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Financial Strategies in Mergers and Acquisitions (M&A): The Case of Regulated Firms

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Abstract

In this paper, a general model of strategic behavior of (regulated and non-regulated) firms in M&A is presented. For non-regulated firms, the model indicates that targeted firms issue new debt strategically. In this case, the firm's capital structure is chosen so that it maximizes the (ex-ante) market value of the firm. However, the focus of the paper is on regulated firms (mostly monopolies). For these firms, the model shows that managers, acting on behalf of shareholders, make their strategic decisions on debt issuing and investment, in anticipation of both the decisions of the regulatory body and the responses of financial markets. These decisions are aimed at influencing the probability that an acquisition occurs as well as the price the potential bidder will have to pay. However, such decisions are also made with a view to influencing the regulatory policies (maximum price or rate of return permitted), thereby mitigating the probability that, in the regulatory game, the regulator adopts an opportunistic behavior. Application of these results to some real-world situations (such as regulated public utilities' companies) is straightforward.

Key Words: Mergers & Acquisitions, Capital and Ownership Structure, Economics of Regulation.

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1. Introduction

Most managerial decisions impact on the firms' preferred capital structure. By the same reasoning, one can think of M&A as also having an impact on the financial decisions of target firms. This is clearly the case when managers of firms targeted by a hostile attempt of takeover increase leverage with the only objective of deterring the impending threat. This type of commitment is similar to many others studied in Industrial Organization literature, specially the use of debt as a commitment device, which was examined in an oligopoly setting by Brander and Lewis (1986).

Approaching M&A from the viewpoint of firms' financial policies implies that we must recognize (and benefit from) the contribution of two strands of literature: Industrial Economics and Financial Theory. Proving how fruitful it may be, this approach is becoming popular among researchers (see for example, Showalter, 1999; Dasgupta and Titman, 1998).

Surprisingly, all research efforts in the field have ignored the case of firms subject to economic regulation, which raises specific issues. In fact, it is in this case that drawing on the contribution of Industrial Economics and Financial Theory is likely to be most insightful – most models in the Economics of Regulation are just extensions of other models derived in the Industrial Organization literature, and the financial features of regulation are the less developed in that former field (even in the more rigorous and sophisticated works as, for example, Laffont and Tirole, 1993). Yet, those financial aspects are crucial in the "regulatory game", where the financial strategies used by the managers of the regulated firm play a fundamental role not only in that game, but also in potential M&A (when allowed by the regulator and/or the government).

Capital structure plays an important role in rate regulation due to the interaction between the investment and financial decisions of a regulated firm and the pricing choices of regulators (Spiegel and Spulber, 1994). The regulatory process is a dynamic one, which can be modelled as a game in which the players are a firm, a regulator, and outside investors. Regulatory commissions set rates that depend on the firm's level of investment and capital structure, thus reflecting not only ratepayer interests, but also those of investors. The capital market, in turn, values the equity and debt of the regulated firm on the basis of its investment and capital structure, as well as on present and future regulatory policies (taking into account a "regulatory risk"). The regulated firm makes its investment and financial decisions in anticipation of regulatory policies and the capital market's reactions. However, those financial decisions can also have a significant effect in the market for corporate control, if we admit that the regulator (and/or the government) permits M&A (or financial participations) in that kind of firms (in particular utilities).

In fact, the decision about capital structure by the managers of the regulated firm affects the outcome of control contests through its effect on the distribution of cash flows between voting equity and nonvoting debt. In particular, higher debt levels result in a lower profitability for the acquirer and, therefore, in a lower probability of acquisition. Thus, the strategic choice of the optimal debt level is based on trading off a decrease in the probability of acquisition (*marginal cost of debt*) against an increase in the share of the expected synergy gain for the target's shareholders (*marginal benefit of debt*), due to a better ability of a rival management to run the firm (if we admit that debt is issued in competitive markets at the present value of its expected payoff, yielding zero net present value to debtholders)[1]. Thus, those financial (strategic) decisions try to influence not only the price that a potential bidder must pay to obtain the control (as well as the probability of the acquisition), but also the regulatory policies about allowed prices or allowed rates of return (trying to mitigate an opportunistic behaviour of the regulator in the regulatory game)[2].

[1] See, about this assumption, Israel (1991).

[2] We can speak here about countervailing incentives. See, about this idea, Spiegel and Spulber (1997).

