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**More than Meets the Eye: Consumers' Willingness to Pay for Marine Stewardship
Council's Certified Seafood**

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1 **More than Meets the Eye: Consumers' Willingness to Pay for Marine Stewardship**
2 **Council's Certified Seafood**

3
4 **Abstract**

5 The Marine Stewardship Council (MSC) certificate provides great promise as a market-based tool
6 for sustainable fisheries but to succeed in the market a critical share of producers needs to
7 participate in the program. Since consumers' willingness to pay is a driver of producer
8 participation, we conduct a consumer choice experiment to determine U.S. American consumers'
9 preferences and willingness to pay for MSC certification for canned tuna. We find that most U.S.
10 American consumers are willing to pay for MSC-certified seafood. Also, results show that MSC
11 certification might be especially advantageous for exporting producers from developing countries.
12 Finally, our modeling allows us to determine complementary effects that MSC might have with
13 other attributes. The results provide insights to stakeholders in the seafood industry on the
14 effectiveness of MSC certification in championing sustainable fisheries. Recommendations based
15 on willingness to pay for sustainable seafood labeled with MSC are provided.

16 Key Words: Marine Stewardship Council, Sustainability, Willingness to Pay, Seafood

17 **JEL Classification:** Q11, Q13, Q18

18 **Introduction**

19 Fish stock depletion is one of the most challenging ecological crises in the world. The FAO
20 announced that over 90% of fish stock is fully exploited or overexploited (FAO, 2014). This dire
21 situation highlights the need for a systematic and broad-based approach that will ensure the
22 sustainability of the fish stock. One of possible approaches is the use of "Ecolabels". In essence,
23 the usefulness of ecolabels is contingent on its ability to create market differentiation. Ecolabels
24 can kill two birds with one stone. Unlike prices and other search attributes, environmental
25 attributes related to a product's production are often impossible for the individual consumer to
26 assess (Caswell and Mojduszka, 1996, Wessells, et al., 1999). Ecolabels could address the
27 information gap that is inherent in "sustainability" related attributes (i.e., as a credence attribute),

28 making it possible for consumers to differentiate between sustainable and conventional products.
29 With the provision of ecolabels, consumers could then make informed purchase decisions
30 depending on their preferences and willingness to pay (WTP) for sustainable products. Moreover,
31 if consumers are willing to pay a higher price for an eco-labeled product, then this could serve as
32 a signal to producers and could then motivate them to participate in sustainable production
33 practices with the potential of price premium, greater market share, or in some cases, the eligibility
34 to make it to retailers' shelf.

35 The number of consumers demanding guilt-free seafood are on the rise, so are the number of
36 sustainable fisheries certifier (Christian et al. 2013). The most established certifier in the fishery
37 industry is the Marine Stewardship Council (MSC). Founded by WWF and Unilever in 1997, the
38 MSC sets and maintains standards for sustainable fishing and seafood traceability. This NGO has
39 rapidly become the biggest seafood certifier, with 255 fisheries now MSC certified accounting for
40 11 million metric tons or 12% of the annual global harvest of seafood (Marine Stewardship Council,
41 2015). Diamond (2005) contends that the MSC is a good example of collaboration between
42 environmental effort and business interest in promoting sustainability.

43 Nevertheless, Stokstad (2011) highlighted that MSC has not yet won over the skeptics of the
44 certifiers' positive impact on sustainability. While MSC has assumed the leadership in the fishery
45 certification business, whether consumers recognize and are willing to pay for its label remains an
46 open debate. For example, concerns were raised that MSC's standard is not sufficiently stringent,
47 pointing to incidences where MSC has allowed certification of declining fish stocks and fish stocks
48 that require more scientific studies to assess their sustainability status. In addition, MSC has a low
49 rate of certification amongst fisheries in small-scale fisheries, especially those in developing
50 countries where environmental enforcement is typically weaker than in developed countries
51 (Jacquet, et al., 2010).

