

論文の内容の要旨

Abstract

論文題目 ECONOMIC ANALYSIS ON THE IMPACT OF JAPANESE ELECTRIC SECTOR
DEREGULATION

(日本における電力自由化の影響に関する経済分析)

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The late 1980s marked the beginning of market driven reforms in the electricity sector. Most of the economies around the world have initiated power sector reforms since late 1980s irrespective of the sector size, resource endowments, institutional capacity and economic development. Japanese government also follows this great trend and deregulate electric sector step by step. However, the impacts of the reform have not yet been clear. In order to fill this gap, this dissertation qualitatively and quantitatively assesses the process and outcomes of market-based reforms on electricity sector both from demand and supply side. Thus, the most direct research questions of this dissertation are simplified as two research questions:

Does deregulation alter the behaviors of consumers? How did consumer behaviors change during the deregulation periods?

Does deregulation change the innovation behaviors of the electric sector? How does deregulation change the R&D behaviors of electric utilities?

In chapter 2, the income and price elasticities of electricity demand in Japan have been estimated. Previous studies in Japan follow the implicit assumption that price elasticity and income elasticity are constant. However, this assumption may be unrealistic. This chapter estimates the price and income elasticities of electricity demand in the industrial and residential sectors in Japan with annual data from 1989 to 2014. A time varying parameter (TVP) model with the Kalman filter is applied to monitor the evolution of consumer behaviors in the “post-bubble” period given the exogenous shock (financial crisis in 2008) and the structure breaks (electricity deregulation and Fukushima Daiichi crisis). Our model provides more robust results against the fixed coefficient model and is able to detect the outliers and structure breaks. The estimation results suggest that both industrial and residential consumers become less sensitive to price after electricity deregulation and the financial crisis, and more

sensitive to price after the Fukushima Daiichi crisis. By contrast, the income elasticities of industrial and residential sector consumers are stable during the examined period. Results also indicate that a negative relationship exists between the price elasticity of electricity demand and the price level of electricity after the electricity deregulation. Some insights on the further electric sector reform and the environmental taxation in Japan are also provided.

In chapter 3, the impact of the deregulation on utility R&D behavior has been analysed. Most previous studies in Japan only focus on the benefit of the static efficiency from the deregulation. However, in the long run, innovation is the source of continued efficiency and productivity improvements. The electricity deregulation started from the 1990s has altered the R&D behavior of electricity utilities remarkably. This chapter estimates both R&D input and R&D output of electric utilities in Japan with an econometric approach. Based on the empirical analysis of innovation activities of nine electric utilities in Japan, it is found that deregulation reduces the R&D investment of the incumbent electric utilities but increases the firm patent applications and patent citations/ average patent citations. In other words, deregulation will lead to better innovation productivity. We also try to estimate how incumbent electricity utilities change their R&D strategy to adapt to new challenges during the transition a competition environment. The breakup of R&D expenditure from 1994 to 2005 implies that the R&D priority of the electric companies switch to cost-saving and business-oriented projects under the deregulation process. The declining R&D efforts may be detrimental to the reliability and dynamic efficiency of the electricity system especially more renewable energy has been incorporated, as well as the innovation maintenance of introducing smart grid and environmental concerns.

In chapter 4, the contributions and limitations of this paper are concluded. This study contributes to the international efforts to estimate the impacts of electricity deregulation on consumer behaviors and R&D behaviors of the electric utilities with econometric approaches. The policy makers may need to consider the changing behaviors of consumers as well as utility R&D when designing the future reform scheme and agenda.