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Implementing Incentive Regulation through an Alignment with Resource Bounded Regulators

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Highlights

- Several regulatory regimes have been conceived to incentivize network operators to provide services in an efficient manner and to pull them in a continuous process of revelation of the economics of their tasks' operation.
- Major challenges are arising today for the electricity system (such as: network quality concerns, various grid innovations, or climate change policy). The classical "cost killing" goals of incentive regulation are then challenged with new goals. The regulators must find how to optimally match their existing regulatory tools with these renewed goals while taking into account more of the actual specificities of the network operation.
- The economic literature built the existing regulatory tools we have today by assuming that a regulator behaves like a theoretical actor, having all the ideally desired cognitive and computational capabilities. The reality, however, is that the regulators are endowed with only limited and heterogeneous resources.
- Theory frequently assumed that a regulator uses a single type of regulatory tool to give incentives to a network company performing a single type of tasks. In real life, the regulators are facing companies performing multiple types of tasks and have to use several types of regulatory tools to deal with these different tasks.
- Regulatory tools should then be assessed to properly match with the real characteristics of the network operator's tasks. We assume that the key characteristics for an operationalization of this "regulatory alignment" are: the controllability, predictability and observability of the tasks, the costs and the output. However these regulatory characteristics have to be aligned as well with the requirements of the various regulatory tools in terms of regulator's resources and capabilities.

Florence School of Regulation

The Florence School of Regulation (FSR) was founded in 2004 as a partnership between the Council of the European Energy Regulators (CEER) and the European University Institute (EUI), and it works closely with the European Commission. The Florence School of Regulation, dealing with the main network industries, has developed a strong core of general regulatory topics and concepts as well as inter-sectoral discussion of regulatory practices and policies.

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Background

Electricity network regulation has been conceived to ensure that network services are produced at minimum costs for a given quality of service. Due to asymmetrical information between the regulator and the network operator, several regulatory regimes have been conceived to incentivize companies to provide their services in an efficient manner and to push / pull them in a process of revealing their private information on the economics of their tasks operation (Box 1).

Major changes have recently occurred with electricity systems: new network quality concerns have appeared, climate change policy is now a key driver of the EU energy policy and grid growing innovation is becoming a concern. Regulation should then reconsider what are the right incentives to undertake all this. The classical cost-killing goal of "RPI-x" has to adapt to new goals of regulation. The regulators have to find how to optimally match all workable regulatory tools with today's relevant goals as well as with the actual economic characteristics of network operators' tasks.

The economic literature built most of the existing regulatory tools by assuming that the regulator is an agent having all the desired cognitive and computational abilities to properly deal with information asymmetry. The reality, however, is that regulators are endowed with only limited and heterogeneous resources. Furthermore the regulator is supposed to control the network operators' costs as a whole while they actually are the byproducts of different tasks with different economic characteristics. Today, the right regulatory question should then be: how to align the regulatory tools, the regulator capabilities and the targeted network tasks to deliver a set of efficient outcomes?

Discrepancy between the practice of regulation and the textbook model of a regulator

In the textbook model, the regulator is assumed to have sufficient cognitive, computational and administrative abilities to implement a regulatory regime decreasing the information asymmetry and dealing efficiently with the risk and uncertainty in the regulatory environment. However in reality, most regulators have severely limited resources (power, budget and skills) to efficiently implement all the conceivable regulatory tools. Regulators' actual capabilities depend primarily on their current resources and accumulated experiences which may strongly deviate from what the textbook model assumes. Furthermore regulators behave according to countries' political and judicial profiles which influence their willingness to undertake risky decisions. Regulators may have to be conservative to avoid negative judicial reviews (like in the USA). They may also be small administrative units of 10-20 people unable to enter into uncertain and complex regulatory innovation. On the contrary, the UK's regulator has been an atypical case of a rather rich, free and sometimes risk taking regulator able to invest in innovative regulatory regimes, to adapt to the changing energy scene, and to look after dynamic efficiency going beyond the already acclaimed cost killing objectives. A regulator with resources and power may undertake uncertain changes and face a risk of error.

Besides this, textbook regulation generally assumed that the regulator addresses a company performing a unique task with a single regulatory tool. In practice however, the regulator is facing a company performing various types of tasks and may have to apply various regulatory tools to these different tasks. Any applied economic reasoning should now reevaluate the regulatory tools in a renewed rational choice frame.

Box 1: Theoretical regulatory tools

Cost plus: The simpler regulation of electricity networks has had to focus on controlling the costs of services provided by the regulated firms. This was based on the principle of compensating the regulated firms up to their costs. In this regulatory frame the regulator observes and audits, each year generally, the firms' operating and investment costs and sets the allowed revenue for that (or the next) year. This revenue includes a reward in the form of a rate-of-return compensating the firms' capital assets. In very general terms, with this regime, the regulated firms keep the benefit from their informational advantage. Rather, they are not incited to reveal more than their observable costs from their own set of economic information.

