Original Research Article

Incentive Regulation and Market Efficiency: Balancing Investment, Service Quality, and Consumer Welfare

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Abstract: Effective regulation of industries necessitates a careful equilibrium between fostering investment, ensuring service quality, and maintaining consumer affordability. This study critically examines diverse regulatory frameworks, with a primary focus on incentive-based regulation, a widely adopted approach across various sectors and jurisdictions. Through a comprehensive review of the literature, the paper evaluates price control mechanisms, investment incentives, and the informational asymmetries that challenge regulatory effectiveness. While price cap regulation enhances efficiency and affordability, it may inadvertently compromise service quality. Additionally, the study explores the role of investment regulations in sustaining long-term infrastructure development while mitigating disincentives that deter firm participation. By synthesizing existing research, this paper provides insights into optimal regulatory strategies that encourage firms to enhance service quality and invest efficiently. The findings highlight the necessity of adaptive, data-driven regulatory frameworks capable of addressing the complexities of evolving market dynamics and economic conditions.

Keywords: Incentive Regulation; Market Efficiency; Investment Incentives; Service Quality Regulation; Asymmetric Information

1. Introduction

Regulatory frameworks play a crucial role in balancing three often conflicting objectives: promoting investment, maintaining high service quality, and ensuring affordability for consumers. Achieving this balance is particularly challenging in industries where natural monopolies or market imperfections exist, necessitating effective regulatory intervention. Incentive regulation, a widely adopted approach, seeks to align firms' profit motives with public interest goals through mechanisms such as price controls and investment incentives. However, despite its widespread application, the effectiveness of incentive regulation remains an area of active debate, particularly regarding its implications for service quality and long-term investment.

Existing literature has extensively examined price control mechanisms and investment regulations, yet key gaps persist. First, most studies treat price regulation and investment incentives as separate policy tools, overlooking their interactive effects and how they jointly influence service quality and market efficiency. Second, regulatory models often assume complete information, whereas in practice, regulators operate under asymmetric and imperfect information, making it difficult to design optimal incentive structures. Third, while theoretical models offer insights into regulatory mechanisms, empirical evidence on their real-world efficacy remains limited, particularly in dynamic market environments where firms continuously adjust their strategies in response to regulatory changes.

This study aims to bridge these gaps by providing a comprehensive analysis of how price regulation and investment incentives interact under different regulatory frameworks. By integrating theoretical perspectives with empirical findings, this paper contributes to a deeper understanding of the trade-offs and challenges regulators

face in balancing efficiency, investment, and consumer welfare. The findings have significant policy implications, offering insights into how regulatory bodies can refine their approaches to enhance market performance while safeguarding public interests.

2. Regulation

Littechild (1983)[10] reported that safeguarding consumer is the main purpose of regulation based on public policy.

2.1. Service quality regulation

The levels of service quality and reliability should be considered by Regulations (Joskow, 2007)[9]. Service quality regulation is extremely difficult (Sappington, 2005)[12], incorporating it into the mechanism means regulators need to consider its the market demand (Giannakis et.al., 2005)[5]. However, since cost-effective companies do not necessarily show high service quality, economists have proposed that service quality should be incorporated into regulation (Giannakis et.al., 2005)[5], especially for the regulation of public utilities, which has obvious incentive advantages (Jamasb and Pollitt, 2007, Ajodhia and Hakvoort, 2005)[1],[8]. Jamasb and Pollitt (2007)[8] pointed that companies are agnostic about whether they resolve quality-related payments with the government (through penalties) or with customers (via compensation or lower pricing), usually the former has greater political clout. For example, there is no direct evidence of the effectiveness of Great Britain's guaranteed standards of performance regulation between 1990 and 2000 (Waddams Price et.al., 2002)[13], but the quality of service has improved significantly during price control period from 2005 to 2010.

Sapping (2015), Jamasb and Pollitt (2007)[8] show that the regulation of service quality depends on the following factors: " the information available to the regulator, institution settings, and consumer preferences". Many literature believe that there is no simple policy plan to solve the problem of service quality supervision while changes in the regulatory policies that are expected will have an impact on the level of quality of services offered by firms (Jamasb et.al., 2012 and Sappington, 2015)[7],[12]. Among them several authors argue that firms' service quality levels are unmeasurable by regulators and (sometimes) uncertainty by consumers. In such circumstances, it is difficult for regulators to ensure the desired level of service quality (Sappington, 2005)[12]. Jamasb et.al (2012)[7] mentioned that because high service quality is expensive to maintain, some regulatory models, while improving the efficiency of natural monopolies, may reduce service quality in order to reduce costs.

