



Evolutionary Regulation: From CPI-X towards contestability

**Per Agrell
Peter Bogetoft**

2004

Disclaimer

This is a position paper for ENCORE, The Economics Network for Competition and Regulation, The Netherlands, delivered 2004-02-16 by the authors, professors Per AGRELL and Peter BOGETOFT. The contents is based on a draft paper presented at an invited lecture at ENCORE in 2003-10-23.

The contents has not been subject to review from ENCORE and expresses only the viewpoint of the authors, who exclusively bear the responsibility for any possible errors.

Table of Contents

1.	Introduction.....	5
2.	Regulatory Mechanisms	8
3.	Dynamic Regulation.....	11
4.	Summary.....	25
	References	26

Abstract

Regulation is a long-term game. To minimize transition costs and to ensure the viability of modern regulatory instruments like yardstick competition, it is important to acknowledge the historical industry structure and market developments. Likewise it is important to plan regulatory trajectories for the immediate and more distant futures. In this position paper, we stress the delicate nature of regulation and in particular the evolutionary context of regulation, where even the yardstick competition is seen as a transition step from simple CPI-X revenue caps towards pseudo-contestable markets.

1. Introduction

- 1.01 Regulation economics was long considered as a fairly uninteresting application of industrial organization. Early regulatory theory largely ignored incentive and information issues, heavily drawing on conventional wisdom and industry studies. This kind of institutional regulatory economics was challenged already in the seventies with economists as Friedman, Baumol, Demsetz and Williamson questioning the organization and potential restructuring of natural monopolies. However, the main breakthrough came in the late eighties with information economics and agency theory (Holmström, Laffont, Tirole). An authoritative reading in the area is Laffont and Tirole (1993). Contemporary economic theory pursues the private goals and strategic behavior of the individual agent, with particular emphasis at the access, cost and use of information. The practical applications from this stream of research have had a profound impact on modern markets, market instruments, contracts and economic restructuring.

Why regulate?

- 1.02 The guiding principle for all economic activity in the Western society is the *market*. Network activities, such as distribution of electricity or water, are examples of natural monopolies or market failures. For electricity distribution, the monopoly is accentuated by (i) the existence of a single supplier of the service for each customer, (ii) no substitute for the offered service and very low price elasticity, and (iii) high economic and legal barriers to market entry.
- 1.03 In addition to the desire to incite productive and allocative efficiency, there may be non-economic reasons to impose regulation on a network industry. Attention paid to public safety, continuity of supply, public service obligations, environmental externalities and information disclosure are examples of such objectives.
- 1.04 Thus, in return for granting exclusive monopoly rights, for a limited or unlimited period of time, the society empowers a regulator to act as a proxy purchaser of the service, imposing constraints on the prices and the modalities of the production. Friedman (1962) clearly states that a natural monopoly *per se* does not necessitate a legal monopoly; it is merely a transient phase in the technological development. Any

policy that blocks, hampers or discourages efficient entrants from market access is economically detrimental, cf. Demsetz (1968).

The regulator's problem

- 1.05 In modern economic theory, the regulatory problem is expressed as a game between a principal (the regulator) and a number of agents (the regulated firms). The objective of the regulator is to maximize social welfare, which may be thought of as the difference between the customers' and the firms' utility (profit) and the costs incurred. Immediately, it is clear that minimization of costs is a societal priority, as well as the inevitable trade-off between the consumer and industry interests. The objective of the regulated firms may be maximization of surplus, which in addition to monetary profit also includes managerial utility (effort level, benefits and conditions).
- 1.06 The availability and access to information is a key issue in the regulatory game. With perfect access to information, the regulator could impose socially optimal price and service quality. However, the information is *asymmetrically* distributed between the regulator and the agents. The regulator faces a double asymmetry, where neither efficient costs, nor optimal efforts are verifiable. Costs and prices in the market are not true reflections of supply and demand, but are set by the actors themselves in a monopoly– oligopoly setting. Since the regulator has an information disadvantage against the agents, the attainable goal of the regulation cannot be to implement the first best competitive solution, but to *mimic* the market by carefully using elicited information. We claim that the closer the regulation gets to market functions, the less harmful it will be in the long run through the distortion or incentives, information and production. Facing efficiency improvements, innovation and technical development, a misspecified regulation will be likely to dampen progress and achieve lower social welfare.

Outline

- 1.07 The regulatory toolbox contains numerous more or less ingenious solutions to different instances of market failure. The set of tools that theorists and practitioners can think of expands every day. To get started, however, we may distinguish four types of regulatory mechanisms a) Cost-recovery regimes (cost of service, cost-plus, rate of return), b) Fixed price (revenue) regimes (price-cap, RPI-X), c) Yardstick regimes, and d) Franchise auctions. In Section 2, we give brief introductions to these classes of mechanisms.

- 1.08 The choice of mechanisms varies between country, between sectors within a country, and over time in a given sector and country. These variations are worth a deeper study. They are not unlike what can be seen in other industries, e.g. in the area of agro-business contracting, cf. Bogetoft and Olesen (2004). However, it falls beyond the limits of this position paper to try to explain these variations in greater details. We will, however, address one aspect hereof, namely the *dynamics of regulation*. It seems that there is a natural sequence in the classes above and that several countries are progressing through the different types over time. We discuss the relevance and design of such a regulatory trajectory in Section 3.
- 1.09 A summary is offered in Section 4.

