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Lessons from Price Capping Regulation of Energy Networks: Abstract

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Static Price-Capping Regulatory Game

Electricity regulation in the UK is twenty years old, RPI-X regulation is twenty-five years old, and there are calls for a retrospective cost benefit analysis and a review of the options for the future. In this paper, we raise the issue of the long-run properties of RPI-X price-capping regulation. In the UK, the relevant regulator Ofgem (2008) in initiating its review entitled '*RPI-X@20*' is broadly optimistic and positive about the successes of price cap regulation to date: "*by almost any measure the incentive- and comparison-based price controls have been hugely successful*" [Ofgem (2008, p. 11)].

The paper begins with an empirical review of the UK energy network price controls that have occurred over the last 25 years and focuses on the choice of P0 and X factors and the nature of the associated cost benchmarking.

Although the original intention was that RPI-X price capping would fade away when it had outlived its usefulness [Beesley and Littlechild (1988)], the continued existence of natural monopoly networks implies that some form of regulation is required for the foreseeable future. Consequently, it is timely to consider the long run properties of price cap regulation, and in particular to revisit the X-setting mechanism suggested by Bernstein and Sappington (1999) which has had a major impact on regulatory behaviour. In practice, regulators have adopted the habit of setting the X factor at a positive number at each price control review, and this is characteristic of the USA and elsewhere in Europe, as well as in the UK. The general but implicit assumption seems to have been that incentive based regulatory contracts would always stimulate out-performance in a world of asymmetric information, and consequently regulators anticipate that inefficiency and slack will be revealed, and that therefore they should seek a forward-looking X factor in order to return to customers, in advance, the efficiency gains which are the results of the incentive mechanism.

A key insight is provided by the work on optimal incentive regulation stimulated by the liberalization of energy markets in the 1990s. Many of the theoretical treatments of optimal regulatory mechanisms have led to a recommendation for intermediate power incentive contracts, Schmalensee (1989), Gasmi, Ivaldi and Laffont (1994), Burns, Turvey and Weyman-Jones (1998), Hawdon, Hunt, Levene and Rickman (2007). All of these contributions arrived at an optimal intermediate power incentive contract because the regulatory objective function contained a weighted sum of consumer and producer surplus. When the incentive mechanism was first chosen the optimal solution is intermediate power to reward both firms and consumers *simultaneously* depending on the regulator's weights on producer and consumer surplus. However, the UK chose to do it *sequentially* through RPI-X: reward firms first and then recapture rent for consumers later in an ongoing dynamic sequence

through the P0 and X revision. This also allows the regulator the leeway to be less concerned about benchmarking accuracy since the objective is not to estimate consistently the efficient frontier of performance but actually to complete the rent capture stage of the sequence of games.

In this paper, we devote attention to the core result of the Bernstein and Sappington (1999) analysis that the equilibrium rate of price change in the regulated sector differs systematically from the equilibrium rate of price change in the competitive sector. In a static model of a one-off episode of privatization and incentive based regulatory review the result is entirely reasonable. However, regulators have in practice interpreted this as a steady state result which does not seem to have been the authors' interpretation. It is regulatory practice that has driven the arguments not the theoretical model suggested in Bernstein and Sappington (1999). It is apparent from the history of regulatory reviews of investor-owned utilities in Europe, and possibly to some extent in the USA, that regulators have in many cases regarded it as a public duty to impose a positive X-factor on regulated businesses many years after the initial privatization or deregulation.

This has ongoing and important re-distributive implications, because it leads to an expectation that at every price control review there will be a re-distribution of network industry rents in the form of a positive X-factor for the long term future. We ask what has been the re-distributive purpose of regulation in the UK and elsewhere, and we explain why regulators are in danger of confusing efficiency catch-up with the frontier shift which lies at the heart of the Bernstein and Sappington mechanism. We pose the fundamental question: based on efficiency considerations alone, why should the X in RPI-X be different from zero in long run equilibrium, and we therefore explore the proposition that the profile of the X factor over time reflects the point made by Crew and Parker (2006) and Crew and Kleindorfer (2002, 2006) that a major driver in the economics of regulation has been the issue of rent seeking and rent re-distribution.

In a US context, Crew and Parker (2006) and Crew and Kleindorfer (2006) are more sceptical about RPI-X. They contrast the old regime of rate of return regulation in the US with the price cap regulation that replaced it, including the whole range of principal-agent analyses [such as Laffont and Tirole (1993)]. The principal-agent models, they argue, cannot be applied in practical reality, and the price cap regulation has failed because it could not address the problem of regulatory commitment. To ensure success, regulated firms must be allowed to keep the incentive rewards they have earned, but no regulator can sustain public support while leaving economic rents on the table.

