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# Is there a price premium for energy efficiency labels? Evidence from the Introduction of a Label in Korea<sup>☆</sup>



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## ABSTRACT

This study examines the price premium from Korea's Energy Efficiency Grade Label. The Korean government recently began energy certification of televisions, providing a setting to analyze a possible price effect of the new label. Hedonic regression results seem to show that a price premium exists for products with the Energy Efficiency Grade Label. However, potential unobserved heterogeneity is a concern. Difference-in-difference and fixed-effects models are used to capture the net effect of the label by controlling for time and product differences. The results suggest that any price premium does not result from the energy efficiency label itself. Instead, energy-efficient products already had higher prices before the introduction of the energy efficiency label. The finding turns our attention to the importance of careful design of labeling programs.

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Environmental labeling is intended to help consumers take environmental matters into account when making purchasing decisions and to encourage firms to produce environment-friendly goods to satisfy consumer demand. Such programs are usually administered by a third party, such as the government.

Kotchen (2013) describes how environmental labeling can alleviate two market distortions. One is incomplete or asymmetric information. While a seller is aware of the environmental friendliness of the good, a buyer cannot observe it and therefore cannot make an informed decision. Labeling helps narrow this information gap between the buyer and the seller by providing information about products' environmental impacts. Environmental labels are certified through third-party assessment so that buyers are assured that information on the label is accurate and credible.

The other market distortion is related to the public good aspects of environmental quality. Environmental labeling may attenuate free-riding by helping to establish a private mechanism to provide

the public good. Consumers may engage in impure altruism, where their voluntary contributions to the provision of a public good are motivated not only by an interest in the welfare of the society, but also by satisfaction from the act of giving (Andreoni, 1990).

The Energy Efficiency Grade Label is a Korean eco-labeling program similar to the US Energy Star program (U.S Environmental protection agency energy star (2012)). This mandatory labeling program is administered by the Korea Energy Management Corporation (KEMC). The energy labeling program may enable consumers to identify which products are energy-saving and might encourage manufacturers to use energy-efficient technology and environment-friendly components. The Energy Efficiency Grade Label was first applied to refrigerators in 1992. Now, the label certifies over 40 product categories, including air conditioners, automobiles, and washing machines (KEMC, 2012).

As televisions constitute 17% of energy usage by households, it was essential that televisions be included in the Energy Efficiency Grade Label program. Internationally coherent system to measure energy efficiency did not exist until 2010, when IEC (International Electrotechnical Commission) 62087 established an agreement in measurement of energy efficiency. IEA (International Energy Agency) advised that every country institutes energy labels for televisions.

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**Table 1**  
How energy efficiency grade level is determined.

R	Level
$R \leq 130$	1
$130 < R \leq 165$	2
$165 < R \leq 205$	3
$205 < R \leq 260$	4
$260 < R \leq 440$	5

$R = W / \sqrt{m^2}$ , where  $W$  is energy used and  $m^2$  is area of screen.

The Korean government followed suit and started the energy certification on televisions in July 2012 (Ministry of Knowledge Economy, 2011). Based on average TV viewing hours by household, the agency calculates average wattage usage of each product and certifies the product with the Energy Efficiency Grade Label following the guidelines provided by the program. Certified products are rated at a level of energy efficiency. Level 1 products are the most energy-efficient and Level 5 products are the least energy-efficient of the certified products. Table 1 describes how levels were determined, and this information was released to the public in May 2011, approximately a year before the labeling program started in July 2012. If a product fails to meet minimum standards for certification, then the manufacturer must remove the product from the market within 90 days. Because this study was carried out one month after levels were first assigned to televisions, those models that failed to receive certification remained on the market. The study takes advantage of such timing to look at the price effect of the energy efficiency label.

Fig. 1 is an example of an Energy Efficiency Grade Label for televisions. On the label, the following information is provided: level of energy efficiency, wattage usage per  $1 \sqrt{m^2}$ , amount of CO<sub>2</sub> emissions per hour, model of television, and yearly energy cost. Before the labeling began, consumers were provided the information on average energy usage only. The labeling program provides new information not only on average energy usage, but also on average CO<sub>2</sub> emissions, average yearly monetary costs, and, most importantly, level of energy efficiency.<sup>1</sup>Newell and Siikamaki (2014) show that labels that give a suggested grade to a model encourage energy-efficient behavior of consumers. In this respect, by providing new information to the consumers, labels may elicit energy-efficient behavior.

Another environmental certification in Korea is the Eco-label, which is given to products that are environmentally less harmful during the manufacturing, consumption and disposal stages. This labeling program also began in 1992 and currently applies to over 120 product categories (Korean Environmental Industry and Technology Institute (KEITI), 2012a,b). The Eco-label is the most widespread environmental certification in Korea. The Eco-label is different from the Energy Efficiency Grade Label in that the Eco-label considers the overall harmful emissions from the manufacturing stage to the disposal stage, while the Energy Efficiency Grade Label considers only the energy-saving aspect.

This paper investigates the effect of the Energy Efficiency Grade Label on the price of televisions in Korea by comparing prices of products that did receive the label and products that failed to receive the label. The fact that this label began to certify televisions in July 2012 motivated the current analysis. Price data is collected before

and after the adoption of the energy label. Because televisions are also certified by the Eco-label, the paper controls for the effect of the Eco-label on price and studies the price effects of the two labels separately.

Hedonic regression results show that, controlling for other observable attributes of televisions, higher prices are observed for televisions that received the Energy Efficiency Grade Label. However, there is no price premium for the Eco-label. If the energy label is what caused higher prices, the different price premiums for the two labels may exist because households have higher willingness-to-pay for energy-efficient products, but not for environment-friendly products in general.

Additionally, difference-in-difference estimation and fixed-effects estimation are carried out to capture the genuine “treatment” effect of the energy labeling program. The purpose is to address potential unobserved differences in product attributes between labeled and unlabeled televisions. The results suggest that the true effect of the label is close to zero and not statistically significant. Energy-efficient products may have higher quality in diverse dimensions and therefore have higher prices.

The finding that the label has zero effect cautions against faults of the labeling program. The two main goals of labeling programs are the following. The first is to induce energy-efficient behavior on the part of consumers. This leads to the second goal: to give incentives to manufacturers to produce energy-efficient products. The Korean energy label program seems to have used excessively lenient standards when rating energy efficiency of televisions, which made it difficult for consumers to differentiate energy efficiency of models. On a different but related note, announcing the standards too early may have offered time for manufacturers to produce models that satisfy requirements for certification. The strategic behavior of manufacturers combined with absence of rigid standards may have caused a price effect of the label to disappear.

Although numerous hedonic studies have looked for price premiums from environmental certifications, this study is the first to look at the effect of the new adoption of a label. Drawing on this opportunity, this study attempts to address endogeneity problems



Fig. 1. Energy Efficiency Grade Label.

<sup>1</sup> In the case of offline retail stores, the label is attached to the model, so the consumers were able to see the level of efficiency for each model. For online shopping websites, once shoppers click on a webpage with a list of televisions, each model's level of energy efficiency is provided with a separate banner and, when they click on a specific model to see a detailed description of the model, information on the level of energy efficiency is provided again, along with wattage usage, amount of CO<sub>2</sub> emissions per hour, and yearly energy cost. Based on this note, consumers are able to differentiate relatively easily the level of energy efficiency of one model from another.

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