2. Regulatory Mechanisms

2.01 To get a first overview of regulatory approaches, we may distinguish between

- Cost-recovery regimes (cost of service, cost-plus, rate of return)
- Fixed price (revenue) regimes (price-cap, RPI-X),
- Yardstick regimes
- Franchise auctions.

Cost-recovery regimes

2.02 Taking the cost information supplied by the agents for granted the regulator may choose to fully reimburse the reported costs, often padded with some fixed mark-up factor. Unless subject to costly information verification (regulatory administration), the approach results in poor performance with skewed investment incentives (no investment risk, yet fixed return on investment), perverse efficiency incentives (loss of revenue when reducing costs) and lack of managerial effort (distorted signals to the labor market and limited managerial rewards). However, even with large investments in information gathering, the information asymmetry and the burden of proof resting on the regulator still cripple the efforts to induce efficiency. Regulatory authorities worldwide, also in the USA, are gradually abandoning these regimes as administratively costly and technologically inadequate.

Fixed price regimes (price-cap, revenue cap RPI-X)

2.03 In response to the apparent problems of the cost-recovery regimes, Littlechild (1983) launched a so-called “high-powered” regime allowing the regulated firms to retain any realized efficiency gains. In the price-cap regime, the regulator caps the allowable price or revenue for each firm for a pre-determined period. To maximize profits, the firms minimize their costs and optimize their efforts, achieving cost efficiency. However, in practice, the price cap is

regularly reset with hindsight to the realized profits in the past period, which limits the efficiency incentives. Recent empirical research (Giulietti and Waddams-Price, 2000) has shown that utilities indeed do play strategic games under price-cap regimes in anticipation of future price-cap reviews. Another difficulty is the initial price/revenue level when firms initially charge differing prices. Either the conditions are homogenous, in which case the price differences reflect inefficiency, or the price levels reflect heterogeneous delivery conditions. In any case, the initial price caps would have to strike a careful balance between informational rents, incentives for restructuring and bankruptcy risks.

- 2.04 Further, the price cap is usually linked to the consumer- (CPI) or retail price index (RPI) as a measure of inflation and a productivity improvement target (X) capturing deviations from the common price development and sector-wide productivity increases. In spite of its conceptual transparency and autonomy, the initial caps, the periodicity of review and the determination of the X-factor face the regulator with the same challenges as other solutions. In particular, since initial windfall profits are retained by the industry and systematic risks are passed on to consumers, there is a potential risk of regulatory capture by consumer or industry organizations. The latter, found frequently in developing economies with weak regulatory institutional autonomy, is characterized by biased decision making in the regulation leading to short-term rent adjustments that could undermine investment, quality or efficiency incentives.

Yardstick regimes

- 2.05 The idea behind yardstick regimes is to mimic the market by using real observations to estimate the production function. Lazear and Rosen (1981), Nalebuff and Stiglitz (1983) and Shleifer (1985) show condition for the implementation of first-best solutions for correlated states of nature. The results carry over even for imperfectly correlated states of nature (Tirole, 1988). Hence, the comparators do not have to be identical, but the relative difference in the exogenous operating conditions has to be known. The regime is attractive in the sense that the revenue of the firm is not determined by its own cost, but by the performance of the market (the other firms). Exogenous systematic risks will directly affect the costs in the industry, lifting the yardstick. Innovation and technical progress will tend to lower the yardstick. Thus, the regime endogenizes the ubiquitous X-factor and caps the regulatory discretion at the same time. However, the pure approach, only to consider the observed cost in each period, is attached with

some risks in implementation. First, a set of comparators or correlated operating conditions has to be established. Second, if the comparators are few and under similar regulation, there is risk of collusion. Finally, a yardstick system that is not preceded by a transient period of asset revaluation or franchise bidding will face problems with sunk costs and/or bankruptcy. The crucial question in terms of yardsticks in electricity distribution is how to preserve the competitive properties while assuring universal and continuous service.

Franchise auctions

- 2.06 A simple mean to elicit accurate cost information while assuring participation is to arrange franchise auctions (Demsetz, 1968, Laffont and Tirole, 1993, Baldwin and Cave, 1996). The idea is to award the delivery rights and obligations based on an auction among qualified bidders. The regime conserves the simplicity of the fixed-price regimes, but limits the informational rent. It also offers perfect adjustment to heterogeneity, since prices may vary across franchises. Problems are for limited markets with high concentration (like the Dutch) that bidding may be collusive, that excessive informational rents may be extracted and that competition may be hampered by asymmetric information among incumbents and entrants (McMillan, 1992). Even under more favorable circumstances, the problems of succession and investment incentives remain to be addressed (Williamson, 1976). Due to the current oligopolistic structure of the incumbent electricity distribution industry, the franchising instrument is likely to be used sparingly in Europe in the near future and then primarily for spatial and/or technical service extensions.