The contribution of this paper is to extend the basic model of strategic behavior in M&A to the case of firms subject to economic regulation and, can be useful to analyse some real-world situations, particularly in the case of regulated industries (usually public utilities), a growing sector in European countries. In fact, rate regulation (or price caps)[3] of public utilities in electricity, natural gas, telecommunications, cable TV, water services, and other industries is currently practiced by many regulatory commissions in most European countries, and accounts significantly for their GNP's, as well as for their total business expenditures for new plants and equipments. At the same time, privatisation and restructuring of some of these industries (for example, electricity or natural gas) and liberalization of others (as the case of telecommunications) had shown that the size and number of transactions in the market for corporate control grew significantly (even with some restrictions posed by regulators and/or governments based in "national strategic concerns"…)[4].

The paper is organized as follows. A general model of strategic behavior in M&A is presented in section 2. In section 3 we analyse the application of the model to the case of regulated industries. The last section summarizes and concludes.

2. A General Model of Strategic Behaviour in M&A

The model provides a basic framework in which regulated and non-regulated firms uses their capital structure as a strategic commitment in a control game. As a corollary of the model, we also analyse the reflections of those strategies in the

[3] Or even more "sophisticated" incentive regulatory schemes. For a rich and recent survey about incentive regulation, see Vogelsang (2002).

[4] We must say that this type of operations (M&A and Financial Participations) takes place not only between European firms, but evolves third country's firms (for example investments and acquisitions at Latin America). A particular interesting case, for our concerns, is the future "building" of an Iberian Electricity Market, which is now being discussed. For a summary of several types of M&A and Financial Participations, not only in the regulated sector but also for non-regulated firms, see Valente (2001; pp. 106-109).

product markets (in the case of regulated firms we analyse the implications of that commitment device in the regulatory game).

Hence, we will use N or n for non-regulated industries and R or r when we are considering regulated firms. Consider an incumbent target-management (A) whose objective is to maximize the market value of the firm (acting on behalf of shareholders). The managers choose capital structure anticipating the possibility that the firm will become an acquisition target of a rival management (B). We consider (in the control game) that the firm operates for one period in a risk-neutral world in which the interest rate is zero.

The firm produces a non-negative random cash flow, Y, whose probability distribution depends on the ability (x) of the management who controls. So, we will have a probability distribution given by H (Y/x), where x = n or x = r. On the other side, that ability (that we assume that can take values between 0 and 1, with higher values corresponding to better abilities), will be different depending on whether it is the incumbent management (n_a, r_a) or the rival management (n_b, r_b) who is in control.

At the beginning of the period, the incumbent management issues debt with face value F, collects its market value, denoted by D_0 (F), and distributes it to the shareholders. The value of debt, conditional on the identity of the management who is in control, is denoted by D (F, x). The expected cash to equityholders under management x is denoted by:

$$C(F, x) = Y(x) - D(F, x) \qquad (2.1)$$

It is important to note that (2.1), where Y (x) represents the cash flow under the control of x, it is not the market value of equity because it ignores the premium the acquirer (B) has to pay to get control.

Considering its ability (n_b, r_b), the rival considers acquiring the target. We assume that the share price it must pay (m) to the target's shareholders is a weighted average of the expected cash to equityholders under the incumbent management and the expected cash to equityholders (net of acquisition costs T) under the acquirer. Normalizing n_a, $r_a = 0$, with the corresponding cash flow Y (0) known, with j = N, R and x = n, r, that price is given by:

$$m(F^j, x_b) = \gamma^j C(F^j, 0) + (1-\gamma^j)[C(F^j, x_b) - T^j] \qquad (2.2)$$

Where $\underline{\gamma}$ (assuming values between 0 and 1) representing the bargaining power of the acquirer, will be different depending on whether it is a regulated or a non-regulated firm, that is to say, $\gamma^N \neq \gamma^R$.

The control game begins if B has a nonnegative gain, that is to say, if, and only if:

$$C(F^j, x_b) - T^j \geq C(F^j, 0) \qquad (2.3)$$

In (2.3), which is obtained using (2.2), we assume that is left right (that represents the expected cash of the acquirer) increases with ability's acquirer. Hence, we can define a minimal ability of the acquirer above which an acquisition becomes profitable:

$$x_b^{min} = x_b^{min}(F^j) \Leftrightarrow C(F^j, x_b^{min}) - T^j \equiv C(F^j, 0) \qquad (2.4)$$

Assuming that the acquirer's ability is uniformly distributed over [0, 1], we can define a probability of acquisition, as a function of debt level (F), which is given by:

$$\ell(F^j) = \Pr(x_b \geq x_b^{min}) = 1 - x_b^{min} \qquad (2.5)$$

The point that must be stressed, is that capital structure decisions, made by incumbent management, affect the price acquirer pays, $m(F^j, x_b)$, and the probability that acquisition will materialize, $\ell(F^j)$. Anticipating these consequences, the incumbent management, will choose a capital structure in order to maximize shareholders value at t = 0, that is to say, before the control game begins, trying to affect the game's outcome (we must say that in the case of a regulated firm, j = R, that choice is influenced by the regulatory process, as we shall see).