In the US, Crew and Parker (2006) and Crew and Kleindorfer (2006) see the use of *performance based regulation* as a hybrid that has emerged from the failure of price cap regulation to effectively remove the X-inefficiency that was attributed to rate of return regulation. It is a hybrid that emphasises profit sharing and sliding scale regulation. This identifies the issue at the heart of the problem: rent-preservation by the regulated firm and rent-seeking by the regulator on behalf of consumers may be so resource costly that the rents are dissipated. In large part, this problem relates to the effectiveness of the regulator in identifying the ability of the firm to catch-up to the frontier, and setting prices accordingly. In that context, it can be argued that the use of

effective benchmarking to determine X in the RPI-X mechanism may overcome this dilemma where it is perceived that rents continue to sit within regulated businesses, and indeed this is increasingly common practice in Europe.

However, the broader issue of commitment and credibility may also have an important part to play in the setting of the long run, frontier shift level of X. The problem of commitment in regulation can lead to the creation of a cycle in which not only the level of the X factor, but also the incentive power of the regime changes over time.

Dynamics and Commitment

We begin by noting that even if there is no long-run basis for a permanent transfer of monopoly rent to consumers, this does not mean that RPI-X regulation has necessarily outlived its usefulness. This is because it is first and foremost an incentive mechanism that has a continually disciplining effect on monopoly providers' behaviour where slack in resource allocation is believed to exist or where it could exist in future if incentives are weakened. An incentive mechanism is still needed even when the X-factor's scope for capturing rent has been reduced to zero, reflecting the importance of the existence rather than the level of the regulatory mechanism [Shleifer (1985)]. Without such an incentive contract, then these rents would build up again requiring the re-introduction of incentive based mechanisms to remove them at some point in the future.

This raises the issue of dynamics. We have suggested that there is period of positive X-factors immediately following privatization, but tending toward zero X-factor in the long run as incentive regulation works itself out, except where slack is persistent. However, this conclusion remains embedded in an essentially static world. It is conceivable that a dynamic process emerges, with initially a large impact on efficiency and resource allocation with a high X-factor followed by a diminishing role for the X-factor as reasons to expect differences in cost performance between regulated and competitive firms are eroded. However, if a low X-factor is coupled with a low-powered regime then inefficiency could re-emerge, and the profile of high X-factor price capping may re-appear. A useful framework in which to examine such a dynamic evolution could be the real options model of regulatory regime shift, see for example Burns, Turvey and Weyman-Jones (1998).

In this paper, we argue that at a time when regulatory mechanisms are under serious review, it is useful to consider again the long run properties of the X factor in the RPI-X regulatory framework. We show that over time the X factor should tend towards zero as the pre-reform inefficiencies are stripped out of the businesses – a process which may take a number of years of management action. In other words, in equilibrium, X should only be positive in order to capture scale effects and reasonable expectations of divergences between factor price inflation and productivity in regulated businesses that do not apply to a materially similar extent in the rest of the economy.

In practice, however, a positive X factor may be sustained for longer than is optimal in order that the regulator can extract rent from the regulated businesses, in response to populist pressure. If this is persisted with for too long, it may lead to missed targets and associated financial losses and possible service degradation. Alternatively, the

regulator may respond to the pressure by setting a low or zero X factor, but accompanied by a shift to a low-powered regime to prevent the realisation of excess profits. This begins a build-up of X-inefficiency that may last many years before a concern about inefficiency is sufficient to force a policy switch back towards high-powered regulation.

Climate Change Policy and the Second Best

A further important issue that now affects the choice of regulatory mechanism is climate change policy. The regulated electricity networks in particular face a major new challenge because micro-generation and renewable resources often require direct investment in the low voltage distribution system rather than the high voltage transmission system. In its ongoing review entitled '*RPI-X@20*', Ofgem and the UK government have signalled that the regulated price controls could be used as part of the armoury of instruments for climate change policy. This could have a major effect on redirecting the economic foundations of incentive mechanisms and have massive implications for the future use of RPI-X. Use of the second best approach to public utility pricing is both a throwback to the 1960s and also reflects the views of the Stern Review (2006) that laments the disappearance of Meadian welfare economics as a basis for pricing policy in regulated industries. There has never been a greater series of challenges to the underpinning of the RPI-X incentive mechanism that has dominated UK energy network policy for 20-25 years and now is an appropriate time to review all of these issues.

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