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DESIGN FRAMEWORK FOR ELECTRICITY QUALITY REGULATION

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Overview

Many European countries have, after restructuring their electricity market, adopted incentive based schemes for network regulation. These systems aim to incentivize network companies to strive for optimal network management, which includes efficient investment and maintenance that pushes the system towards a social optimum: the total social costs (i.e. the costs for maintaining the system plus the cost of the supply interruptions) should be at a minimum. This means that the social value of the power supplied should in some way be internalized to the companies this is where quality regulation comes in.

Methods

This paper provides with a comprehensive review of the current status electricity network quality regulation. Special attention is given to the financial incentives adopted in the regulatory approach, most notably how to integrate network quality in incentive-based economic regulation methods.

Results

In order to provide an optimal incentive, the regulator needs to internalize consumer interruption costs into the firm's decision-making process. In acquiring information about interruption costs, the regulator does not only face an informational asymmetry between itself and the firm, but also one between itself and the consumers. Obtaining information about quality demand, approximated by interruption costs, can be a difficult undertaking due to the many factors that can influence these costs.

Another problem is concerned with the cost-quality relation. Costs and quality can vary both in the spatial and in the temporal dimension. The spatial problem leads the optimal quality level to vary as a function of the location in the network. The occurrence of a time lag between cost decisions and quality creates uncertainty whether quality levels will be optimal in the long-term. For designing an integrated price-quality system, the regulator will need to take into account an efficiency factor that incorporates the firm's improvement potential in both the productivity and the quality sense.

Two approaches may be identified for integrating quality into the price-cap. Under the *totex approach*, quality integration takes the form of an integrated assessment of previous performance of the firm. Rather than only basing the X-factor on past cost performance, the X-factor is now set on the basis of combined price and quality performance as featured by the total social costs resulting from the firm's cost and quality decisions. Firms that manage to make a better price-quality trade-off will incur less sotex and therefore gain a higher efficiency score. Under the *building blocks approach*, integrated regulation takes the form of a combined price-quality assessment of proposed investments. Here, the regulator should make sure that investments that are allowed into the firm's capital base – and that will therefore ultimately be reflected in the allowed price – are those associated with least levels of sotex i.e. are implemented at a cost level that reflects an efficient mode of production and that provides a level of quality that is optimal.

Conclusion

Under a totex approach, achieving the social optimum could be achieved by incorporating quality into the benchmarking analysis. Rather than only observing the firm's actual costs, the regulator would then also take into account the effects of the firm's cost decisions on quality and interruption costs experienced by consumers. However, such a benchmarking analysis is not likely to be conducted at the level of the individual consumer. Rather, it would be performed at the system level and thus ignore possible spatial differentiation in costs and quality demand. Also, with respect to the temporal aspect of the cost-quality relation, it is questionable whether the benchmark would be effective in detecting whether cost decisions will generate a sustained optimal quality level in the longer term.

Under the building blocks approach, spatial and temporal problems would in principle be dealt with as here, the regulator effectively prescribes the required spending level of the firm (at least with respect to investments). If, for each investment, the regulator could assess the quality level provided to individual consumers and the associated costs, he could set a target for the firm's investment levels such that consumers are guaranteed some minimum quality level whilst on the overall network level, quality levels are as close as possible to the social optimum. Furthermore, this excludes the risk of unexpected quality degradation in the longer term.