Effectiveness of Liberalizing Retail Electricity Market for Small Customers
－ Issues in Metering System and Customers Switching Cost －

Background

Although the Japanese government has decided to postpone the liberalization of the retail electricity market for small customers, effectiveness of competition in the market for small customers remains to be investigated. In the UK, Norway and Germany, when liberalizing the retail market for small customers, a system of load profiling [1] is used to determine the generation costs associated with those individual customers without the need to install real time meters. On the other hand, some countries have started to roll out such meters for all customers, indicating that the cost effectiveness of the new metering system will become an important policy issue for Japan. Moreover, it has been pointed out that competition would not be effective in the residential electricity market because of customers switching cost.

Objectives

To investigate the effectiveness of introducing competition in the retail electricity market for small customers, we analyze the issues associated with the system load profiling and real time metering and the cost effectiveness of each system. We then consider the possible consequences of customers switching costs (resulted from transaction cost and psychological cost) on competition in the retail electricity market.

Principal Results

1. Problems of load profiling

The system of load profile necessarily creates problems associated with estimation errors, and it is unlikely to facilitate competition as it does not provide customers with incentive to reduce peak demand, limiting the efficiency gains by competition. Since the cost of real time meters has fallen in recent years, cost advantage with load profiling has been diminished and it is noteworthy that several countries started to roll out real time meters to all customers (Table 1).

2. Preliminary cost-benefit analysis of installing real time meters

Although the benefit from retail competition and reduction in peak demand with real time meter is uncertain, our calculation for Japanese electricity market suggests that it has to be very large in order to outweigh the cost. Specifically, in order to recover the cost of meters (estimated approximately ¥10,000-¥20,000), there has to be an annual 0.3% rate reduction for at least 10 years (Table 2). We might expect the benefit of shifting peak load by introducing time-of-use rates, but it is uncertain whether it is large enough to produce net benefits for customers.

3. Effect of switching cost of customers on consumer welfare

Because of the switching cost, small customers may not change the supplier even if there is an opportunity to lower rates. As a consequence of this, the incumbent utilities could have significant market power in residential electricity market, possibly resulting in rate increase. Our calculation based on a survey conducted by Ariu and Goto (2006) shows that it could result in reduction of 10% of consumer welfare if the incumbent utilities behave so as to maximize profit given the knowledge of customers switching cost (Fig.1).

Future Developments

Impact of competition between electricity and gas for residential market will be studied, as it could have been effective in increasing consumer welfare. In addition, the design of appropriate wholesale electricity market to bring benefits to final customers will be studied, as it is necessary for Japanese customers to keep benefiting from electricity liberalization.

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Reference
T. Hattori, 2007, "Effectiveness of liberalizing retail electricity market for small customers - issues in metering system and customers switching cost," CRIEPI Report Y06007 (in Japanese)

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[1]： Load profiling is to estimate how much electricity a particular type of customer consumes in each hour or half-hour period, and use these estimates to determine the generation costs associated with those individual customers without the need to install real time meters.

Table 1 Real-time meter installation in several countries/regions (as of the summer of 2007)

Country/Region	Type of Meter	Outline of Plans and Implementation
Italy	AMM	Rolling out started in 2001 and 30 million units were installed over 4 years, which covers all the customers in the country
Sweden	AMR/AMM	Rolling out started in 2003 and 5 million units will be installed by 2009
Northern Ireland	Keypad (prepayment)	160 thousand units will be installed by 2005
California, U.S.	AMR	Three largest investor-owned utility proposed the plan and regulatory commission approve the cost recovery of meters through rate increase
Victoria, Australia	AMM	All the customers will be installed real-time meters during 2008 through 2013
Ontario, Canada	AMM	All the customers will be installed real-time meters by 2021

Note: AMR (Automated Meter Reading) meter enables one-way communication from the meter to the supplier, and AMM (Automated Meter Management) meter enables two-way communication between the meter and the supplier.

Table 2 Rate reduction required for cost-effectiveness of real-time meters

		Period for Rate Reduction	
		20 years	10 years
Cost of Meter (yen/unit)	10,000	0.30%	0.40%
	15,000	0.37%	0.48%
	20,000	0.43%	0.56%

Note: In addition to the cost of meter itself, the calculation takes into consideration initial cost of real-time meter including data management system, installation, and stranding cost.
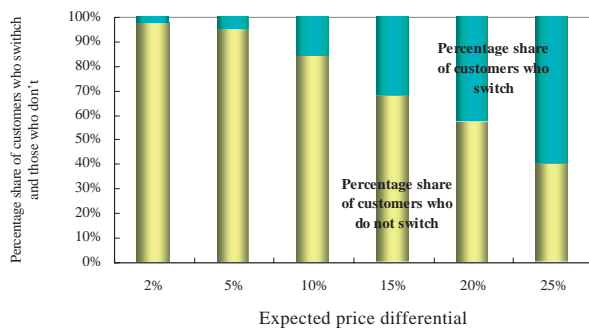

Fig.1(a) The share of customers who do not switch even if there is a price differential
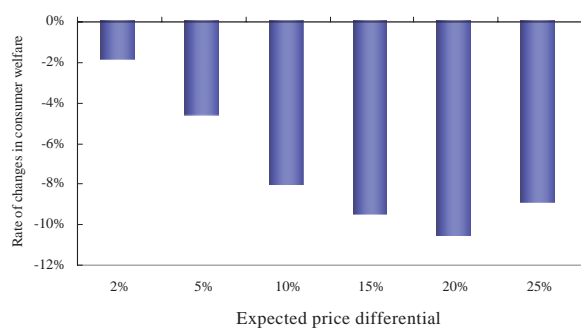

Fig.1(b) The impact of price deviating from the marginal cost on consumer welfare

Note: Because of the switching cost, not every customer switches if there is a price differential to save (Fig.1(a)). As a result, the incumbent utilities are able to raise price up to 20% from the price offered by new entrants which is assumed to be equal to the marginal cost. When the incumbents raise price, the reduction of consumer welfare of those who do not switch is greater than the welfare gain of the customers who switch the supplier, leading to a net decrease of total consumer welfare (Fig.1(b)).