2.2. Imperfect information

It is the consensus of most relevant literature that the imperfect information makes the regulatory system and regulatory process limited (Cambini and Rondi, 2010, Joskow, 2014)[3],[9].

When regulators have enough information, they can provide appropriate incentives to reward and punish regulated firms. However, they often do not have enough information about the firm's exact costs and opportunity costs (Giannais et.al., 2005, Joskow, 2014)[5],[9]. Basso et. al (2017)[2] note that companies will have more direct and better sources of information than regulators, and will be willing to invest in better demand information, which is often hard to share with regulators. In the face of poorly designed regulatory policies, companies may provide false information for their own benefit, which can cause "both the social costs of adverse selection and moral hazard". And the diversity of consumers makes it impossible for regulators to know exactly what prices

and services they want (Joskow, 2007)[9].

Therefore, the more tools the regulator has at its disposal, and the lower the cost of employing them, the closer the regulator will be to the complete information standard (Joskow, 2014)[9].

3. Regulation Method: Incentive Regulation

Incentive regulation is extensively utilised in many nations, and the precise content varies depending on the industry and the current condition of the region where it is governed. Examples include the England sliding scale mechianism in 1885, and the regulation of electric power companies in the United States in the 1980s. In the instance of energy reform in the United Kingdom, incentive regulation incentivises utilities to increase the efficiency of their operations and investments through financial incentives and punishments while also protecting customer rights (Jamasb and Pollitt, 2007)[8].

3.1. Price control

Fundamental conflicts between (relatively low) welfare-maximizing prices and (relatively high) profit-maximizing prices need to be resolved by price regulation (Sappington, 2005)[12]. The regulatory approach of price caps has been increasing successful so far (Cambini and Rondi, 2010)[3], which include capital and operating costs (Joskow, 2014)[9]. For example, the most widespread form of application, RPI-X, was first seen in the telecommunications industry in the UK, and has gradually been applied to utilities such as water, electricity and gas (Littechild, 1983)[10]. UK's price caps have been regulated in this way since 1990 (Sappington, 2005)[12].

Price regulation has obvious advantages. Price caps which reflect realized costs, can increase incentives to improve service quality when production costs are high and motivate regulated enterprises to raise the service quality they provide to consumers with low quality valuations to a welfare-maximizing level (Sappington, 2005)[12]. As an example, the examination of distribution price control improves the relative position of UK distribution costs and end-user pricing among EU member states. Following efficiency gains and tight price control evaluations since 1995, network (distribution and transmission) access prices in the UK are now among the lowest in the EU. Furthermore, decreased distribution costs boost end-user affordability. As a result, low-income consumers in the UK spend the smallest proportion of their earnings on energy in the EU (Jamasb and Pollitt, 2007)[8].

However, obviously, there are some problems with price regulation. According to Sappington (2005)[12]'s research, price cap can affect service quality. Independent of supplier realisation costs, price limitations reduce providers' incentives to service quality improvement. If the authorized price does not rise in tandem with the business's increased expenditures to enhance the service quality supplied, the firm may be tempted to give a lesser level of service. This occurs because price limitations hinder businesses from realising any incremental customer surplus generated by greater service quality.

In Basso et. al (2017)[2]'s paper, their research suggests that quality regulation is the better regulatory tool, although price regulation exists in almost all real-world situation, especially with marginal costs lowering and the option of menu offering, regulators will greatly improve by controlling benefits through quantity.

Investment

Regulators should adhere to the limitation that enterprises will invest only if they anticipate to benefit from the investment up front, and will continue to produce only if they can afford avoidable costs ex post. And companies should deliver the amounts of services that consumers require while also investing in the required

infrastructure in an efficient and timely fashion (Joskow, 2007)[9].