52 Given the debate about the MSC label, it would then be important to know if consumers are
53 convinced about the effectiveness of MSC in achieving its goal in sustainability. Despite the belief
54 that consumers prefer sustainably-produced food products, recent evidence suggests that ecolabels
55 do not always induce favorable consumer preference (Delmas and Lessem, 2014). Among others,
56 trust is a significant factor in consumer preference of sustainable products and of fundamental

57 importance (Wessells, et al., 1999). Consumers have to trust MSC's visions and its ability to
58 achieve those visions in order to be willing to pay for the certificate. In addition to trust towards
59 the certifying agency, existing literature shows that consumers' attitudes and certain demographic
60 factors can influence the preference for sustainably produced seafood (Brécard, et al., 2009,
61 Wessells, et al., 1999). For example, Jaffry, et al. (2004) find that consumers in the UK prefer
62 sustainability certified products. Roheim, et al. (2011) detected a price premium for the MSC label
63 using a hedonic price model in the Metropolitan London market. Johnston, et al. (2001) highlighted
64 that the preference is heterogeneous across geopolitical boundaries.

65 Evidence of strong consumer acceptance may hold the key to increase producers' participation in
66 the sustainable practice, especially given that the cost of obtaining MSC certification range from
67 \$10,000 for small scale fisheries to \$500,000 for larger and more complex fisheries (Roheim, 2003,
68 Washington, 2008). Washington (2008) further points out that the lack of in-depth analysis
69 showing a higher willingness to pay for ecolabels may have detrimental effects to participation of
70 fisheries in developing countries.

71 There is scant literature however on US consumers' WTP for sustainably produced seafood. In
72 addition, most existing literature merely provides a rather static average WTP, omitting the
73 potential for heterogeneity in the valuation estimates and hence, also the assessment of the fraction
74 of the market willing to pay for sustainably produced seafood. Moreover, the literature is relatively
75 scarce on the joint effects that MSC certification might have with other categories of attributes
76 when they are presented together. Louviere, et al. (2000) exhort that the interaction effects could
77 account for a significant portion of decision makers' choice. For instance, MSC certificates may
78 mitigate the negative connotation associated with imported seafood from developing countries due
79 to poorer environmental standard and practice that are often linked to these countries. MSC
80 certification could also have substitution effect that could crowd out WTP for other attributes (Gao
81 and Schroeder, 2009).

82 1. To fill this void in the literature, in our study, we will estimate consumers' WTP for
83 sustainable seafood and also address taste heterogeneity and the relationships between
84 ecolabelling, country of origin labeling and health claims. The main goals of this study are:

85 To determine willingness to pay for sustainably produced seafood amongst American
86 consumers.

87 2. To quantify the share of American consumers willing to pay a premium for sustainably
88 produced seafood.

89 3. To evaluate the presence of complementary or substitution effects that MSC certification
90 might have with other seafood attributes.

91 Our results using an online consumer choice experiment study suggest that US consumers
92 generally exhibit a heterogeneous willingness to pay for sustainable seafood. In addition, we
93 observe that sustainability could complement Country of Origin labeling on imported products and
94 some health claims.

95 **Methodology**

96 *Design of the Study*

97 The data of this study is collected via an online survey. Survey development involved literature
98 review, consultation with experts, and pretesting. In the online choice experiments, 1039 canned
99 tuna consumers from the US participated. The sample was stratified based on education, gender,
100 and age of the American population so that the preferences determined are representative of
101 American canned tuna consumers.

102 While the main goal of this study is to assess consumer willingness to pay for MSC certified
103 seafood, we included other attributes to avoid single cue bias (Bilkey and Nes, 1982). As noted,
104 the MSC certification was used to represent sustainable practice as it is the largest seafood labeling
105 program of its kind. Second, the country of origin attribute was included (unspecified, USA,
106 Ecuador, Vietnam). Third, a label was used to indicate if the can lining material is free of
107 Bisphenol-A, a controversial plastic packaging material that is linked to obesity, endocrine
108 disruption, and other health concerns (Bhandari, et al., 2013, Munguia-Lopez, et al., 2005,
109 Takeuchi, et al., 2004, Yoshida, et al., 2001). Fourth, a heart-healthy label, which is used to
110 highlight food that meets certain nutritional requirements that promote heart health was included
111 (present or absent). Lastly, the price was included based on market prices of canned tuna in the
112 U.S.

