



Consumer choice on ecologically efficient water heaters: Marketing strategy and policy implications in Japan

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ABSTRACT

This study examines how consumers select ecologically efficient water heaters in Japan. Energy conservation in household water heating is increasingly important for reducing an amount of CO₂ emission, because the share of water heating in household energy consumption is approximately 30%. Recently, Japanese households have widely used ecologically efficient electric heat pump water heaters (Eco Cute) or gas-fired water heaters (Eco Jozu). The total number of such efficient water heaters sold in Japan was more than 2.5 million at the end of 2008. This study investigates various factors and impacts of marketing strategy for promoting the appliances in Japan. We apply mixed and nested logit models to a disaggregated choice data on water heaters from 2004 to 2008. This study considers retail energy prices, a government financial support and marketing activities as important factors for appliance selection. In addition, we consider consumers' housing attributes such as floor space and age of building. This empirical study finds two business implications. One of the two implications is that an increase in an energy price may enhance a choice probability of Eco Cute and Eco Jozu because a price increase invites consumer's consciousness on energy conservation so that a cost reduction on energy consumption becomes essential in a use of the efficient appliances. The other implication is that marketing activities, especially by recommendations from sales representatives and/or housing suppliers, are important for consumer behaviors. The other important findings are discussed in this study. This business experience in Japan is useful to the other countries where ecologically efficient water heaters are not popular at the current moment.

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1. Introduction

As a worldwide concern, policy makers, researchers and individuals who are interested in the global warming and climate change, have been discussing about a reduction on green house gases such as CO₂. The G8 (Group of 8) conference at L'Aquila (Italy), opened in July 2009, has supported an international pledge in which all industrial nations reduce more than 80% of green house gases by 2050, compared to the levels of 2005. In particular, they have discussed on the gas reduction in residential and commercial sectors as well as a transportation sector. For example, their discussion includes space and water heaters in residential houses and business offices. They have also discussed an impact of direct combustion of fuel in passenger cars and trucks on CO₂ emission.

To reduce the amount of CO₂ emission, many international organizations (e.g., IEA: International Energy Agency, 2009) have paid attention to a use of electric technology such as an electric

vehicle and an electric heat pump water heater. See, for example, IEA (2009), Edmonds et al. (2006) and Eurelectric (2007).

Japan cannot escape from the international trend on global warming and climate change. Indeed, Japan has achieved high efficiency in an energy usage of the industrial sector. However, the residential and commercial sectors have not achieved such a high standard. The amount of CO₂ emission in Japan is increasing in the residential and commercial sectors. Recently, Japanese government, along with local governments, provides consumers with a financial incentive when they purchase an ecologically efficient water heater because the share of water heating in household energy consumption is relatively large, which is approximately 30%. The governmental support can be considered as a policy tool to reduce the amount of CO₂ emission in Japanese household energy consumption.

In addition to the general trend mentioned above, Japanese Ministry of Economy, Trade and Industry (METI) proposed a long-term energy plan and Japanese Cabinet approved the plan on June 18, 2010. The energy plan has a policy goal in which Japan reduces the amount of CO₂ emission in households by 50% until 2030. To attain the policy goal, Japanese government recommends a use of a "smart meter" energy management system that can enhance an efficient use of energy, along with a use of efficient lighting and water heaters, in

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households (Nihon Keizai Shinbun—Japanese Economic Newspaper on April 17, 2010, corresponding to Wall Street Journal in USA and Financial Times in UK).

Admitting the importance of diffusion of ecologically efficient water heaters for achieving a low-carbon society toward which Japan is now directing, this study is motivated to examine how Japanese consumers select ecologically efficient water heaters. No study has investigated the marketing aspect on the water heaters. In examining the business/policy issue, we have been long wondering why people purchase such ecologically efficient water heaters even though they are very expensive. To attain the research objective, this study investigates an effective marketing strategy of energy companies in order to promote these appliances to households. This study is also concerned with preparing policy implications related to the marketing effort.

Hereafter, this study uses “Eco Cute” and “Eco Jozu”, implying “ecologically efficient electric heat pump water heaters” and “ecologically efficient gas-fired water heaters” in Japanese. Note that “Eco” implies “ecologically efficient”, “Cute” implies “hot water supply”, and “Jozu” implies “good” in Japanese, respectively.

The purpose of this study is to examine the business and policy implications for promoting Eco Cute and Eco Jozu by examining various factors that influence consumers' behavior in purchasing Eco Cute and Eco Jozu. This study is important because a use of such two types of water heaters reduces not only energy consumption and cost for households, but also the amount of CO₂ emission from households. No study has empirically examined the research agenda on Eco Cute and Eco Jozu. It is true that this study focuses on the experience in Japan. However, it is easily envisioned that this Japanese experience will be useful for the other industrial nations, which attempt to introduce ecologically efficient water heaters in their households and business offices.