Firm's value at t = 0 is given by:

$$V_0(F^j) = E_0(F^j) + D_0(F^j) \qquad (2.6)$$

The ex-ante equity value is:

$$E_0(F^j) = [1-\ell(F^j)]\, C(F^j, 0) + \ell(F^j)\, [m(F^j, x_b) \mid x_b \geq x_b^{min}] \qquad (2.7)$$

The first term on the right hand side of (2.7), is equity value under the incumbent management multiplied by the probability that it remains in control. The second term, is the conditional expected price (*m*) the acquirer pays times the probability that acquisition will take place. Similarly, the market value of debt, at t = 0, is:

$$D_0(F^j) = [1-\ell(F^j)]\, D(F^j, 0) + \ell(F^j)\, [D(F^j, x_b) \mid x_b \geq x_b^{min}] \quad (2.8)$$

Where, similarly, we consider the conditional expected value of debt (*D*).

If we admit that debt is issued in competitive markets at the present value of its expected payoff, yielding zero net present value to debtholders ("fair" price), then the debt level that maximizes ex ante firm value also maximizes ex ante equity value. Thus, the incumbent management acting on behalf of its shareholders[5] , selects the optimal capital structure to maximize the ex ante total firm value, equity plus debt. Formally, selects the debt level $\underline{F^j}$ that maximizes (2.6), which can be rewritten, using (2.1), (2.2), (2.5), (2.7) and (2.8), as:

$$V_0(F^j) = Y^j(0) + (1-\gamma^j)\int_{x_b^{min}}^{1} \left[\Delta C(F^j, x_b) - T^j\right] dx_b + \int_{x_b^{min}}^{1} \Delta D(F^j, x_b)\, dx_b \quad (2.9)$$

Where $\Delta C(F^j, x_b) = C(F^j, x_b) - C(F^j, 0)$ and $\Delta D(F^j, x_b) = D(F^j, x_b) - D(F^j, 0)$. The firm value consists of the expected cash flow under the incumbent management, $Y^j(0)$, and a premium due to a possible value-increasing acquisition (that can be explained, for example, by a better ability - $x_b = n_b$ or $x_b = r_b$).

Such a premium incorporates two components. The first component is the portion, $\underline{(1-\gamma^j)}$ of the expected (net) appreciation in expected cash to equityholders accruing to the target's shareholders. The second one is the total expected appreciation in debt value. The reason for this asymmetry is that while a portion $\underline{\gamma^j}$ of the expected appreciation in expected cash to equityholders accrues to the acquirer, the target captures the entire ex ante expected appreciation in debt value when debt is first sold at a "fair" price (as we have assumed).

Meanwhile, the riskiness of debt and the fact that the acquirer has better ability than the incumbent management, imply that the expected appreciation in debt value increases with the level of $\underline{F^j}$. This fact will imply, on the other hand, that

[5] We ignore, for simplicity, any agency problems.

the expected gain of the acquirer (with a better ability) will be smaller. Then, it results that the minimal ability of the acquirer above which an acquisition becomes profitable ($\underline{x_b}^{min}$) must be greater, the corresponding probability will be smaller as well as the probability of acquisition - $\underline{\ell(F^j)}$. This is the value-decreasing effect of debt on the premium in (2.9).

However, that negative effect must be traded off with a positive one. In fact, if we assume that the gross synergy, $\Delta Y = \Delta D(F^j, x_b) + \Delta C(F^j, x_b)$, is fixed, a change in the level of debt that results in a unitary increase in $\Delta D(F^j, x_b)$ must also lead to a unitary decrease in $\Delta C(F^j, x_b)$. Since the target's shareholders realize the entire ex ante expected increase in debt value but lose only $(1-\gamma^j)$ of the expected decrease in $\Delta C(F^j, x_b)$, their ex ante expected payoff increases with the level of debt (for a given probability of acquisition). So, we can speak of a value-increasing effect of debt on the premium in (2.9).