3. Dynamic Regulation

Regulation is a long-term game

- 3.01 Electricity distribution is a classical example of an infrastructure industry with strong dependency on capital investments, low marginal cost and strong network externalities in grid expansion and operation. The technical and economic life of the average network asset largely surpasses any regulatory period, if not the tenure of the owners and regulation itself. Yet, investments have to be undertaken sequentially and costs allocated into an uncertain future, which naturally puts the attention of the managers and owners to the regulation.
- 3.02 On the other hand, optimal regulation depends on the information that can be assessed or produced in the industry, which leads to an interest in the market and industry structure. Regulation of a few very large firms is likely to focus at different challenges (collusion, market power) than in the case of a large number of very small firms (coordination, economies of scale).
- 3.03 Part of the difficulty for the regulator and the firms to anticipate future costs and revenues is linked to the endogeneity of the process and market development. The allocation and total amount of rents that the regulator leaves to the industry determines the potential for internal process development and innovation, as well as structural changes in the type, size and scope of firms in the market. As shown in Agrell and Bogetoft (2003a) on ex-post regulation, “successful” rent extraction (low short-term consumer tariffs) by regulators has in practice been associated with risks of halting process innovation, improvement and management recruitment. On the other hand, empirical results from excessive and lax regimes show the implicit promotion of anti-competitive arrangements by incumbents with the aim to block entry.
- 3.04 The endogenous character of regulation, industry response and market/process development is illustrated in Figure 3.1 below, where the exogenous influences from technology/market innovation and market entry are indicated.

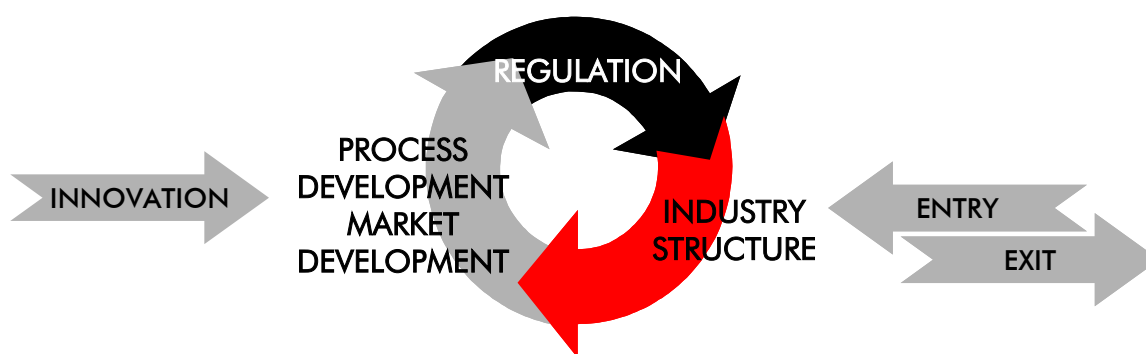


Figure 3.1 Regulation, industry structure and market development in interaction.

3.05 If we now add a time dimension to the regulatory game in Figure 3.1, it becomes apparent that the decision makers involved need to take into account not only current conditions (regulation, market structure), but also the past as indications of the future situation. Of particular importance is of course the credibility the regulator signals when changing or updating regulation [regimes/parameters]. As pointed out in Agrell and Bogetoft (2003a), any positive results from a fixed-price regime, such as CPI-X, depends on a credible commitment from the regulator not to penalize revealed efficiency. If the regulator uses the information, e.g., revealed cost in earlier periods, in order to set targets for the upcoming period, the incentives for cost reduction are curbed by the so called *ratchet effect*. Some signals are irreversible, or at least long remembered by industry and market, which makes it difficult to revert to an earlier state once they have been emitted. E.g., administrative requirements that implicitly penalize small networks can in the long run incite horizontal integration (mergers). However, even if the original administrative costs are reduced later on, the merged firms are not likely to split up for this reason only.

3.06 The anticipation of future regulation is inevitable, as the investments carry far in time. Thus, in the absence of information on possible regulatory changes, historical and imperfect information on political and economic tendencies become influential in the investment decisions of firms. This uncertainty is counterproductive, as less informed decision-makers are forced to anticipate reactions of regulators, who in their turn are eagerly awaiting the decisions of firms to monitor the regulation. The wheel of information in Figure 3.1 can in this way be both a positive cycle of improvements and adaptation, or a negative cycle of uncertainty and underperformance.

The idea of dynamics

- 3.07 Regulatory reform is a positive sign of economic dynamics. However, as sketched in the previous section, the characteristics of the electricity sector necessitate more than temporally optimal solutions. First, the discussed interdependency means that a regulation regime is optimal only with respect to a certain industry and market situation. Change is inevitable in the long run, as the technology and process may mature. Second, the time and resources spent in transition between regimes may finally be as important as the “steady state” or equilibrium state, since the operations are characterized by high capital intensity. An abrupt change to a more advanced regulation regime may be socially costly if the some information acquired by the incumbents is lost by e.g. discontinued operation. The time and resources to adjust to new objectives must also be considered in relation to the efficiency gap between current and future operations. Moreover, as will be discussed below, there may not even exist any terminal state, but just an ongoing transition process. This means that firms will continuously be required to learn and adjust to market and technological constraints, without the full information offered on a competitive market. Third, to be effective, the gradual development of the market needs to be guided by unambiguous signals about the *direction* of development, rather than the exact *mode* of future regulation. These signals should be credible with respect to prior regulatory history and institutional independence. Hence, too institutional signals burden future regulation by unnecessarily jeopardizing credibility.
- 3.08 In this section, we will sketch a dynamic framework for the regulation that clarifies the objectives, means and modes of current and future regulation. In the interest of space, the dynamic plan, or *trajectory*, will be defined in detail only for the first stages, whose mechanisms will be covered by subsequent sections.

