Consumer preference for durability and energy efficiency: Welfare Analysis of Light Bulb Market

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Abstract

Durability is the pivotal component of durable goods. Durablility not only induces demand dynamics through the change in the stock of products, but also affect the product choice of consumers. Furthermore, durability of products affect the long-run profits of firms.

This paper specifies a dynamic structural model of consumer demand for durability by explicitly accounting for the failure of products. I estimate the model on the light bulb market using aggregated data in Japan. The structural model is applicable to study the issues related to durability, which has not been fully investigated yet.

Using the structural model, I quantitatively evaluate the welfare consequence of light bulb ban, which prohibited the production of energy-ineffcient incandescent bulbs. The results show that banning products is economically inefficient in the case of light bulb market, because of the lack of close substitutes for the banned products. Applying tax-subsidy scheme is more desirable.

The structural model is also applied to empirically validate the relationship between market structure and firms' durability choice, which has been intensively studied in theoretical literature since the work of Swan. I build a theoretical model generalizing Swan's model, and show how the relation can be quantitatively clarified using actual market data.

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