Investment is closely related to pricing systems (Evans and Guthrie, 2012)[4], especially in natural monopolies. The regulated price level may be an important determinant of investment activities by regulated firms. Similarly, Jamasn and Pollitt (2007)[8] mentioned that "benchmarking of new investment can be an increasingly important part og the price control process". For another, Jonathan Mirrlees-Blacks (2014)[11] has argued that a carefully designed PRI-X framework can promote investment growth.

According to Jamasb and Pollitt (2007)[8], longer regulatory periods (for example, 7 or 10 years) might lessen ambiguity about long-term investments and their rewards. Evans and Guthrie (2012)[4] analysed the behaviour of a regulated firm of its productive management capacity over time in the economies of scale investments. They found that, the firm's initial investment will increasing thereby the increasing overall welfare, by limiting its ability to ration demand. Before capacity can be expanded, firms need to build a buffer of unmet demand to prevent demand shortages after expansion. A higher price cap means that the firm's tradeoff for flexibility and the value of expansion options will increase, but the initial investment will decrease, resulting in a lower overall benefit level. If the price cap is set at a level that maximizes overall benefits, the firm will make a larger initial investment. Regulators can therefore encourage firms to invest in economies of scale and maximise benefits by allowing some rationing .

However, the regulation of investment promotion also has limitations. Once the firms have made initial investments, regulators want more oversight and cannot promise to benefit the firms at the expense of consumers, therefore the changes of policies affect the firms' investment strategy (Evans and Guthrie, 2012)[4]. In some other situations, while long-term regulation can help reduce investment insecurity, it cannot fully incentivize long-term innovation investment (Jamasb and Pollott, 2007)[8]. Simultaneously, regulatory rigidities will become a growing impediment to improving the interests of customers and investors (Janathan Mirrles-Blacks, 2014)[11].

3.2. Recommendation

A number of articles have given suggestions on how regulation should be conducted.

Jammasb and Pollitt(2007)[8] stress that the approach needs to keep up with The Times and vary from country to country. There should be close links between regulators and regulated companies, and experience should be drawn from around the world to ensure continued development and innovation in regulation.

The best choice of regulatory approaches may depend on how complex regulators can implement it. Regulators will benefit from the flexibility of the regime by offering different options to firms, inducing more efficient allocation and capping of firms' rents (Basso et.al., 2017)[2]. For example, rate of return regulation can induce greater levels of service quality by providing incentives for regulated enterprises to employ capital intensive technologies if service quality grows with the capital intensity of a firm's operation (Sappington, 2005)[12].

Joskow (2007)[9] proposed the optimal regulatory mechanism to achieve the trade-off between incentives and rent extraction: fixed price option and cost-contingent contract, base on the idea of low-cost-opportunity firms with high-power-incentive scheme and high-cost-opportunity firms with low-power-incentive scheme.

Conclusion

"incentive regulation in practice is considerably more complicated than incentive regulation in theory" (Joskow, 2006)[9].

Effective regulation plays a pivotal role in balancing investment incentives, service quality, and consumer

affordability. While incentive regulation has been widely implemented across industries, its real-world effectiveness is shaped by a complex interplay of factors, including price controls, firm investment behaviors, and the challenges posed by asymmetric information. This study highlights the critical trade-offs that regulators must navigate to design policies that align firms' incentives with public welfare objectives.

Our analysis underscores that while price regulation mechanisms, such as price caps, can enhance affordability and encourage efficiency, they may also lead to unintended consequences, such as reduced service quality if firms seek to minimize costs. Similarly, investment incentives are essential for ensuring long-term infrastructure development, yet their effectiveness is contingent on regulatory stability and firms' ability to anticipate long-term returns. The presence of imperfect information further complicates regulatory design, as firms often have better insights into costs and market conditions than regulators.

Given these challenges, this paper advocates for a more dynamic and flexible regulatory approach—one that adapts to market conditions, incorporates mechanisms to mitigate information asymmetry, and fosters long-term investment without compromising service quality. Future research should focus on empirical evaluations of incentive regulation in diverse market contexts, as well as on the development of hybrid regulatory models that integrate both price-based and quality-based incentives.

Ultimately, as economies evolve and industries undergo technological transformations, regulatory frameworks must also continuously adapt to ensure that investment remains robust, service quality meets consumer expectations, and market efficiency is sustained. A well-calibrated regulatory approach—grounded in both economic theory and empirical evidence—will be essential to achieving these objectives.

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