Consistency improves social welfare

- 3.09 By acknowledging the dynamic nature of regulation, the trajectory allows the regulator and the firms to focus on relevant short-term and long-term actions, which directly reduces the amount of double or irrelevant investments. Also, administrative costs can be reduced as costly improvements of imperfect, transitory regimes can be avoided. The consistency, reducing regulatory uncertainty, can furthermore help supporting progressive and useful organizational learning and adaptation in all segments of the market. When

opening the electricity retail segment to competition in the UK, OFGEM instituted contractual transparency rules to impose 28 days as the maximum contractual length. Although statically inferior to free contracting, the solution reflected the need for consumers as well as retailers to get adjusted to competitive terms, which lay the ground for a more efficient market after the first transitory period. As the overall signal (deregulation of retail) was unambiguous, the contracting constraint was a consistent response to detected incumbent strategies of lock-in contracting that would starve the market and hamper competition.

Consistency improves network design

- 3.10 Long-range goals in combination with a coherent plan of implementation can provide clear and unambiguous investment signals for firms. Investments in technology and innovation, potentially across sectors, can also be triggered, or definitively discouraged, by open cards on the regulatory trajectory.

Consistency is to best use local resources

- 3.11 A consistent plan pays explicit attention to local current conditions, without sacrificing advantages due to poor transition planning. Indirect impacts of regulation on firm scope, size, governance and information structure will be addressed. Gradual and smooth changes allow for learning and adaptation by the current firms, rather than the pre-emptive entry of potentially more opportunistic firms. One could easily model a situation with firms having varying investment horizons leading to incentives for hit-and-run tactics. Infrastructure and healthcare reforms show anecdotic evidence for this hypothesis.

Dynamic Regulatory Path

- 3.12 Given that we foresee economic, operational, behavioural and informational difficulties to maintain an input-oriented (normally cost-based) regulation regime in the long run, we assert that a competitive and contestable output-oriented regime is a viable regulatory vision. However, it is neither realistic, nor socially optimal, to destroy the current industry and market structure in a drastic change. The lowest (social) cost transition from the current situation to the desired situation is what we call a *regulatory path* or *trajectory*.

Figure 3.2 illustrates a trajectory for the Norwegian electricity distribution regulation.

- 3.13 The major indicator of progression in Figure 3.2 during the transition is the level of granted and accepted *delegation* that the industry enjoys. The final stage can only be achieved if the service coordination mainly rests at the firms, yet to provide social welfare, delegation can only be awarded as firms accept the commercial and technical conditions that are intimately attached to it. The depicted trajectory starts with a high delegation during a low-powered regulation regime (cost-plus), reflecting the objective to offer low-risk entry conditions to assure rapid (service) coverage and the information disadvantage to impose service conditions or higher incentive power by the regulator. As the regulator gains in authority and the industry firms develop their processes under a maturing technology, the regulation switches to higher power to promote efficiency at a predefined service level. However, as the service level can only be imperfectly defined by a third party, the information costs of the decision power to the regulator become gradually more apparent, calling for a reform. The following regulations can then promote competition between firms, rather than with the monopsonistic regulator, gradually endogenizing the service dimensions.
- 3.14 The horizontal axis in Figure 3.2 is labelled "time" or "market orientation" as the need of adjustment time is explicitly acknowledged in the approach. Indeed, there is reason to believe that organizational learning and adjustment, as well as the more active role of the previously captive clients, will be important and interesting dimensions in the regulatory reform.
- 3.15 It is important not to interpret the trajectory in strictly causal terms, meaning that e.g. a particular sequence of mechanisms would directly provoke the establishment of a contestable market. Rather the trajectory is an attempt to show the gradual preparation of the market actors to move in a predetermined direction that will support the emergence of e.g. more developed markets with lower transition costs. It should be intuitively clear that firms adapted to a low-powered cost-recovery regime with high commitment would be an easy prey in the case the technical rationale for the legal monopoly rights ceased to exist. Illustrations to this effect are found in telecommunications, where traditional technologies (wire-based) are being challenged for basic services by wireless technologies in new or expanding markets.