113 The product attributes and their levels were used in a choice experiment to measure consumers'
 114 willingness to pay. To design the choice experiment, we used Bayesian D-Optimality Criteria to
 115 construct the choice sets. This avoids efficiency-reducing dominant choice sets (Crabbe and
 116 Vandebroek, 2012). The design had a D-Efficiency score of 88.40%. The choice experiment
 117 consisted of a total of 24 choice sets. To minimize potential respondent fatigue, the choice sets
 118 were distributed into four blocks, and each respondent was presented with six choice sets (Savage
 119 and Waldman, 2008). Each choice set featured two five ounces canned tuna options incorporating
 120 various combinations of the attributes. Each choice set also includes an opt-out option, which
 121 allows the respondents the option of not buying if the two given canned tuna choices do not
 122 represent an appealing option for purchase (Hensher, et al., 2005, Louviere, et al., 2000).

123 *Econometric Model*

124 The decision process for choice of canned tuna can be represented by a random utility model. The
 125 utility of Individual decision maker i , associated with alternative j in choice set t is given as:

$$U_{ijt} = \boldsymbol{\beta}'_i \mathbf{x}_{ijt} + \gamma p_{ijt} + \boldsymbol{\delta}' \mathbf{z}_{ijt} + \varepsilon_{ijt} \quad (1)$$

126 The parameters to be estimated are $\boldsymbol{\beta}$, γ , and $\boldsymbol{\delta}$. The vector \mathbf{x}_{jt} depicts non-price main-level
 127 attributes presented in the alternative j of choice set t . Following the specification of the mixed
 128 logit model, the parameter vector $\boldsymbol{\beta}$ accounts for the part worth of utility associated with the
 129 attributes, and is assumed to follow a given distribution $f(\boldsymbol{\beta})$; thus, the model also produces
 130 estimates for standard deviations of the random parameters, $\boldsymbol{\lambda}$. The price attribute, p , is assumed
 131 to be fix to avoid distribution of the price parameter around zero for a more realistic distribution
 132 of willingness to pay. The mixed logit model enables accounting for taste heterogeneity, which
 133 could provide a more realistic representation of the distribution of taste as preference of attributes
 134 in food is often found to be heterogeneous. Vector \mathbf{z} represents the interaction terms of MSC and
 135 none price attributes. The stochastic error term ε_{ijt} is assumed to follow type I extreme value
 136 distribution (Train, 2003).

137 **Results**

138 The final model records a McFadden Pseudo R-squared score of 0.3186 (see table 1). The AIC
139 criterion suggests that the mixed logit specification significantly improves upon a counterpart
140 model estimated with a conditional logit specification where all parameters in equation (1) were
141 assumed as non-random. All of the estimated standard deviation of the random parameters are
142 significant and lend credence to the presence of taste heterogeneity among the examined attributes.
143 The statistically significant and negative price parameter conforms to the standard theory, which
144 suggests that higher price reduces the likelihood of purchase.

145 *Preference and Willingness to Pay for MSC Certification*

146 Of main interest in our study are the parameters associated with MSC. The significant and positive
147 main level parameter suggests that consumers prefer canned tuna furnished with the MSC label.
148 The standard deviation associated with MSC points to the existence of taste heterogeneity in
149 regards to MSC-labelled seafood. Our estimates suggest that about three quarter of the respondents
150 show preference for MSC-labelled canned tuna (table 1), which is in line with Johnston, et al.
151 (2001) who observed that 80% of Americans are willing to pay for sustainably-produced salmon.