Hence, the incumbent management selects the optimal debt level trading off those two effects, and this optimal level, $\underline{F^j}^*$, satisfies the first order condition:

$$\frac{\delta V_0}{\delta F^j}\Big|_{F^j = F^{j*}} = 0 \tag{2.10}$$

Which can be written in marginal terms:

$$\gamma(1-x_b^{min})\,[\delta\Delta D(F^j, x_b)/\delta F^j \,|\, x_b \geq x_b^{min}] = (\delta x_b^{min}/\delta F^j)\,[\Delta Y(x_b^{min})] \tag{2.11}$$

Where $\underline{\delta\Delta D}$ is the expected value of the increment in the value debt. The left-hand side of (2.11) is the marginal benefit of debt. It is the increment in the value transferred from the acquirer's expected payoff to the debtholders.[6] The value transferred consists of the acquirer's bargaining power multiplied by the expected change in the appreciation in debt value. The debtholders, in turn, pay the target's shareholders this full value when debt is first issued at a "fair" price. The right-hand side of (2.11) is the marginal cost of debt. It consists of the probability that additional debt will deter the just indifferent acquirer (that is, the one with minimal ability) from acquiring the target firm multiplied by the foregone synergy

[6] Similarly, wealth of $(1-\gamma)$ […] is being transferred from the shareholders to the bondholders of the target firm as the level of debt increases. The debtholders, however, pay this amount up front to the shareholders when debt is issued at a "fair" price.

as a result of this deterrence. Based on this tradeoff we can establish the existence of an optimal debt level.

Meanwhile, an important insight is to analyze the consequences of such financial strategies in product markets. In fact, and for the case of non-regulated firms, the target firm usually interacts with rival firms (RV) in oligopolistic markets. That greater level of debt (or a selection of $F^{N*}>0$) can commit the firm to a more "aggressive" behavior (greater output - $\underline{q_A}^N$) as a consequence of the so-called limited liability effect (Brander and Lewis, 1986). On the other hand, an incumbent management who admits to increase leverage (in a defensive manner for the case, for example, of a leveraged buy-out or strategically as the case we are considering) wills anticipates the potential reaction of the rivals.

In fact, firms contemplating leverage increases also consider the likely reactions of their competitors. A firm will be less willing to increase its leverage if it believes that rivals will respond to its new financial structure by aggressively cutting their prices (in a Bertrand game) to steal its market share.[7] However, if competitors were expected to react to the leverage increase by increasing their prices (strategic complements), there would be an added impetus to increasing leverage.[8]

In the case of regulated industries (j = R), where the firm that increases leverage is usually a monopoly, our task is to analyze the impact of such a kind of financial strategies in the regulatory game. In other words, the question is to identify a price influence effect of debt on regulatory decisions (Taggart, 1981). In fact, debt precommitment can raise rates by causing the regulator to avoid bankruptcy costs, that is to say, $p^R = p^R(F^R)$.

In this setting, we must define price functions (assuming a Bertrand game), where the level of debt influences that price. We will have:

$$p_i^N = p_i^N(F_i^N) \qquad (2.12)$$

$$p^R = p^R(F^R) \qquad (2.13)$$

[7] For the reasons to use a Bertrand game see, for instance, Showalter (1995). Empirical evidence is provided by Chevalier (1995 a, b), Phillips (1995) and Showalter (1999).

[8] In this paper we will not develop this case. See, for instance, Valente (2001).

Where i = A, RV. Hence, we will have as market value functions:

$$V_0(F^N, p_i^N) = V_0\left[F^N, p_i^N(F_A^N, F_{RV}^N)\right] \quad (2.14)$$

$$V_0(F^R, p^R) = V_0[F^R, p^R(F^R)] \quad (2.15)$$

The above expressions, as well as the model presented, will permit us the analysis of several situations of financial strategies in M&A of regulated and non-regulated firms. The insight of the analysis is that we can also evaluate the impact of those strategies in product markets. In the case of non-regulated industries, usually in oligopoly markets where the firm who increases leverage interacts with rivals (RV) playing a Bertrand game. For the case of regulated sectors, mostly monopolies, we can analyze the influence of those strategies on regulatory decisions (in this case the regulator can be seen as the "rival"). In the next section we will discuss the case of regulated firms.

