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## Consumer preferences for reduced packaging under economic instruments and recycling policy

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### ABSTRACT

This study was conducted using a web-based survey and bidding game in contingent valuation method to evaluate consumer preferences for packaging with less material. Results revealed that people who live in a municipality implementing unit-based pricing of waste have a higher willingness-to-pay (WTP) for a product. Economic instruments can affect the purchase of products with reduced packaging because a higher disposal cost increases the attractiveness of source reduction. However, unit-based pricing combined with plastic separation for recycling reduces WTP. This result suggests that recycling policy weakens the effect of economic instruments on source reduction of waste.

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### 1. Introduction

The amount of municipal solid waste that goes to landfill in Japan has gradually decreased over the last decade, dropping from 109 million tons in 2000 to 51 million tons in 2009 ([Japanese Ministry of the Environment, 2011](#)). As a result of the implementation of several laws related to the recycling of materials, recycled municipal solid waste amounts have increased steadily from 70 million tons in 2000 to 95 million tons in 2009. Although recycling can reduce the amounts of finally disposed waste, it requires energy and labor input, which engenders the assertion that more attention should be developed to source reduction in the field of waste management. For instance, the EU Waste Framework Directive (2008/98/EC) states that waste legislation and policies of EU Member States should adhere to a waste management hierarchy in which prevention is the best option, followed by re-use and then recycling. Following Directive 94/62/EC on packaging and packaging waste (PPW), EU member states have been undertaking large investments in their recycling systems for packaging ([Da Cruz](#)

[et al., 2014](#)). The PPW Directive and its targets were updated in 2004 (Directive 2004/12/EC); member states are expected to have recovered a minimum of 60% by weight of packaging waste by the end of 2008. The recycling targets for respective materials were 60% by weight for glass, paper and cardboard, 50% by weight for metals, 22.5% by weight for plastics, and 15% by weight for wood. The [OECD \(2010\)](#) points out that waste management policy in Japan has emphasized recycling and reduction of final disposal, and that further efforts must be undertaken for waste prevention. There is considerable policy emphasis on the need to study which problems are connected with source reduction and how source reduction can be promoted better.

Buying commodities packaged with less material is an important means of practicing source reduction of waste. [Deweese and Hare \(1998\)](#) reviewed the regulation of packaging waste in Canada. They found that 88 percent of reduction in waste in Ontario was achieved by source reduction: the shift from glass and steel to plastic and aluminum and “lightweighting” of containers of all types. They concluded that, except for refillable beer bottles, Canadian consumers have rejected refillable beverage containers. Source reduction has been achieved mainly by manufacturers as a market-driven measure.

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Regarding minimal packaging, a more intensive strategy than simply less packaging, several researchers have examined consumer perceptions and behavior. [Bech-Larsen \(1996\)](#) used several questionnaire surveys to investigate Danish consumers' attitudes about food packaging. Those results indicate that many consumers are concerned about the environmental consequences of packaging waste, although their perceptions seldom affect their actual purchasing behavior. Furthermore, consumers do not feel comfortable in solving the packaging waste problem. [Bech-Larsen](#) suggests that environmental information using shelf labeling, shop signs, and other forms of communication at the place of selection should emphasize the positive contribution that consumers can make to environmental quality.

[Rokka and Uusitalo \(2008\)](#) investigate Finnish consumers' preferences for recyclable packaging using choice-based conjoint analysis. Their results indicate that consumers evaluate recyclable and resealable packaging positively. They also identified various distinctive consumer segments in the market. In contrast to results of earlier studies, they found that the largest consumer segment favored environmentally labeled packaging as the most important criteria in their choice.

[Ferreira and Marques \(2015\)](#) estimated the willingness to pay (WTP) for selective collection of packaging waste in Portugal using dichotomous choice contingent valuation technique. Their results show that WTP is –1.35 euros, although it becomes 3.16 when protest bids are excluded.

This paper presents an examination of the economic value of less packaging using the stated preference approach, which elicits individual WTP for hypothetical market goods. We empirically investigate the potential demand for products with less packaging and its price competitiveness compared to products with conventional packaging.