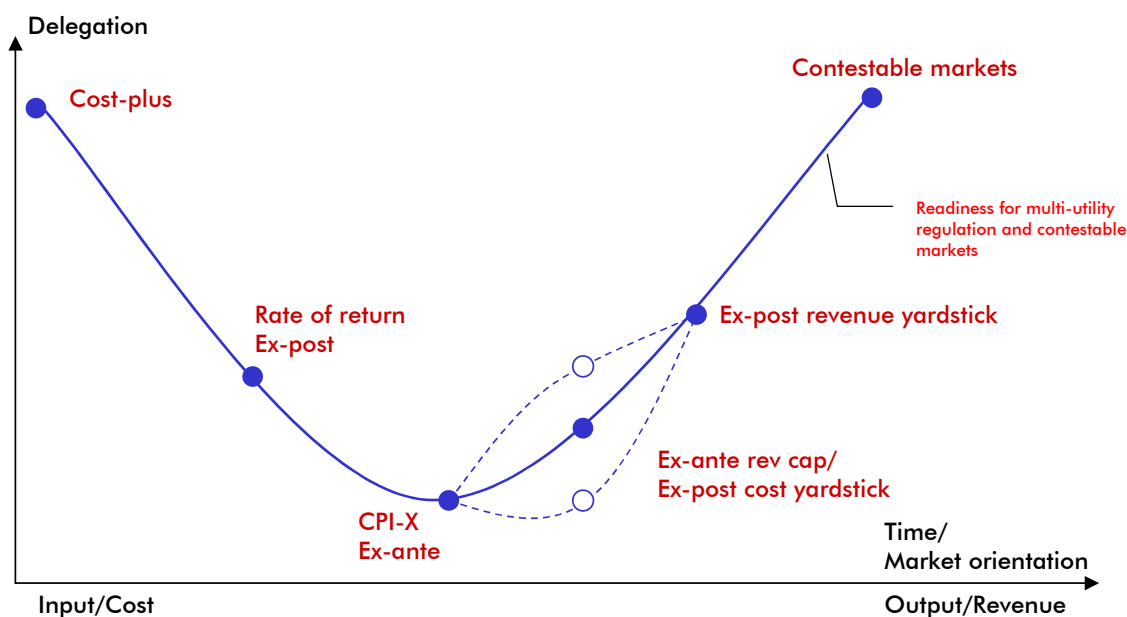


Figure 3.2 Regulatory trajectory.

Stages

- 3.16 A *stage* is a regulatory approach (mechanism, institutions and market) that is in effect at a given time along the path. Given the sequential character of the regulatory path, the closer stages are more detailed than the farther intermediate stages. In this manner, new information and knowledge can affect the design of each subsequent stage, without jeopardizing the direction.
- 3.17 The *path* is dynamic as it evolves over time. Although illustrated as continuous below, it is uniquely defined by the (discrete) stages and could thus be depicted alternatively.
- 3.18 The design of stages is a double challenge, in that their number, duration and characteristics will affect effectiveness of the regulation. In Table 3.1 below, a quick evaluation with regard to the number of stages is offered. A regulation that offers many intermediate stages, say biannual revisions of industry and market regulation, can on the one hand offer a tailor-made sequential adjustment to actual conditions. On the other hand, it also incurs higher administrative and information costs, risking to blur the overall goals while craving attention for ever-changing conditions. However, it is intuitively difficult to imagine e.g. a health-care reform that simply announces

the a future goal (say, open providership, free entry, exit and client contracting) without giving a clue on how the current structure is to arrive at this state without chaos. A pragmatic approach to this challenge may be to distinguish a limited series to economic and technical criteria that indicate the progress towards the goal. Below, we sketch such scenario, where the two main concepts contained in the final goal are *competitiveness* and *output (service/performance)-orientation*. A minimum number of stages should at least allow firms to adjust to these concepts separately. The final integrative stage can then be defined as the combination of the two, whenever this is realized.

Table 3.1 Choice of stages.

Evaluation (positive +, negative -)	Few stages	Many stages
Adaptation possibility	-	+
Administrative costs	+	-
Transparency	+	-
Investment incentives	+	-
Adjustment complexity	-	+

Discovery, Learning and Information Asymmetry

- 3.19 Part of the motivation behind the dynamic stages is a modern view of regulation and operation under regulation as a learning and discovery process (cf. Wiesman and Pfeifenberger, 2003). According to this theory, the asymmetry of information is double, in the sense developed in Agrell, Bogetoft and Tind (2002a,b). The optimal cost and service is a moving target that at any given time is unknown to the regulator as well as the firms. By investing time and resources, the regulator or the firms may discover part or all of the technology. The investment for an external party, as the regulator, will be higher than for a firm, which motivates the idea of delegation. On the other hand, the capacity of a firm to discover and digest the new information is limited by its technological, organizational and management resources. Simple high-powered regimes that in theory would reveal private information by firms would in this view not necessarily give more than short-term cost reductions by a subset of the operators. The proposed regulation exposes the sector to new incentives and new horizons, but gradually as to permit to all firms to join the learning process.

First Stage: Competition

- 3.20 Imagining a transition from a traditional high-powered regime with periodic revisions of price or revenue caps, the first stage will introduce an industry-competitive element to focus at inter-firm relations rather than regulator-firm interaction. By assigning high incentives only to competitive actions, excellence and catch-up are promoted. The regime also sends a credible signal to entrants and incumbents that the counter-productive efforts such as accounting distortion, lobbying and attempts to capture regulator or politicians will not guarantee high rents.