3. Financial Strategies in M&A: The case of regulated firms

3.1 The basic framework

The case we will now discuss refers to the strategic positioning by an incumbent management, whose decisions are scrutinized by a regulatory commission. In such a case, the regulator set rates that depend on the firm's level of investment and capital structure[9], thus reflecting not only ratepayer interests, but also those of investors. In such a framework, the regulator will choose an optimal regulated price by maximizing a utilitarian welfare function given by:

$$W(p^R, I, D) = S(p^R) + \Omega\, \pi_R(p^R, I, D) \quad (3.1)$$

Where $\underline{p}^R$ is the regulated price, $\underline{I}$ is the level of investment (eventually sunk) and $\underline{D}$ is the market value of debt (which will finance, at least partially, the level of investment).

9 We assume that regulated firms are allowed to exercise discretion in choosing their capital structure and investment level, at least, when the proposed projects are within the range of the utility's corporate activity.

In (3.1), welfare depends on the price established by the regulator in two different and opposite ways. First, higher prices have a negative effect on welfare because consumers' surplus (S) is less. On the other hand, with a higher regulated price the expected profit of the regulated firm (π_R) will be higher and, consequently, this represents a positive effect on welfare. The expected profit also depends on I and D. In what concerns investment, it will have a positive effect on profits if we assume that it represents an "effort" in order to reduce production costs[10]. However, the regulatory authority usually treats the costs of investments as sunk costs, only considering its positive effect on profits. This represents an opportunistic behavior of the regulator (who, as we shall see, responds to the firm's investment by cutting the regulated price), and the extent of regulatory opportunism depends on the regulator's welfare weight (Ω). This one can take values between 0 and 1, which reflects an "environment" more or less pro-consumer. In what concerns debt, its effect will be negative because of interest payments and increasing expected bankruptcy costs.

From the maximization of (3.1) we will obtain an optimal allowed price, which will depend on the levels of investment and debt, or, $p^R = p^R(I, D)$, which is equivalent to (2.13) in the general model, including now the level of investment and considering the market value of debt instead of its face value. Note that a regulated price, p^R (I, D), corresponds to an allowed rate of return that can be obtained from the expected profit, taking into account that the firm's capital stock (rate base – K) depends on the level of investment.

At this point, it is important to emphasize that we do not assume that the regulator is able to make credible commitments to specific rates of return, so rates cannot be established through prior announcements. In fact, regulators have considerable discretion in setting rates and in determining what is a "fair" rate of return. Formally, under rate regulation, the prices that the firm is allowed to charge are set such the firm's expected revenues equal its estimated revenue requirement (cost-of-service). The latter is based on an estimate of the firm's variable costs such as operating expenses, taxes, and depreciation, plus an allowed rate of return multiplied by the capital stock (rate base). The allowed rate of return

[10] Of course this is just one possibility. See, about the parameterisation of "effort" in terms of cost

is generally an average of the costs of debt and equity weighted by the relative proportions of debt and equity, usually measured at book value.[11] The cost of debt is usually taken to equal total interest payments per unit of the book value of debt. The estimated cost of equity is perhaps the most troublesome and is arrived at in various ways, including the discounted cash flow method and the earnings/price ratio method, although in nowadays, and considering the state-of-the-art in Financial Theory, it is the Capital Asset Pricing Model (CAPM) that is mostly used in regulatory proceedings[12].

In practice, because negotiations take place between the firm, consumers, and the regulator concerning each step in the calculation (rate hearings), regulators can exercise considerable discretion in the rate-setting process.[13] In particular, regulators have some latitude in determining the underlying rate of return. A “fair” rate of return covers the cost of capital, but often exceeds the risk-free interest rate. It is important to emphasize that the regulator’s pricing policy affects the firm’s expected earnings, which in turn affect the firm’s cost of capital. Clearly, if the regulatory commission fails to take into account the effect of the rate setting on the firm’s value, the allowed rate of return may depart substantially from the actual cost of capital. The circularity of this process suggests that the regulated firm, the capital market, and the regulators all take into account the interrelated determination of the cost of capital and regulated prices. In such a setting, the regulator can be seen as “the rival”, because of his capacity to limit the choices

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functions, Laffont e Tirole (1993), Bös (1994) and Armstrong *et al*. (1994).

[11] This procedure is followed not just under rate-of-return (or cost-of-service) regulation but also under price-cap regulation, because regulatory commissions set price caps on the basis of the firm’s cost of capital. About the cost of capital in regulated industries see, for example, Grout (1995) or Valente (2001, ch. 4).

[12] Alternative approaches based on comparable earnings require the regulator to identify firms with comparable risks, which is not an easy task in a lot of situations. About the problems on the estimation of the cost of capital of regulated firms, as well as the utilization of the CAPM, see Morin (1994), Kolbe *et al*. (1984) and Binder and Norton (1999).