Estimation of WTP for less packaging can yield important implications for designing an adequate waste policy. First, a higher WTP for such qualitatively different goods suggests the possibility of promoting these goods to environmentally friendly consumers. Vendors of sufficiently attractive products with less packaging can increase their market share without any need for policy intervention. Secondly, the WTP can be affected by various factors such as consumers demographic characteristics and perception of the benefits and shortcomings of less packaging. Understanding the characteristics of consumers who prefer less packaging is expected to provide important hints for the effective promotion of the products. Furthermore, we investigate the effects of policy instruments related to waste management on the promotion of products with less packaging. Economic instruments such as unit-based pricing (UBP) of waste collection might induce a higher WTP for less packaging because of higher disposal costs that must be borne by consumers. Alternatively, the separation of waste for recycling might reduce WTP for less packaging because source reduction becomes less attractive when people prefer recycling. Earlier studies have revealed that UBP can decrease the amount of household waste ([Usui, 2008; Usui and Takeuchi, 2014](#)). However, they do not clearly show whether the decrease can be attributed to source reduction or to recycling. Assessing the possible interaction between source reduction and UBP is expected to be important for the effective use of economic instruments.

We use a bidding game contingent valuation method<sup>1</sup> in our survey. In the bidding game format, respondents are asked iteratively whether they would be willing to pay a certain amount to acquire the product. The amounts are raised or lowered depending

on the response to the previously offered amount. Using this process, researchers can estimate the individual WTP of each respondent more efficiently. However, the bidding game has a starting-point bias: the WTP estimates are affected by the first amount to start the bidding process ([Desvousges et al., 1987; Onwujekwe and Nwagbo, 2002](#)). Following [Ladenburg and Olsen \(2008\)](#), we examine the existence of a starting-point bias by preparing scenarios with three starting bids.

The aim of this study is twofold. First, it investigates consumers' WTP for less packaging. Although several studies have specifically examined consumer perceptions and their behavior with regard to minimal packaging ([Bech-Larsen, 1996; Matsumoto, 2011; Rokka and Uusitalo, 2008](#)), no study has examined WTP for less packaging or has analyzed the individual characteristics that affect WTP. Secondly, this study assesses the effect of policy instruments on consumer preferences for less packaging. Previous studies of minimal packaging analyze the effect of environmental information provided at store shelves, whereas the present study elucidates the interaction between waste policies and green marketing. We investigate how waste policies are expected to affect consumer preferences for packaging with less material.

The remainder of this paper is presented as follows. Section 2 explains the survey design and data. Following that, econometric models are provided in Section 3. Section 4 summarizes the empirical results of our estimation. Section 5 discusses the implication of those results. Section 6 presents our conclusions.

## 2. Data

### 2.1. Survey design

The survey was administered in December 2010 after several pretests with a few respondents to refine the survey wording and to reduce the scenario rejection. We sent e-mail messages to Nikkei research's registered monitors<sup>2</sup> of a survey company to invite them to answer on-line questionnaires. The survey respondents were people of both sexes from 20 to 69 years old residing in Japan. Among the 10,717 persons who received the e-mail messages, 2411 completed the questionnaire. After incomplete answers were removed, the number of valid responses remaining for final analysis was from 1908 to 2214, depending on the estimated model. The valid response rate<sup>3</sup> ranges from 17.8% to 20.7%.<sup>4</sup> [Schonlau et al. \(2002\)](#) reviewed response rates for web surveys and noted that response rates were from 7% to 44%. The response rate of our survey is in the middle of this range.

The survey comprises four sections. The first section asks about respondents' daily shopping behavior, such as their degree of concern about price, quality, brand, and environmental friendliness of body-care products. We chose body-care products because they are frequently purchased items that have the same contents packaged in different containers. The second section includes contingent valuation (CV) questions related to reduced packaging. We use a bidding game type of CV question that compares a conventional product with less packaged product. The reason for using the bidding game format is that it enables us to estimate an individual's WTP more precisely. In addition, pairwise comparison is

<sup>2</sup> Registered monitors are individuals who participate in the survey upon request from the survey company. Survey companies have their own group of monitors to represent a population in Japan.

<sup>3</sup> The valid response rate is the number of the responses that answered a sufficient number of questions for analysis, divided by the number of potential respondents to whom e-mail messages were sent.

<sup>4</sup> The population in Japan was approximately 126,890,000 on August 1, 2015 ([Statistics Bureau, Ministry of Internal Affairs and Communications, 2015](#)). We sent invitations to our survey considering the regional distributions of population, gender, and age. Approximately, 0.008% of the population received the invitations.

<sup>1</sup> The contingent valuation method is a state preference approach to estimate individual willingness to pay for hypothetical goods and policy. Using a survey questionnaire, it directly asks respondents how much they are willing to pay for purchasing a hypothetical good.

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