Second Stage: Output-orientation

- 3.21 Once the competitive element has been firmly established, the focus is ready to evolve from internal process competition to external values for final customers. For the final client, what matters is not whether the service provider has an cost-efficient level of costs, but what he/she pays in total for the service. In this stage, the regulator delegates the responsibility for costs, operating expenses as well as capital costs, to firms in return for instruments that are based on observed services and their final chain costs. Consistent with the competitive focus of the preceding stage, the regulator has now gained informational advantages in the service definition, but leaves the price development to the market. The incentives for efficient firms are high, as in any (pseudo-) competitive market

Third Stage: Contestability

- 3.22 The second stage is not a viable long-run phase, as it still draws on the regulator as the “market clearer” using (usually national) observations. Market restructuring in the vertical or horizontal sense may signal that the industry is mature to proceed to the final stage, where competition and output-orientation is combined into a more contestable market. In other deregulated industries, solutions of this kind have been found in either franchise auctioning instruments, if there are a significant number of qualified actors, or a “Charter-like” light-handed approach (cf. Agrell and Bogetoft, 2002b) if considerable economies of scale have created a few operators. In this final stage, a number of powerful instruments still rest at the regulator’s disposal, such as the concessions and the service obligation contracts.

Characterization of the Stages

- 3.23 Below, we give a short characterization of the stages in Table 3.2, where stage 0 is defined as the incumbent price/revenue cap regime. Concerning the optimal time and duration of the stages, we have no studies or models that permit us to forward more than some managerial judgement. Two regulatory periods may be the minimum time, given that conservative, yet efficient, firms may want to study the impact of competition “from the side” one period before revealing their potential. Thus, the reliable sector response does not likely occur until the end of the second period, when enough comparative material exists. However, as pointed out above, one could also let the menu choices guide the transition speed to some extent, perhaps by judging the number of firms on yardstick in the preceding period. A similar point holds for the somewhat illusory final point for the second output-yardstick regime. As the transition is triggered primarily by the industrial structural changes of scope and scale, we are in no position to provide any reliable estimate. However, by assigning a high number (at least 30 years), we signal that such development is clearly not the first priority in this reform, and that there is plenty of time to tailor the third stage to the potential market structure of the future.

Table 3.2 Characterization of stages. (Agrell and Bogetoft, 2003a)

	Stage 0	Stage 1	Stage 2	Stage 3
Orientation	Input (Cost)	Input (Cost)	Output (Service)	Output (Service)
Approach	Price/Revenue cap with some individual targets	Cost yardstick Revenue cap	Output yardstick	Light-handed regulation
Instruments	CPI-DEA, X	Menus DEA-Yardstick	DEA-yardstick	Concessions Service reviews
Information	High collection	High collection	Limited collection	Selective collection
Risk sharing	Firms/clients	Firms, depending on menu choice	Firms, lower idiosyncratic risk	Firms
Decision making delegation	Mixed	Firms	Firms	Firms
Regulatory commitment	Ex ante (ex post for inflation)	Ex post / ex ante	Ex post	Ex post
Discretion	Medium	Low	Low	High
Role of regulator	Contractor	Market maker	Market clearer	Market monitor
Focus of regulator	Rents, quality and efficiency	Quality and rents	Anti-collusion	Contestability Entry
Length of stage	10 yrs	10 yrs	> 30 yrs	Indef.
Investment review	Regulator	Firms	Firms	Firms

Example

- 3.24 Consider an infrastructure reform (say, railway transportation) that departs from a publicly owned monopoly with the typical inefficiencies related to mixed objectives and administrative lags. The first (standard) stage involves here a necessary investment in supply structure by unbundling and separation of the activities into natural service segments (e.g., retail, transport operations freight and passenger, infrastructure operations and maintenance). Let us focus at the latter, which due to information asymmetry and network externalities is likely to be the most difficult to split into competing operators. The first regulation periods are now suggested to be characterized by high-powered contracts signed with the regulator as a proxy buyer for the sector. The new operator will thus orient its activities towards a new objective, potentially attracting new managerial talent and financiers by the allocated rents. This situation is succeeded by the next stage where the (presumably more efficient)

firm enters a phase where the rents will be more endogenous to the industry and less dependent on ad hoc relations to a third party. By acquiring industry data, the yardstick format will promote efficiency while limiting the previously arbitrary rents. The next stage is initiated when the initial service definition, that implicitly limits rents and competitive dimensions, is replaced with an output (service) yardstick. The infrastructure manager can now compete, not only on cost at a predefined quality and service level, but at multiple levels of service at varying values. The role of the regulator in this stage is now to assure that the sector (here acting as clients) pays a "competitive" fee for its services, where the conditions for this (pseudo)-market are given beforehand (e.g. through a DEA-yardstick scheme). As such information collection is sensitive to collusion, the regulator is now operating in a mode closer to normal competition surveillance. In the third stage, finally, the infrastructure operations in the nation (or in Europe) may have restructured to reflect economies of scope and managerial efficiency. In this future advanced stage, following a long period of progressively competitive regimes, several possibilities are open to the sector and the regulator. Either there are several competing operators on the (larger) infrastructure market, in which case the regulator may offer franchise auctions on the different segments of the infrastructure. Or, in case of a consolidated infrastructure market, the regulator may withdraw its yardstick in favor of a surveillance policy aiming at the entry conditions to discipline market power.