152 Assuming that the price per can of five ounces of tuna is \$2.00, our results suggest that consumers
153 are willing to pay a sizeable amount for sustainably produced canned tuna. The willingness to pay
154 for MSC-labelled tuna is estimated to have a mean value of \$0.58 per can, and \$1.55 per can at the
155 90th percentile (table 2). The willingness to pay estimates agree generally with findings from
156 previous studies. While it appears to be higher than the 14.2% mean premium reported in Roheim,
157 et al. (2011), the discrepancy could stem from difference of measurement between market
158 premium and willingness to pay.

159 The finding of the sizeable willingness to pay supports the notion that US consumers prefer MSC-
160 labelled seafood products. This is important given that policy-makers and others have raised
161 doubts regarding the effectiveness of MSC as a tool to support the market condition for sustainable
162 seafood market (Roheim, et al., 2011). This finding suggest that US consumers intend to support
163 sustainably produced seafood, and it may lend credence that regardless of how consumers may

164 associate the MSC label to the actual production, they express trust towards the products that bear
165 the MSC label.

166 The negative coefficients associated with imported products, β_{vietnam} and β_{ecuador} , suggest that US
167 consumers view imported canned tuna unfavorably even when comparing against similar products
168 that are not labeled with origin; conversely, consumers prefer domestic products (origin USA) over
169 an unlabeled product. These results are hardly surprising given that studies have repeatedly shown
170 that US consumers prefer US products over imports (Lim, et al., 2013, Tonsor, et al., 2009), and
171 favor labelled US products over unlabeled products (Loureiro and Umberger, 2007). In relation to
172 the MSC certificate, the question arises as to whether the certificate improves the negative
173 connotation that Americans displayed towards imported seafood.

174 Judging from the term, $\gamma_{\text{msc}*\text{Ecuador}}$, the test rejects the null hypothesis that the interaction effects
175 between MSC and country of origins does not exist. MSC might show positive interaction effects
176 for imported product. To illustrate, the average consumer has a negative willingness to pay of
177 \$ -.85 for a can of Ecuadorian tuna compared to a similar can of tuna not labeled for Country of
178 Origin. Nevertheless, when Ecuadorian canned tuna is offered with the MSC label, the MSC label
179 increases willingness to pay by on average \$1.14 per can from the main (\$0.56) and interaction
180 effect (\$0.58) of having the MSC certification.

181 The interaction effects of sustainable production and health claims are mixed. From the main
182 effects, the estimates suggest that consumers prefer BPA-free and Heart-healthy claims. When
183 BPA-free is offered in addition to MSC certification, we observe a complementary effect. The
184 mean willingness to pay increases by \$0.47 per can when BPA-free is offered with MSC
185 certification. This complementary effect suggests that MSC labelling could strengthen the positive
186 image of certain claims.

187 Nevertheless, the interaction terms between the Heart-healthy claim and MSC certification is
188 negative; this suggests that MSC is a gross substitute to the Heart-healthy claim. The data provide
189 no direct explanation as to why the relationship between the two attributes exists. The two
190 attributes however could be net substitutes, i.e., consumers could perceive the two attributes
191 serving overlapping purposes, thus offering one attribute over the other does not lead to simple

192 addition of their associated values. We could also postulate that while the two attributes are not
193 necessarily net substitute, it is possible that the income effect exerts downward pressure on utility.
194 In other words, as the number of attributes offered increases, consumers accommodate the budget
195 constraint by cutting back expenditure especially on those attributes that have large main effects,
196 such as the Heart-healthy claims; thus the two attributes could be net complements, but gross
197 substitutes (Nicholson and Snyder, 2011).

