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Regulatory risk in the utilities industry: An empirical study of the English-speaking countries

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Abstract

The economic theory on regulation suggests that firms subject to incentive regulation, such as price cap, bear more risk than firms subject to cost plus regulation, such as rate of return regulation. This hypothesis is tested empirically using a sample of 93 regulated companies operating in six English-speaking countries: Australia, Canada, Ireland, New Zealand, UK and USA, during the period 1995–2004. I replicate the methodology of the existing literature and also apply panel data techniques to my sample. The results obtained do not support the hypothesis that price cap regulation imposes more risk.

JEL classification: G12; L50; L97

Keywords: Regulation; Risk; CAPM; Price cap; Rate of return; WACC

1. Introduction

This paper investigates the relationship between regulation and risk using a sample of 93 regulated companies operating in six English-speaking countries: Australia, Canada, Ireland, New Zealand, UK and USA, during the period 1995–2004. The objective of this work is to answer the question: Do different types of regulatory regimes have different impacts on the level of risk run by the regulated firms?

In order to answer this question, I estimate the systematic[1] risk that a regulated company bears and then I assess how the level of such risk is influenced by the different types of regulatory regime in office. From a theoretical perspective, the presence of regulation in an industry entails a different degree

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[1] Financial literature tends to classify risk in two categories: (i) systematic risk and (ii) unsystematic risk. (Several synonyms are used in literature: the former is also referred as market or undiversifiable risk, while the latter as firm-specific or idiosyncratic or diversifiable risk). The difference lies in the possibility of diversifying away the risk by using a wide financial portfolio. The systematic risk refers to the risk that cannot be hedged by portfolio diversification; in other words it is the risk of the economy or of the market as a whole, which is inevitable (undiversifiable). On the contrary, that proportion of risk, which is independent of the economy, but which affects a particular firm only, is called unsystematic risk. The unsystematic risk is therefore specific to the firm and can be reduced by diversification. To summarize:

$$\text{Total risk} = \underset{\text{(market, undiversifiable)}}{\text{Systematic risk}} + \underset{\text{(firm-specific, idiosyncratic, diversifiable)}}{\text{Unsystematic risk}}$$

This work aims to analyze only the systematic risk component. Therefore whenever I mention the word risk, it should be read as *systematic* risk.

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of risk run by the firm: the extent of risk exposure varies with the rules and the type of the underlying regulatory regime.[2] This argument is demonstrated by the following two examples.

In the first example, under a pure price cap regime, the pattern of future prices is fixed ex ante, typically by the price cap formula RPI-X.[3] The regulated firm has powerful incentives to increase productive efficiency (i.e. reduce its costs), because it will keep any gain in efficiency.[4] However, if an exogenous negative shock occurs (e.g. an unexpected increase in input costs), the increase in costs is not compensated by a corresponding increase in revenues and hence the firm's profits shrink. Therefore, under a pure price cap regulation, the firm carries out the entire set of business risks.

Conversely, in the second example, under a pure rate of return (ROR) regime, the firm is ensured that it can recover all of its costs plus a predetermined rate of return on capital. Prices accordingly adjust to ensure that such return is earned and that costs are recovered. There are neither incentives to spend resources to reduce costs,[5] nor risks from increases in exogenous, uncontrolled costs. In this context, a negative cost shock is passed through to consumers via higher prices, while the firm remains immune to any disadvantageous consequences of the shock. For this reason, ceteris paribus, a firm under ROR regulation bears a lower level of risk than a firm subject to the price cap regulation.

The purpose of this paper is precisely to test whether these arguments are supported empirically for a sample of regulated utilities.

The rest of this paper is structured as follows. The next section offers a formal theoretical description together with a literature review. Sections 3 and 4 describe the construction of the variables used in the empirical estimation. The former explains how to estimate risk as a quantitative variable; the latter explains how to classify different regulatory regimes into a qualitative variable. Section 5 replicates the methodology of the literature to my sample and then compares my own results with the existing research. Section 6 characterizes the econometric model. Section 7 explains the estimation method and presents the new results. Section 8 carries further tests on the relationship between methods of regulation and risk. Finally, Section 9 summarizes and concludes.

2. Theoretical background and literature review

We can illustrate the relationship between regulation and risk formally, by rephrasing the profit equation expressed in Alexander et al. (1996).

$$\Pi = PQ - (C_c + C_{nc})Q \quad (1)$$

In words, the firm's total profit (Π) is given by the difference between total revenues (price P times the quantity Q) minus total costs. Costs are an increasing function of quantity and consist of controlled costs, C_c, and non-controlled costs, C_{nc}.

With respect to the different regulatory regimes of my sample, Table 1 describes what elements of Eq. (1) are considered by the regulator in the price setting process.

At the bottom of the table, in the rate of return row, all elements of the profit equation are taken into account by the regulator, even non-controlled costs. At the top of the table, conversely, only P is explicitly considered by the regulator, all the other elements are ignored.

Table 1 should also be seen from another perspective. Note that as we move from the bottom to the top of the table, we are shifting from methods of cost plus regulation (low incentives) to methods of regulation with intermediate incentives (earning sharing, rate case moratorium and price cap with pass-through) through to regulatory methods with high incentives (revenue and price cap, rate freeze).

The hypothesis that for utilities some forms of incentive regulation (including price cap regulation) imply higher levels of systematic risk than standard forms of cost plus regulation, such as ROR, was tested by Alexander et al. (1996). They survey a cross-country[6] sample of regulated firms for the period 1990–1994, and apply the Capital Asset Pricing Model (CAPM) of Sharpe (1964) and Lintner (1965) to estimate the equity and asset betas. They mostly use daily stock market price data to obtain their beta estimates. In this model, the estimates of beta provide the measure of systematic risk.

They then divide the regulatory regimes into three categories, according to the capacity of the underlying regime to implement incentive regulation. They define these three clusters as ''High-Powered'' (which collects all the types of incentive regulation), ''Intermediate'' (which represents a sort of hybrid regulation, for example regulation which allows for a high level of discretion of the public authority) and ''Low-Powered'' (which gathers all the forms of cost plus regulation). Finally, they compare their beta estimates with the corresponding regulatory regime. Sector by sector, they find an increasing trend of the betas, from low values for companies belonging to the Low-Powered group to high values for companies belonging to the High-Powered group.

Other studies on the link between systematic risk and regulation have been carried on by Grayburn et al. (2002) and Alexander et al. (2000). Grayburn et al. (2002) survey and summarize the main works on the field. Alexander et al. (2000) focus on the relationship between regulation and risk with respect to the transport sector only. They also describe the methodology to estimate the Weighted Average Cost of Capital (WACC), which I will use in the robustness section below.

Finally, Mason et al. (2003) provide a very detailed compendium on estimating the betas of regulated utilities. Their

[2] See Grout and Zalewska (2006), Pedell (2006) and Alexander et al. (1996).

[3] RPI stands for the retail price index while X is the expected efficiency gains by the company.

[4] Costs shrinking together with revenues remaining constant translate into higher profits.

[5] Firms may even carry out positively inefficient actions, such as over-investment (see Averch and Johnson, 1962).

[6] Austria, Argentina, Australia, Belgium, Canada, Chile, Denmark, France, Germany, Italy, Japan, New Zealand, Norway, Spain, Sweden, Switzerland, The Netherlands, UK and USA.