Evaluation of the Stages

- 3.25 First, we dare a brief evaluation along the regulatory structural criteria proposed in Agrell and Bogetoft (2003a) listed in Table 3.4. The main difference in this respect between the current regime and the first and second stages is the pseudo-competitive principle that radically changes the roles in the market. As the performance targets are set by the sector rather than by external forecasting, considerable coordination gains are possible. Further, this yardstick mechanism is the strongest yet least risk-introducing incentive available. The ex post settlement provides additional risk adjustment for idiosyncratic shocks (technological changes, inflation, natural catastrophes), which lowers the cost of risk.
- 3.26 The final stage of contestable markets is characterized by a high level of delegation where the role of the regulator will depend on the exact structure of the market.

Table 3.3 Contractual analysis of stages.

Focus	Concern	Stage 1	Stage 2	Stage 3
COORDINATION	1. Coordinate production	+	+	++
	2. Balance the pros and cons of decentralization	+	+	0
	3. Minimize the costs of risk and uncertainty	0	+	+
	4. Reduce the costs of post-contractual opportunism	+	+	+
MOTIVATION	5. Reduce the costs of pre-contractual opportunism	+	0	0
	6. Do not kill cooperation	-	+	++
	7. Motivate long-term concerns	0	+	+
TRANSACTION COSTS	8. Balance the pros and cons benefits of renegotiation	+	0	++
	9. Reduce direct costs of contracting	+	++	-
	10. Use transparent contracts	+	+	-

3.27 A more detailed assessment is offered in Table 3.4, where we look at the impact of operating, investment and managerial efficiency and the challenges mentioned above. Once again, we see how the stages address the two main introversions of the current regime, the lack of competition and the input orientation. Although a quick look at the plusses in the table suggests a quick jump to stage 2, the overall social welfare is only maximized if the industry-level information is conserved between stages and learning has been effective. An immediate introduction is likely to create restructuring, costly for both the sector and particularly the competitive rents carried by the clients.

Table 3.4 Open evaluation of stages.

	Stage 0	Stage 1	Stage 2	Stage 3
<i>Operating efficiency</i>	+	++	++	+
<i>Investment incentives</i>	0, possible ratchet in renewal	+	+	0, harder to predict rents
<i>Investment efficiency</i>	-, periodization problems	+	++, costs are irrelevant	++, costs are irrelevant
<i>Quality impact</i>	-, skimping	0?	++, service focus	++ open service focus
<i>Client involvement</i>	--, passive	-, but improved in anticipation	+	+
<i>Innovation incentives</i>	-, only SR cost reduction	+	++	++
<i>Management involvement</i>	-, defensive	+, choice of regime, internal competition	++, competition for service quality	++, competition for clients
<i>Owners' involvement</i>	-, passive	0, forced to strategy choices	+, stronger incentives for good owners	++, stronger incentives for good owners
<i>Multi-utility provision</i>	-, separation	-, separation	+, cost irrelevance	++, expected
<i>Bundled services</i>	-, separation	-, separation	+, cost irrelevance	++ , cost irrelevance
<i>Non-grid investments</i>	-, separation	-, separation	+, on competitive terms	++, negotiable
<i>Accounting investments</i>	+, profitable	0, harder competition, but still cost orientation	--, accounting only for internal purposes	--, accounting only for internal purposes
<i>International entry</i>	0, limited interest	0, higher interest in anticipation	+, high interest for over-performers	+, high interest for over-performers

Conclusion

3.28 Dynamic regulation may initially seem somewhat confusing to a reader used to static regulation models. However, let us tempt your intuition with a non-economic example to illustrate the bearing idea.

Assume that you are a passenger of a taxi in a foreign country, where you do not speak the local language. As the driver could easily abuse you by driving you to the wrong destination, prolonging the ride or cheating with the fare, you are “protected” by a local friend who guides the driver in the front seat. Your friend, who has but a rough idea of where you want to go, watches the drivers moves carefully, occasionally giving direct instructions where to turn or stop. If the directions fall randomly and without warning, the driver is likely to adjust to a slow and hesitant driving policy, staying in lower gear at a poor fuel economy. On the other hand, if the uncertain destination is transformed to a final state only too early, the driver will adjust to a fast and efficient ride to potentially the wrong place, with potentially costly consequences at the end of the ride. Ideally, we would like to guide the ride in a clear and consistent manner that both reflects the behaviour of the driver (speed, credibility etc) and the gradual clarity of where we want to go (customer preferences, service conditions), so that the ride can be made in an efficient, yet safe mode.