198 **Conclusion**

199 The MSC certificate provides considerable promise as a market-based tool for sustainable fisheries.
200 To succeed as a long-term solution, however, it must receive a critical mass of participation from
201 producers (Roheim, et al., 2011, Wessells, et al., 1999). For this to happen, consumers' willingness
202 to pay is a necessary condition for market premium or wider market access. The existing literature
203 provides limited information about consumers' willingness to pay for sustainable fishery products.
204 Our results suggest that most US consumers are willing to pay for MSC-certified seafood, and that
205 the amount they are willing to pay is substantial, especially in the higher percentile. Additionally,
206 we found that MSC certification might be especially advantageous for exporting producers from
207 developing countries as our model demonstrated a complementary effect, which will help alleviate
208 the negative image commonly associated with imported products.

209 This article shows consumers' taste variation to MSC-labelled products, and is possibly the first
210 to point out complementary effects that MSC might have with other attributes. Nevertheless, the
211 scope of this research is limited to the US population and canned products. The results are unlikely
212 to be fully generalizable to other markets and products. Even though the marginal willingness to
213 pay estimates are believed to be robust (Lusk and Schroeder, 2004), as with all stated preference
214 studies, the results are contingent upon the accuracy of the data obtained from stated preference
215 methods involving hypothetical choice scenarios. Nevertheless, our analysis serves as a reasonable
216 starting point for further discussion on the effectiveness of MSC in championing sustainable
217 fisheries.

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279

280

281 **Table 1. Mixed Logit Model Estimates**

	Coeff.		Std. Err.		Coeff.		Std. Err.
Random Coeff.				Std. Dev. of Random Coeff.			
$\beta_{\text{opt out}}$	-4.7345	***	0.2734	$\lambda_{\text{opt out}}$	4.2017	***	0.2308
β_{usa}	1.0683	***	0.1588	λ_{usa}	1.1889	***	0.1622
β_{vietnam}	-0.7673	***	0.1963	λ_{vietnam}	1.7249	***	0.1698
β_{ecuador}	-1.2743	***	0.2210	λ_{ecuador}	1.5300	***	0.1730
β_{bpafree}	0.2948	**	0.1394	$\lambda_{\text{bpa free}}$	1.0914	***	0.1029
β_{msc}	0.8655	***	0.2530	λ_{msc}	1.1422	***	0.1122
$\beta_{\text{heart-healthy}}$	1.7122	***	0.1732	$\lambda_{\text{heart-healthy}}$	1.1116	***	0.1135
Non-random Coefficients							
γ_{price}	-1.5048	***	0.0780				
$\delta_{\text{msc*usa}}$	0.2412		0.2629				
$\delta_{\text{msc*viet}}$	0.1089		0.2727				
$\delta_{\text{msc*ecua}}$	0.8415	***	0.2875				
$\delta_{\text{msc*bpa free}}$	0.7094	***	0.2256				
$\delta_{\text{msc*heart-healthy}}$	-1.0409	***	0.2575				
Log likelihood score			-4639.62				
AIC			9319.20				
McFadden R-squared			0.3186				

282 *, **, *** denotes significant at the 90%, 95%, and 99% significance levels respectively.

283 The log likelihood score of a conditional logit model is -5996.56, and the AIC is 12019.1.

284 **Table 2. Willingness to Pay Estimates**

	% of Positively Distributed Region	Mean willingness to pay (\$/can)		Willingness to pay at 90th Percentile (\$/can)
Main Effects				
Opt Out	12.99%	-3.1463	***	0.4332
USA	81.56%	0.7100	***	1.6485
Vietnam	32.82%	-0.5099	***	0.9204
Ecuador	20.25%	-0.8468	***	0.4487
BPA Free	60.65%	0.1959	**	1.0624
MSC	77.57%	0.5752	***	1.5596
Heart Logo	93.83%	1.1378	***	2.0768
Interaction Terms				
MSC*USA		0.1603		
MSC*Vietnam		0.0724		
MSC*Ecuador		0.5592	***	
MSC*BPA Free		0.4714	***	
MSC*Heart- Healthy		-0.6917	***	

285 *, **, *** denotes significant at the 90%, 95%, and 99% significance levels respectively based on
 286 1000 Krinsky and Robb Simulation.