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Will American consumers pay more for eco-friendly labeled canned tuna? Estimating US consumer demand for canned tuna varieties using scanner data

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ABSTRACT

This study estimates consumer demand for eco-friendly labeled canned tuna products in two distinct US marketing channels, conventional and natural supermarkets, to evaluate market-based incentives for conservation measures that affect fishing costs and retail prices. Using retail scanner data, this paper finds that US consumer demand for canned tuna varies depending on the species of tuna, what gear type was used, whether the can is sold in natural food or conventional supermarkets, and whether canned product is or is not certified as eco-friendly. The paper's main conclusions are that retail price premiums for eco-friendly products face upper limits due to consumer responses to higher prices, and are most effective when coupled with: (1) inelastic own-price elasticity of demand; (2) price premium signals that are transmitted from retail markets to raw material producers; and (3) limited retail consumption substitution possibilities with lower-priced conventional products that help maintain price premiums and that otherwise create conservation disincentives by increasing conventional supply. Results from this paper not only have unique implications for various forms of international tuna fisheries policy that incorporates or anticipates change in market behavior, but also could serve as a scientific reference to clarify the trade disputes.

1. Introduction

Several key questions facing fisheries sustainability are dependent on consumer response to “eco-friendly” labeling that indicates which type of fishing gear is used, and addresses bycatch, and other ecosystem impacts of the fishing method how the fishing method that the production method would interact with different level of bycatch that the ecosystem would be impacted ([1]; [2]). Are consumers in US retail markets willing to pay higher prices for eco-labeled seafood or is the increasing popularity of eco-labeling a result of increased market access? How responsive is consumer demand to eco-labeled and conventional seafood prices? How willing are consumers to substitute lower-priced conventional seafood for higher priced eco-labeled products, and at what price levels? How is the incidence (cost share) of a retail level eco-labeled price premium, or green sales tax, shared between consumers and supply chain firms? How will research concerning the development and implementation of certifications contribute to debates surrounding the wider theory of how market based incentive mechanisms can generate sustainable behavior?

Eco-labeling can create a market-based incentive for better-managed fisheries by fostering consumer demand for seafood products from well-managed stocks [3]. Eco-labels provide otherwise unobservable information to consumers about the environmental attributes of the products conveyed by the eco-label compared to those products that do not. Consumers valuing the environmental attributes conveyed by the label will shift demand towards the eco-labeled products and away from products that are not, which in turn creates a price premium and a market incentive for producers to supply these environmental attributes. Eco-labeling can also create market access. Market access can be viewed as a price premium, since the alternative is a potentially lower or even zero price when a product cannot enter a market. Empirical evidence points toward eco-labeling and certification as potentially effective in terms of meeting sustainability targets. For example, evidence suggests MSC certified fish stocks are healthier [4].

More formally, do consumers respond to information that can either supplement or serve as an alternative to traditional methods for

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regulating environmental externalities [5]? In general, externalities are unintended and uncompensated positive or negative impacts from one consumer/producer to another. When information is incomplete and asymmetric, so that consumers have less information about environmental performance than the suppliers of seafood (vessels, supply chain firms), consumers have difficulty matching choices for eco-labeled products with their preferences, and incentives are created for vessels to harvest fish by environmentally damaging techniques or at levels exceeding the preferences of perfectly informed consumers.

Three linked economic externalities are present: (1) the familiar common resource stock externality from vessels using the resource stock as a costless input into their production process and leading to overfishing, (2) a public good ecosystem externality arising from bycatch, biodiversity loss, and ecological damage, and (3) an information externality due to incomplete or asymmetric information. Market failure, overexploitation, biodiversity loss, and economic inefficiency follow. Eco-labeling is intended to lessen the information externality in order to address the linked common resource stock and ecosystem externalities.

Eco-friendliness is not the main reason consumers purchase a product, but it can be an important consideration when choosing among competing products [2]. There is evidence that eco-friendly seafood (as indicated by labeling and production method) can create a price premium, but any market advantage conferred by an eco-label can be easily offset by a less eco-friendly product offered at a reduced price. This raises the questions of consumer responsiveness in retail markets to price differentials between products with and without labels and responsiveness to own-price changes, and the possibility of consumers to substitute conventional seafood for eco-friendly seafood, all with conservation implications.

However, the retail price premium may not be successfully transmitted to vessels. Without explicit mechanisms to transmit higher prices to fishers, the actual effectiveness of seafood eco-labeling schemes in promoting sustainable fish stocks, their legitimacy, transparency and openness, the integrity of their supply chains, and other direct and indirect consequences of using fisheries certification as a market-based instrument may be called into question [6–14].

