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## Introduction

- Global catches of tuna species have been continuously increasing for decades
- In US, Tuna demands counted a third of all fish and seafood sales and stock depletion have threatened long term outlook of tuna supply
- Eco-Labels and Traceability have been taken to mitigate the problem
- US companies committed to allow to trace the source from "catch to can"

## Objectives

- Investigate household level tuna steak (sashimi grade) consumption and purchase preference especially within land-locked state -Kentucky
- Examine perceptions and attitudes toward farm raised and wild caught
- Quantitate willing-to-pay for eco-friendly labels and attributes

## Survey and Data

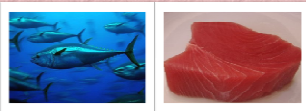
- An online survey conducted for Kentuckians in July 2010 via [zoomerang.com](http://zoomerang.com)
- 421 usable questionnaire returned:
  - 71.5% Female (State Average: 51.6%)
  - 49.9% Occupied (State Average: 55.3%)
  - Mean age over 18 is 52.2 years old (State Average: 48.5)

### Conjoint Experiment: Attributes and Levels

#### Tuna (steak form and sashimi grade)

Origin	Wild Caught	Farm-raised		
Storage Mode	Previously Frozen	Fresh and Never Frozen		
Eco-Labeled	Certified Turtle Safe*	None		
Price	\$8.99/lb	\$14.49/lb	\$19.99/lb	\$25.49/lb

\*: "Certified Turtle Safe by definition is fish harvested by fisheries under stringent controls to avoid sea turtle by-catch"



## Theoretical Model

Random Utility Model and Mixed Logit Regression are applied

$$U_{ni} = V_{ni}(x_{ni}, s_n) + \varepsilon_{ni}$$

$x_{ni}$ : Observable Alternative Attributes;  $s_n$ : Demographics  
 $V_{ni}$ : Observable Utility Component;  
 $\varepsilon_{ni}$ : Unobservable Utility Component/Random Utility

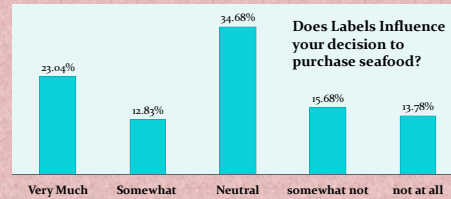
The probability of choosing alternative j is written as:

$$P_j(j) = \frac{\exp(X_{nj}\beta)}{\sum_{i=1}^I \exp(X_{ni}\beta)}$$

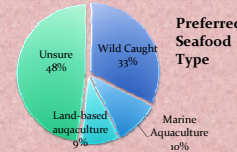
Willingness to Pay:  $WTP = MU_{attribute} / MU_{price}$

## Descriptive Summary

- 30% of respondents could differentiate fish between wild-caught and farm-raised aside from labeling
- Over 40% had notice labeling whether seafood is wild-caught or farm-raised
- About 36% admitted that the label information will affect their purchase decisions (see below chart)



However, almost half (48%) of the respondents are unsure about source of their seafood consumption



## Econometric Results

### Mixed Logit Regression Results and Willingness-to-Pay

Variable	Coefficient	SE	p-value	WTP
Buy Nothing	-1.45	0.19 ***	<.0001	
Wild Caught	-1.96	0.34 ***	<.0001	-\$9.69
Pre-Frozen	0.97	0.31 ***	0.002	\$4.78
Turtle Safe	1.43	0.49 ***	0.0034	\$7.04
Price	-0.20	0.02 ***	<.0001	-

⇒ Kentucky Consumers might not preferred wild caught tuna and negative WTP is reported.

⇒ Significant Price Premium for "Turtle Safe".

### Whether Has Differentiate Ability of Wild Caught or Farm Raised

Wild Caught*Differ	0.21	0.21	0.3254	
Pre-Frozen*Differ	0.08	0.16	0.6218	
Turtle Safe*Differ	-0.30	0.21	0.145	
Price*Differ	0.05	0.01 ***	<.0001	\$0.24

### Whether Label will Influence Purchase Decision

Wild Caught*Label Influence	0.30	0.08 ***	0.0002	\$1.46
Pre-Frozen*Label Influence	-0.21	0.06 ***	0.0006	-\$1.03
<b>Turtle Safe*Label Influence</b>	<b>-0.21</b>	<b>0.08 **</b>	<b>0.0124</b>	<b>-\$1.03</b>
Price*Label Influence	0.02	0.00 ***	<.0001	\$0.10

⇒ Respondents whoever admitted they are affected a lot while purchasing seafood by Label Information, did pay higher for wild caught tuna, however, lower for certified turtle safe tuna surprisingly.

Pre-Frozen*Urban	-0.25	0.14 *	0.0831	-\$1.21
Pre-Frozen*Female	-0.59	0.16 ***	0.0003	-\$2.89
Turtle Safe*Female	-0.36	0.18 *	0.0534	-\$1.76
Turtle Safe*Age	-0.01	0.01 **	0.0381	-\$0.06
Turtle Safe*Education	0.03	0.05	0.4512	
Turtle Safe*Occupied	-0.14	0.14	0.3256	
Turtle Safe*Income	0.10	0.06	0.1048	\$0.51

### Environmental Priority

Wild Caught*Env Friendly	-0.31	0.22	0.152	
Pre-Frozen*Env Friendly	0.21	0.18	0.2409	
Turtle Safe*Env Friendly	0.58	0.22 ***	0.0096	\$2.87
Price*Env Friendly	0.01	0.01	0.2623	

For individual who has a priority for choosing environmental friendly seafood product, they did pay higher price for turtle safe certified tuna.

## Conclusions

- This study provide perspectives upon consumer demand for commercial tuna fish.
  - Comparison between wild caught and farm raised tuna species via conjoint experiment choice setting, Mixed Logit Regression results reported lower price for wild caught in Kentucky area;
  - Regarding environmental concerns, significant price premium displayed, especially for "Turtle Safe".



- Interesting results regarding heterogeneous consumers revealed different attitude afterwards: individuals who admitted labels information would affect they seafood purchase decision turn out to paying less for certified turtle safe tuna steak.

- One of the contributes of this study, is to inform tuna producers and marketers about future product marketing strategies and promotions.

- Additionally, the premium on Eco-Friendly label -- "Certified Turtle Safe" -- suggests consumers' blooming desires for ecological wellbeing and sustainability.

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# Consumer Demand and Preference for Eco-friendly Labeled Commercial Fish Commodities: Application to Tuna Steak

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