

Computer Industry Laboratory



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Summary of Achievement

Refereed academic journal

[o-fu-309-038-01:2015] Kenta Ofuji. Wholesale and retail electricity markets in Japan: Results of market revitalization measures and prospects for the current reform. *Economics of Energy and Environmental Policy*, 5(1):31–49, 3 2016.

This study provides an overview of the current status of the wholesale and retail electricity markets in Japan, with a focus on the results of market revitalization policies, such as the thermal power bidding system, regular backup, and partial supply system. This study also offers a perspective on the future of the Electricity System Reform policy currently under way. Throughout the history of Japan's electricity market reform, the implementation of full-scale retail deregulation and the unbundling of electricity generation from the transmission and distribution (TandD) sectors have been significant issues. The outcomes and issues generated by market revitalization efforts indicate that reforms have entered the crucial stage that determines whether consumers will actually benefit from them.

[o-fu-309-038-02:2015] Ken-Ichiro Nishio and Kenta Ofuji. Explaining Differences in Household Electricity Saving Rates: A Panel Data Analysis on Household Attributes and Electricity Consumption Tendencies. *IEEJ Transactions on Power and Energy*, 136(3):284–290, 3 2016.

In this paper, we studied differences in the electricity saving rates across households, observed in the summer months of July through September after the Great East Japan Earthquake. To explain what factors carry different influences on the electricity saving rates, we ran panel data regression models using the electricity consumption billing data in the summer months, July through September, over the five years of 2010 - 2014 for 910 households in the Tokyo and Kansai areas. Specifically, we concentrated on two main explanatory factors: household attributes that include household size and income, and electricity consumption tendencies characterized by average consumption level and its standard deviation. We found that, while some household attributes such as age and floor space have statistically significant linear relationships with the saving rates, households with higher average consumption can have higher saving rates, implying the electricity consumption data acquired by smart meters may be among the key determinants for tailored energy-saving recommendations.

Unrefereed proceedings of an academic conference

[o-fu-309-038-03:2015] Kenta Ofuji. A Time Series Analysis of JEPX Spot Traded Quantities and Prices to Assess Influences from Voluntary Commitment. In *Proceedings of the 34th Conference on Energy, Economy, and Environment*, pages 8–1. Japan Society of Energy and Resources, June 2015.

In this paper, I analyze Japan's wholesale electric power exchange, Japan Electric Power Exchange (JEPX)'s spot market data with time series models, to gain insights on the effectiveness of so-called voluntary commitment (VC) that commenced in March 2013, as a market stimulus policy measure. VC is implemented by cooperation of general electric utilities, largely by increasing selling offer volumes, increasing buying bid volumes at the same time, and selling at prices that are close to the marginal cost of generation. By using time series models, I investigate what kind of changes have been brought about by VC. As a result, I found two pieces of empirical evidence that support the increased thickness of the market: a) diminishing influence of the selling offer and the buying bid volumes onto the spot price and traded quantities, b) buying bid is becoming more easily contracted. However, market risk perception may not be modest yet because supply-demand situation of power is still seen to affect the price and traded quantities.

[o-fu-309-038-04:2015] Osamu Kimura and Kenta Ofuji. Persistency of electricity savings in commercial and industrial sectors after the Great East Japan Earthquake: 2014 update. In *Proceedings of the 34th Conference on Energy, Economy, and Environment*, pages 17–4. Japan Society of Energy and Resources, June 2015.

Japan has experienced a severe electricity shortfall since March 2011 because of the Great East Japan Earthquake and subsequent shutdown of nuclear power plants. The supply-demand balance was especially severe in TOKYO and TOHOKU areas in summer 2011. Although the situation has been improved to a great extent since 2011, the power shortage is still persisting, requiring demand side activities to save electricity. This report summarizes results of the questionnaire survey on activities of Japanese firms to save electricity in response to the power shortage after the earthquake. We conducted surveys in 2011 to 2014 to follow firms' activities in each year's summer to analyse persistency of electricity saving activities. The results show that, while the overall activity level of saving electricity was lowered in 2014 compared to the 2011 level, various saving activities such as limiting use of lighting and air conditioning were still in effect. Perception on adverse effects of saving electricity was also lowered in 2014. Interestingly, in a little contrast to the moderated activity, reduction in demand (kW)

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and consumption (kWh) was maintained by 5 to 10 buildings. Results of panel regressions suggest that introducing LED lighting and efficient air-conditioning equipment has been making an important contribution to the persistent demand reduction.

Advisor for undergraduate research and graduate research

[o-fu-309-038-05:2015] Akane Gunji. Graduation Thesis: Is power saving effect statistically clear in the energy efficiency projects in the business sector?, University of Aizu, 3 2016.

Thesis Advisor: K. Ofuji

[o-fu-309-038-06:2015] Mayumi Yamanishi. Graduation Thesis: Analysis of sub-user influence in household water heater market, University of Aizu, 3 2016.

Thesis Advisor: K. Ofuji

[o-fu-309-038-07:2015] Fumina Matsuwaki. Graduation Thesis: Are continuous improvement activities effective in promoting power saving in offices and factories?, University of Aizu, 3 2016.

Thesis Advisor: K. Ofuji

[o-fu-309-038-08:2015] Suguru Sugisaki. Graduation Thesis: Test for differences in average values of dietary patterns based on the health data, University of Aizu, 3 2016.

Thesis Advisor: K. Ofuji

[o-fu-309-038-09:2015] Junya Ishii. Graduation Thesis: A survival analysis of forward market trading in Japan Electric Power Exchange, University of Aizu, 3 2016.

Thesis Advisor: K. Ofuji

[o-fu-309-038-10:2015] Moe Saito. Graduation Thesis: Relationship between willingness and actual behavior to save electricity, University of Aizu, 9 2015.

Thesis Advisor: K. Ofuji

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[o-fu-309-038-11:2015] Yuji Kawai. Graduation Thesis: The influence of lifestyle factors on the power saving efforts and continuity, University of Aizu, 9 2015.

Thesis Advisor: K. Ofuji

Contributions related to syllabus preparation

[o-fu-309-038-12:2015] Syllabus: Graduate School, Univ. of Aizu: PMC01 Managerial Economics