Price/Revenue Cap: Contrarily to cost plus regulation, price cap regulation implies that the regulator unilaterally sets a maximum allowed revenue (or a price per unit of output) that the firm can get for the services provided in a conventional period –four to five years- so as to be partially but not totally linked to its incurred costs. As the length of the regulatory period is relatively longer than with cost plus regulation, the incurred costs could happen to be lower than the earned revenue. This allows the firm to benefit from its cost cutting. This regulatory scheme provides simple and clear incentives for cost reduction which would increase the social welfare (with less costs for the same output) in an environment based on asymmetric information. This does not mean that the asymmetrical information problem is easily solved. Notably in cases where there is a too important lack of regulator expertise to properly anticipate and predict the future firm's costs, firms might earn excessive rents within that regulatory period. However, only very dramatic regulator mistakes could end reducing the social welfare.

Menu of Contracts: Cost plus and price cap regulations are, in theory, the two extreme cases in terms of gain and risk sharing. The menu of contract scheme lies in between these two extremes. The price that the regulated firm will receive is linked ex ante to its realized costs observed ex post as well as to a reference cost determined ex ante. The regulator then offers a set of benefits / costs sharing contracts and the firm chooses the more suitable one regarding its privately projected expenditures, its efficiency capability belief and its own risk aversion. Such contract mechanism would open higher productive and allocative efficiency objectives. On the one hand it is conceived to provide incentives to perform much better by giving the firm the opportunity to benefit from its own knowledge of feasible cost saving and better serving. On the other hand, it ensures that prices have to follow an underlying cost variation within a reasonable distance.

Performance-based Regulation: Menu of contracts is a general category which covers PBR (Performance Based Regulation). PBR has been used to better target a particular task with its own particular incentive schemes (like: cost of losses; cost of reserves; cost of congestions; etc.). It gives a direct link between the ex post observed performance and an ex ante defined set of financial reward and penalty. Ex ante the regulator has set a specific formula that links a financial reward-penalty scheme to a firm's expected tasks expressed in an agreed KPI ("Key Performance Indicator").

Yardstick (Benchmarking): It is a way to set performances or prices of a given company on the basis of the outcomes of other similar companies. In its full form, each benchmarked company has no control over its own revenues. Its allowed revenues are only linked to an index of the other suppliers' performances. A second and relaxed approach relies on external performances for only one part of the firm's revenues. It usually covers the calculation of a productivity trend factor or an initial price in a price cap scheme. It may also be the ex ante targeting of a task performance in the performance-based regulation.

Characteristics of the network operator's tasks

Beside the discrepancy between the reality of regulators' abilities and the assumption of the textbook model, it is also usually assumed that the regulator frames a company performing a single task with a single regulatory tool. In practice, network operators perform various types of tasks with different characteristics. For transmission, the main tasks may be seen as various as: 1- system operation, 2- grid maintenance, 3- network user connection, 4- customer relationship management and 5- grid expansion. TSOs may also face new tasks arising from the new regulatory objectives, like a revival of RD&D in both domains of infrastructure and services.

Controlling the network operator's costs and service quality as a whole would then be inefficient given the heterogeneous nature of its tasks. Encouraging companies to reduce operational expenditures could lead to a lower quality of this or that provided service. Another drawback arises with innovation which is inevitably costly in the short term with an expected benefit only obtained in a longer period while exposing the company to a higher risk. That is why, first, the regulator should strike a proper balance between medium term novelties and short term cost efficiency by assessing the firm's financial sustainability in the long run. Second, the regulator may have to conceive a hybrid approach that combines various kinds of regulatory tools to better address the various characteristics of the different tasks.

The key regulatory characteristics of the various network tasks belong to three categories: Controllability, Predictability (ex ante) and Observability (ex post) (Box 2).

Box 2: Regulatory characteristics of network operator's tasks

Controllability: It qualifies the network operator's ability to manage a single cost/task or a combination of several as to get a defined level and quality of output.

Predictability: It qualifies the possibility of predicting (then: ex ante) the influence of external factors on network costs/tasks and the relationship between a given set of costs/tasks and the level and quality of outputs.

Observability: It qualifies the possibility of verifying (then: ex post) the influence of external factors on network costs/tasks and the relationship between a given set of costs/tasks and the level and quality of outputs.

