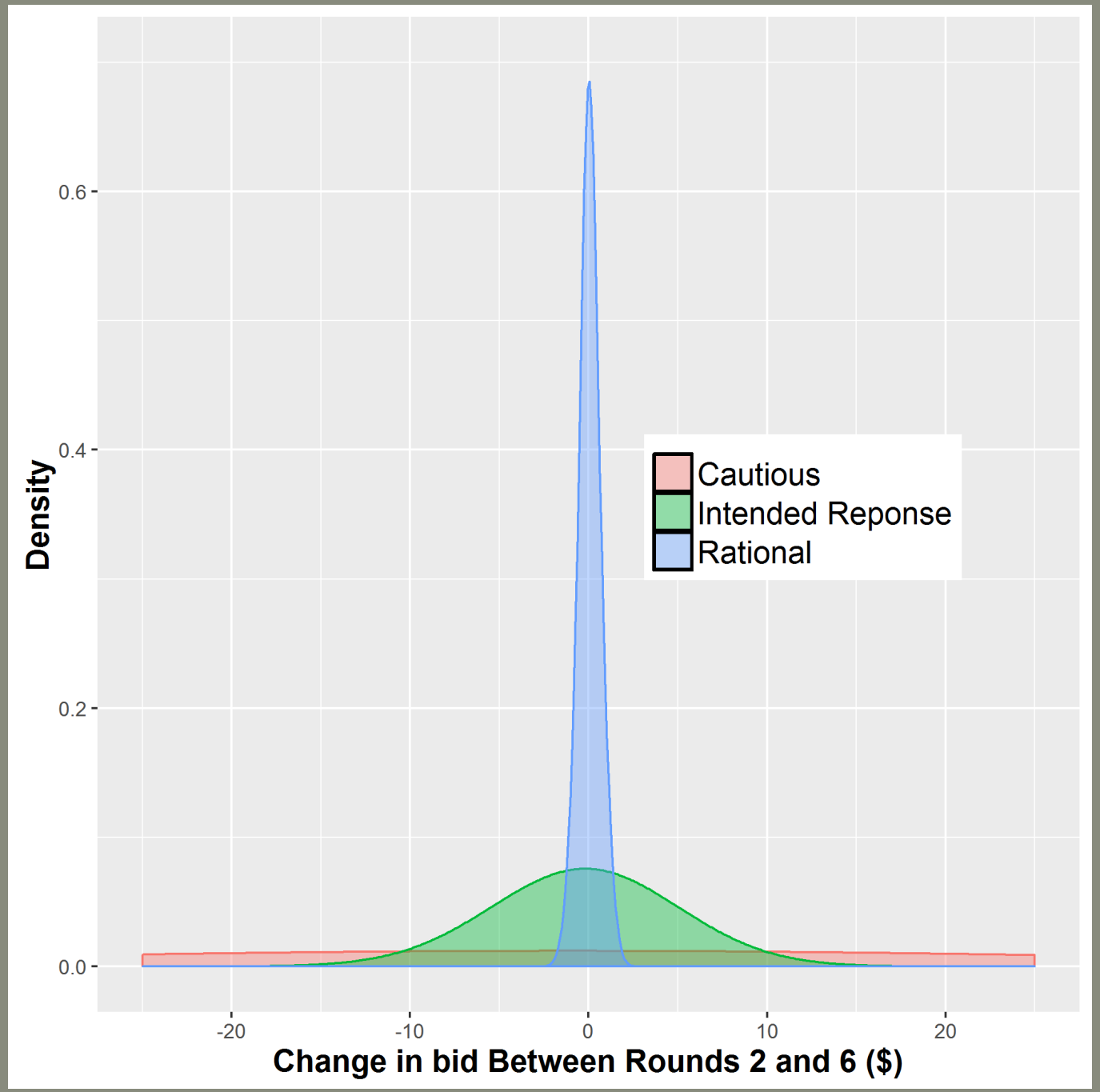
- Characteristics
  1. 55.3% of sample
  2. 63% female
  3. ~39 years old
  4. Neutral on seafood safety
  5. Less relative trust of market information
  6. Generally eat more seafood
  7. Only decreased bid for swordfish, on average*
  8. Variance of $2.14 of change in bid

~ USDA Target Group

RATIONAL CONSUMERS

- Characteristics
  1. 36.2% of sample
  2. 52% female
  3. ~37 years old
  4. Neutral on seafood safety
  5. Less relative trust of market information
  6. Generally eat more seafood
  7. Tended to decrease bids for "more harmful" products and increase bids for "more beneficial" products, based on information
  8. Smallest variance of change in bid $ 0.40

~ Rhode Island Average


Density
0.6
0.4
0.2
0.0
Cautious
Intended Reponse
Rational
-20
-10
0
10
20
Change in bid Between Rounds 2 and 6 ($)

DISCUSSION/CONCLUSION

- In general, our sample exhibits the profile of the target group of the information treatments in the experiment, primarily females of child bearing age
- KEY DIFFERENCE: Particular classes differ in regard to variance of change in bid, which we can interpret as a measure of uncertainty
- Thus, there are still instances to take advantage of targeted information campaigns to communicate health benefit information more effectively to combat uncertainty

THANK YOU TO…

FUNDING

COMMENTS

- URI Marketing and Pricing Lab
- Cathy Roheim, Tom Sproul, Clayton Michaud, Carrie Gill, Katherine Canfield, and Vasu Gaur