The remaining structure of this study is as follows: Section 2 describes the energy consumption in Japan and the recent situation on Eco Cute and Eco Jozu. Section 3 explains our research strategy from methodology and empirical models applied in this study. This section also summarizes previous research efforts from the perspective of methodology. Then, this study describes the position of this study in the area of energy studies. Section 4 summarizes a conceptual framework and its derived hypotheses to be examined in this study. Section 5 describes a data set and estimation results, then summarizing our empirical results. Their business and policy implications are also discussed in this section. Section 6 concludes this study along with future research extensions.

2. Energy consumption and residential water heaters in Japan

This section starts with a description on Japanese energy consumption and recent situation on residential water heaters in order to specify the importance of this research. Japanese industrial technology on energy conservation is highly regarded in the world. However, there are few studies that have discussed the energy business/policy issue from the perspective of ecologically efficient appliance selection.

As widely known, Japan depends upon other nations in obtaining 96% of energy resources such as oil and natural gas. After facing an energy crisis twice in the 1970s, the Japanese industry has been long making a full effort for energy conservation. For example, the chemical and paper pulp industries in 2007 attained the 50% reduction in their energy consumptions from the level of 1973 (Agency for Natural Resources and Energy, 2010).

In contrast, Japan could not attain any reduction in its energy consumption in households and the transportation sector because people changed their life styles and the number of cars drastically increased. For example, the industry sector did not change the level of energy consumption from 1973 to 2007. Meanwhile, the households and transportation sectors increased 2.5 times and 2 times in the observed period, respectively (Agency for Natural Resources and Energy, 2010).

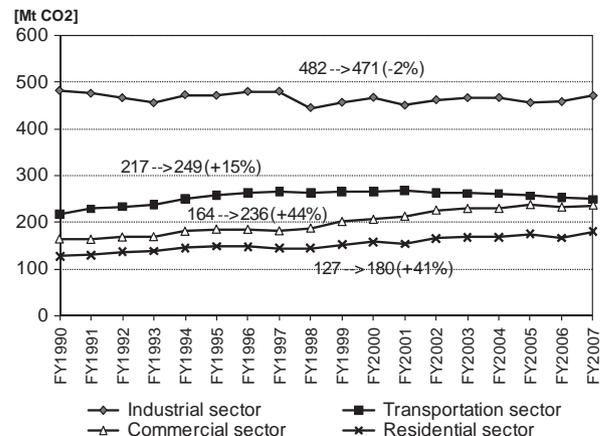


Fig. 1. A shift in the amount of CO₂ emission in Japan. Source: National Greenhouse Gas Inventory Report of Japan (2009). Note: FY stands for a fiscal year in Japan which starts from April to March.

To describe the shift in energy consumption from another point of view, Fig. 1 depicts a shift in the amount of CO₂ emission, listed in the vertical axis of Fig. 1, from the four sectors (i.e., industrial, transportation, commercial and residential sectors) from 1990 to 2007. The industrial sector includes large industrial plants and production facilities and the commercial sector includes office buildings. Fig. 1 visually indicates that the industrial sector reduces the amount of CO₂ emission by 2% during the observed period. In contrast, the amount of CO₂ emission increases 15% in the transportation sector, 44% in the commercial sector and 41% in the residential sector. Thus, it is important for Japan to reduce energy consumption in the commercial and residential sectors because such a reduction effectively decreases the total amount of CO₂ emission.

Focusing upon the residential sector, Fig. 2 depicts a shift of five energy consumptions in the sector. This study is particularly interested in energy consumption by water heaters because they have a share of 30% in the residential sector.

In Japan, there are two types of ecologically efficient water heaters, as depicted in Fig. 3. Eco Cute is an electric heat pump water heater and Eco Jozu is a latent heat recovery gas-fired water heater, as we discussed previously. Both are ecologically efficient. The electric power companies promote Eco Cute, while the city gas companies promote Eco Jozu¹.

Japanese residential customers are still regulated so that they are not eligible to choose alternative electricity suppliers or gas suppliers. However, the electric power companies and the city gas companies compete with each other for supplying residential hot waters, because residential customers can choose fuel between electricity and gas as alternatives for producing hot waters².

As depicted in Fig. 3, both Eco Cute and Eco Jozu were released in 2001 and 2002, respectively. The two appliances increased in their numbers since 2001. The two types of water heaters were sold more than 2.5 million units in total at the end of 2008 (1.53 million units for Eco Cute and 1.03 million units for Eco Jozu). One of such rationales for popularity is a recent technology progress on water heaters. For example, Coefficients of Performances (COP)³ of Eco Cute and Eco Jozu

¹ In Japan, there are 10 vertically integrated investor-owned electric power companies, and a few major city gas companies that operate from the production of gas to the retail sales to final consumers. Both electricity and gas markets are deregulated so that all consumers with the exception of household consumers and very small commercial consumers can choose their suppliers as of 2010.

² There are no electric and gas combined energy utility companies in Japan. This is very different from the USA and many countries in Europe.

³ COP is a performance indicator of energy efficiency for appliances such as an air conditioner. The ratio shows heating and cooling capability per 1 kW. The higher number is associated with a high level of energy efficiency.

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