The regulatory alignment between network tasks, regulatory tools and regulator's abilities

The first criterion to look at when wanting to match a network task and a regulatory tool is the controllability of the task by the network operator. When the network operator is unable to significantly influence the cost or the outcome of a task, the economics of the output are mainly out of the company's control. It will not make much sense to regulate such a task with an incentive scheme. This will be better addressed via a cost plus scheme. To get the maximum benefits of that scheme the regulator should then have minimum accounting capabilities as to audit the company's uncontrollable costs and to set a tariff for them (for instance, in a meshed grid used for high transit from abroad the operator cannot easily control its aggregated volume of losses).

When network tasks are controllable, the TSO can undertake actions to reach an efficient level of operation, and an incentive regulatory scheme makes sense (for instance, congestion costs being controllable in the medium term -while not easily in the short term- and volume of losses in an isolated power system where the TSO is actually able to act on these levels).

In practice, however, the choice of the appropriate regulatory tool will then depend on the (ex ante) predictability of the task operation, and the regulator's own capability to manage more complex and more hazardous decision processes to influence the targeted efficient outcome.

However, when the task's outcomes are too difficult to predict (by the company or by the regulator), a cost plus scheme could always be applied as a "safe plan B". It can also be the case with unfamiliar innovation undertaking.

Inversely, a regulator might conceive more complex incentive schemes whose risks depend on the degree of task predictability, given that a low predictability should imply a higher risk and vice versa. The degree of task predictability is also linked to the regulator's proper capabilities. A regulator with a large senior and experienced team plus a large consultancy budget can better tackle the hazards of complex schemes than a regulator with a limited junior staff and a starvation budget.

Finally, the last step in a regulatory tool choice comes with the task / cost's (ex post) observability. Observability may be too low or the regulator may think that its very limited resources will not allow it to collect relevant enough information on the actual management of the tasks having been performed. Here again the regulator may prefer the safeguard of a cost plus scheme.

On the contrary, in case of a limited observability of certain tasks for a rich and experienced regulator, it makes sense for it to invest in more advanced regulatory tools as a "menu of contracts" where the company is pulled into a voluntary efficiency revelation scheme. When the menu of contracts is conceived correctly enough, the company will rationaly choose a contract that fits best with its true (while unobservable) task characteristics. Another sophisticated way to address this information problem is to apply benchmarking techniques, creating a "virtual competition environment" upon the condition that the regulator could get enough relevant information from several comparable network operators. It also assumes that the regulator has enough cognitive and computational capabilities as to manage the demanding process of benchmarking results interpretation.

Of course with a high observability of tasks, a regulator may choose less sophisticated tools requiring lower experience and resources. We must however distinguish two types of observable tasks. When the observable task is an input into the firm's activity process and is required to provide a well-defined output, a price cap regulation might be appropriate. Under this regime, the network operator could undertake efficient actions to reduce the cost / increase the output of the task and to benefit from this improvment (for instance, transmission maintenance tasks are controllable, predictable and observable. Assuming that the regulator could easily observe the past firm's performances, a price cap regulation with a defined efficiency target should be sufficient).

However the output may have two separated dimensions: the quantity (the volume) and the quality (the unitary utility for the consumer) of the provided service. When both are observable and the regulator is also able to properly define (ex ante) and measure (ex post) the quality of service, a "performance-based" regulation of the output would be more appropriate than a price cap. When quality is controllable in the medium term it is because the network operator knows how to influence it by her investment and maintenance decisions. Quality may also be predictable if extreme events are filtered out from the quality indicators. Quality may then be observable to some extents, depending on the set of indicators that the regulator is able to conceive and to use. With an output regulation for quality, the regulator sets the output targets that the network operator should meet within a predefined period as well as certain economic schemes reacting to the observed deviations. Any gap vis-a-vis the ex ante target will be treated in a predefined penalty or a reward function.

We now look at tasks closely linked to an innovation process. An innovation process may be controllable in the sense that the network operator may significantly influence the output of innovation that it will produce. However innovation has a low degree of predictability and observability. Nevertheless this predictability and observability also increases with the technological and managerial maturity of the innovation process. In

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case of low maturity, it seems inappropriate to put in place an incentive regulation tool because of the difficulty for both the regulator and the network operator to predict innovation's costs and benefits, whatever the actual degree of regulator abilities. In case of higher maturity, however, an incentive regulation that sets a rule of risk sharing between the network operator and the grid users may usefully be considered. A scheme is to pay innovation by unit of outcome measured by some KPI. Again, the degree of observability of the innovation process depends significantly on the innovation maturity.

Figure 1 summarizes the "regulatory alignment" decision tree to identify the appropriate regulatory tool assuming certain regulator's capabilities, the network operator's nature of tasks and the implementable regulatory tools. To sum up: If a particular task does not satisfy any of the controllability, predictability and observability criteria, then the cost plus scheme is the most likely tool to recover the incurred cost. Otherwise, the usefulness of any other appropriate regulatory tool would mainly depend on the actual regulator endowment.

Figure 1: A Regulatory Alignment Decision Tree