

Investment and Efficiency under Incentive Regulation: The Case of the Norwegian Electricity Distribution Networks

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(1) Overview

Achieving a sustainable energy economy requires a transformation of the electricity networks through expansion of networks, adoption of new technologies for managing the variability of the supply side, accommodating an active demand side, and research and development. Such transformation can only be reached through substantial capital investments. Given the anticipated scale of the required investments in the coming years, ensuring sufficient and efficient investments in the networks presents itself as a policy and regulatory priority. Following the liberalisation of the electricity sectors since the early 1990s, many sector regulators have recognised the potential for cost efficiency improvement in the networks through incentive regulation aided by efficiency benchmarking. Although, benchmarking has achieved efficiency (mainly in operating cost) however; new challenges have emerged as how to address the issue of network investments.

(2) Methods

We analyse the relationship between cost efficiency and capital investment under the Norwegian incentive regulation framework. We investigate the theoretical aspect of benchmarking concerning the investments and explore how it can affect the companies' investment behaviour, using a distance function and stochastic frontier analysis technique. We estimate impact of investment on relative efficiency of 128 distribution networks from 2004 to 2010.

(3) Results

Our analysis demonstrates that, on average, investment contributed to the 4.8% efficiency gain. The results show that over the whole period studied the sector is investment efficient. However, for one year we find an estimated 1% investment inefficiency. At the level of individual companies, on the other hand, there are many differences in efficiency achievement after investment. Also, the efficiency loss is more prevalent among the firms with lower investment to cost ratio.

(4) Conclusions

The Norwegian incentive regulation scheme is designed to discourage over-investment through partial disallowance of capital expenditures in process of benchmarking however; the power of this model to detect over-investments is limited to the case of non-harmonised investment behaviour. Thus, sector-wide 'in phase' or cyclically harmonised over-investments by the firms are not revealed in the process of benchmarking. This will, in turn, limit the ability of the regulator to effectively address the issue of over-investments. Furthermore, systematic underinvestment can give the appearance of cost efficiency while it can have detrimental effects on quality of service over time which eventually will be reflected in cost of energy not supplied and cost of network energy losses.

References

- Coelli, T.J., and Perelman, S. (1996), "Efficiency Measurement, Multiple-Output Technologies and Distance Functions: With Application to European Railways," CREPP Discussion Paper 96/05, University of Liege.
- Joskow, P. L. (2008), "Incentive Regulation and Its Application to Electricity Networks," *Review of Network Economics*, 7(4): 547–560.