There may also be information asymmetries or market power imbalances between upstream and downstream firms in a supply chain, so that consumer willingness to pay is not fully transmitted as incentives to produce eco-friendly products. Producers will respond to higher prices and/or market access by altering their production methods only if the prices producers receive in raw materials markets increase revenues.

This paper addresses questions in retail seafood markets concerning consumer willingness to pay a price premium for eco-labeled products, comparative price responsiveness of eco-labeled and conventional products, and product substitution between conventional and“eco-friendly” products. It also discusses implications of eco-labeling for conservation and the bearers of the incidence of the price premium or related environmental retail sales tax that internalizes stock and ecosystem externalities to provide better understanding and knowledge of the market place. The paper evaluates the US retail market for canned tuna by generating price elasticities for the period from September 13, 2008 to September 3, 2011. The paper touches upon, but does not resolve, three other questions: whether consumer willingness to pay is transmitted through the supply chain to producers and whether the prices producers receive in raw materials markets are price-responsive and how producers respond.

This paper estimates the price premium and price elasticity associated with eco-labeled canned tuna consumed in the US. These metrics have major policy implications for the global tuna fishery, that directly affect fisheries management, international regulations, catch quota levels, fishing effort, and gear types, etc. Further, the price incentives generated by eco-labeling effects behavior at the retail market and create conservation incentives via demand spillover effects are demonstrated. The motivations and questions are described in Section 1. Section 2 discusses methods, notably, a review of relevant literature, US market demand and market delineation, data, and model. Section 3 presents empirical results. Section 4 discusses these results and their policy implications. The concluding remarks are given in the last section.

2. Methods

2.1. Relevant literature review and background

Existing empirical research shows that seafood eco-labels are associated with shifts in market demand from moderate to more sustainable choices and willingness to pay for eco-labeled seafood [15–18]. These studies show that eco-labeling and certification have market impacts, can be associated with willingness to pay, and can potentially contribute to the promotion of fisheries management that achieves healthy fish stocks and minimizes environmental impacts [12,19–21]. However, none evaluate price and income elasticities, consumer substitution possibilities, or conservation implications. Most of the research uses attitudinal and knowledge surveys, consumer choice experiments, and experimental auctions, which capture consumers' stated preferences rather than actual behavior ([18] reviews the literature).

The literature on consumer demand in canned tuna markets is limited. Babula and Corey [22] estimated price elasticities of supply and demand for conventional US canned tuna products. Domestic canned tuna own-price demand elasticity was negative and inelastic at −0.3, while imported canned tuna demonstrated elastic own-price demand of −1.3. However, this study did not specify species and fishing gear (an indicator for eco-friendly in this study), and the modeling was based on tuna import and domestic production and producer price index (versus actual grocery store sales data).

Jaffry and Brown [23] modeled UK canned tuna demand using scanner data. They examined product mediums and interaction between traditional tuna in brine and oil and more recent value added tuna in sauces, versus products differentiated as eco-friendly. All products had negative and inelastic own price elasticities. Tuna in brine and sauce was a normal good, while tuna in oil was a luxury good. Both normal and luxury goods enjoy an increase in demand as the real income/expenditures of consumers increase, where the income/expenditure elasticity of demand measures the proportional increase in demand for a one percent change in real income/expenditures. If the income/expenditure elasticity of demand is greater than zero, the good is a normal. If it is greater than one, the good is a luxury good.

Babula and Corey [22] and Jaffry and Brown [23] looked at general demand for canned tuna in the US and UK, whereas Teisl et al. [16] focused on one of the first US seafood eco-labels, dolphin-safe tuna. Using monthly Nielson scanner data to test whether the dolphin-safe label on canned tuna changed consumers' purchasing decisions, they found the label increased the canned tuna market share. These findings have important implications for canned tuna eco-labels in general, but don't provide insight into different tuna species or market segments.

Conventional canned skipjack tuna is typically caught by purse seine vessels, which often use fish aggregating devices (FADs), but may also set on free-swimming schools of skipjack. Longline vessels catch conventional canned albacore tuna. Both fishing methods result in ecosystem impacts due to effects on the populations of target catch, and high levels of bycatch of finfish or mega-fauna species, such as sharks, sea turtles, and sea birds. Eco-friendly canned tuna brands are those that are differentiated on their labels due to harvest by Pole and Line gear (P & L), a capture method with substantially lower bycatch rates than FAD purse seines or longlines. Canned skipjack differentiated as FAD-free, or free school on the label, and which has substantially lower bycatch than FAD-caught, has only recently entered US markets, but was not included in this analysis.