- 3.29 Dynamic regulation is all about how to transform and adapt industry structure, rather than replacing it. Certainly, the relative merits of such dynamics will depend upon the rate of technological change in the sector of interest. Whereas transportation, electricity and water infrastructure may provide good examples to support the idea, the telecommunications sector may be an example where it might be less socially costly to completely replace the incumbent structure (e.g. inefficient fixed lines operators vs franchised wireless networks). However, the current proposal is not intended to promote a panacea for regulatory use, merely to enrich the comprehension of the regulatory toolbox and its uses.

4. Summary

- 4.01 To the seasoned practitioner, regulation of socially vital monopolies may seem as much an art as a science. Unable to apply the theoretical models based on severe simplifications, but forced to show institutional credibility through action, the regulator has often been left to socially costly solutions with more or less bias toward incumbent firms. Confusing arguments concerning cost recovery and regulatory consistency have been used politically to stall or balk regulatory reforms, challenging the institutional independency and European market development. Too few European economists have made conscientious efforts to develop regulatory *practice* rather than enriching its *theory*. On an international scale, we note insightful work by Estache and collaborators (cf. Estache et al., 2003).
- 4.02 This paper is a modest contribution to address more than pure mechanism design in regulation, by inscribing the two instruments; yardstick competition and menus of contracts; into a evolutionary, institutional and data-driven context. Acknowledging some loss of generality in the derivation of the results, we have tried to provide a consolidated argument in favor of increased individual output-orientation, delegation and sector-wide (pseudo)-competition. It is our belief, based both on theoretical and applied experience, that elements of this process do contribute to social welfare through reallocation of regulatory effort and industry reorientation. However, this position paper has no claim to present a recipe for safe success in the regulation of electricity distribution. Our recognition of the particularities of each regulatory “trajectory” already signals the need to carefully consider the past, current and future role of regulation in each specific context. Let us just hope that the approach and adequate further reading can provide some science without ruining the art of regulation.

References

- Agrell, P. J and P. Bogetoft (2003) Dynamic Regulation. Final Report NVE, SUMICSID AB.
- Agrell, P. J., P. Bogetoft and J. Tind (2002a), Incentive plans for Productive Efficiency, Innovation and Learning. *International Journal of Production Economics*, 78, pp. 1-11.
- Agrell, P. J, P. Bogetoft, and J. Tind (2002b), Multi-period DEA Incentive Regulation in Electricity Distribution. Under revision for *Journal of Productivity Analysis*.
- Baldwin, R. and Cave, M. (1999) Understanding Regulation. Oxford University Press.
- Bogetoft, P. and Olesen, H. (2004), Design of Production Contracts, CBS Press, Copenhagen.
- Demsetz, H. (1968) Why Regulate Utilities? *Law and Economics* 11.
- Estache, A., J.L. Guasch and L. Trujillo (2003) Price Caps, Efficiency Payoffs and Infrastructure Contract Renegotiation in Latin America. Conference "The UK model of regulation: a retrospective of the 20 years since the Littlechild report", London Business School Regulation Initiative-CRI, April 9, 2003, London.
- Friedman, M. (1962) *Capitalism and Freedom*, Chicago University Press, Chicago
- Giulietti, M. and Waddams Price, C. (2000) Incentive Regulation and Efficient Pricing: Empirical Evidence. Research Paper 00/2, Centre for Management under Regulation, University of Warwick, UK.
- Laffont, J.-J. and Tirole, J. (1993), *A Theory of Incentives in Procurement and Regulation*. MIT Press.
- Lazear, E.P. and S. Rosen, 'Rank-Order Tournaments as Optimum Labor Contracts', *Journal of Political Economy*, vol. 89, no. 5, pp. 841-864, 1981.
- Littlechild, S. C. (1983) *Regulation of British Telecommunication's Profitability*, London.
- McMillan, John (1992) *Games, Strategies and Managers*, Oxford University Press.
- Nalebuff, B. J. and Stiglitz, J. E. (1983) Prizes and Incentives: Towards a General Theory of Compensation and Competition. *Bell Journal of Economics*; 14(1), pages 21-43.
- Shleifer, A. (1985) A Theory of Yardstick Competition. *Rand Journal of Economics* 16, pp. 319-327.
- Tirole, J. (1988). *The Theory of Industrial Organization*. MIT Press.
- Weisman, D. L. and J. P. Pfeifenberger (2003) Efficiency as a Discovery Process: Why Enhanced Incentives Outperform Regulatory Mandates. *Electricity Journal*, 2, 55-62.
- Williamson, Oliver E. (1976) Franchise Bidding for Natural Monopolies: In General and with Respect to CATV, *Bell Journal of Economics and Management Science*, 7, 73-104.





SUMICSID AB
Tunbyn 502
S-855 90 Sundsvall, SWEDEN
sweden @ sumicsid.com

Tel: +46 60 56 51 41
Fax: +46 60 56 51 41

SUMICSID (BELGIUM)
Avenue des Tourterelles 37
B-1150 Bruxelles, BELGIUM
belgium @ sumicsid.com

Tel: +32 10 47 83 65
Fax: +32 10 47 83 24

SUMICSID (DENMARK)
Fru Ingesvej 19
DK-4180 Sorø, DENMARK
denmark @ sumicsid.com

Tel: +45 57 83 15 18
Fax: +45 57 83 15 18

<http://www.sumicsid.com>