[13] For example, estimates of the cost of equity generally depend on regulatory assessment of investor expectations regarding the future performance of the firm and thus depend on future regulatory policies. So, in regulatory environments we must take into account a regulatory risk (see, for example, Grout, 1995 or Kolbe *et al*., 1993).

that can be made by the regulated firm about prices to charge, outputs to be produced, or standards to be reached.

Meanwhile, the insight of the analysis of the considering case, is that the strategic choice of debt by managers of a regulated firm can fit simultaneously two different intentions. Thus, on one hand, that choice can be the result of anticipating a takeover attempt by a rival management, trying to affect the price that the acquirer must pay, $\underline{m\ (D^R, r_b)}$, and the probability of acquisition, $\underline{\ell(D^R)}$, as it was established in the basic model. On the other hand, that strategic choice can result from the regulatory game, anticipating the regulator's decisions about allowed prices or allowed rates of return.

Hence, an incumbent management of a regulated firm will make its financial and investment choices (at t = 0) in order to maximize the expected profit of the firm, for all states of nature where the firm remains solvent (which makes clear that the incumbent management acts on behalf of shareholders, and reflects the limited liability effect). The expected profit is given by:

$$\pi_R(p^R, I, D_0^R) = \int_{\theta_r^m}^{\theta_r^l} \left[\pi_R\left(p^R, I, \theta_r\right) - D_0^R\right] dF(\theta_r) \qquad (3.2)$$

Where $\underline{\theta_r}$ represents a random variable distributed on the interval $[\theta_0, \theta^l]$, according to the density function f (θr), which affects profit either through the demand function or the cost function. We also define a critical value, $\underline{\theta_r^m}$, below which firm is liquidated (we assume that profit increases with $\underline{\theta_r}$).[14] So, the optimal choice of the regulated firm, ($D^R{}_0{}^*$, I^*), is made in order to maximize:

$$V_0\ (D^R{}_0, p^R) = V_0\ [D^R{}_0, p^R(D^R{}_0, I)\ ] \qquad (3.3)$$

The above expression, which is identical to that one presented in the general model, (2.15), with the inclusion of variable $\underline{I}$, shows that the management of a regulated firm, acting on behalf of its shareholders, will maximize (at t = 0) the market value of the firm given by (3.3). In order to do that, managers will make their strategic choices about the level of debt and the investments plan, anticipating a potential takeover attempt by a rival management, trying to take

[14] See, for instance, Brander and Lewis (1988), although for the case of non-regulated firms.

advantage of value-increasing acquisitions, and also anticipating the regulator's plan about allowed prices.

The regulator's optimal pricing strategy is defined, once he observes the firm's strategy, (D^R_0, I). We assume that the regulator place a high value on keeping the firm solvent. Accordingly, the optimal pricing strategy, $p^{R\,*} = p^{R\,*}(D^R_0{}^*, I^*)$, will be defined in order to maximize (3.1) subject to a restriction that the firm remains solvent. The probability of bankruptcy is given by: $F(\theta_r^m)$. If we assume that expected bankruptcy costs are increasing with the firm's insolvability degree, then those costs can be represented by: $F\,[D^R - \pi_R(p^R, I, \theta_r)]$. Then, the restriction in the regulator's maximization programme will be given by:

$$\pi_R(p^R, I, \theta_{0,\,r}) \geq F[D^R - \pi_R(p^R, I, \theta_{0,\,r})] \qquad (3.4)$$

Where we assume that the regulator sets a regulated price that is high enough to ensure that the firm is never liquidated for all debt levels, even in the "worse" state of nature, $\underline{\theta_{0,\,r}}$. Meanwhile, the regulator's incapacity to assume credible commitments about allowed prices or allowed rates of return, means that the probability of bankruptcy in equilibrium is positive (connected with regulatory risk), and the firm's strategic issue of debt only attenuates the possibility of regulator's opportunistic behaviour.

3.2 The Regulatory Game and Regulator's Opportunistic Behaviour

The trade-off between expected bankruptcy costs and higher prices is the significant aspect of the regulator's decision about allowed prices (and corresponding allowed rates of return). The regulator wishes to avoid bankruptcy costs, but faces deadweight losses from pricing above expected marginal costs. Hence, it can be established (Spiegel and Spulber, 1994) that the optimal regulated price always exceeds expected marginal cost, and for that price, given a positive level of debt, the probability of bankruptcy is positive (with the corresponding expected costs).

On the other hand, if (3.4) is nonbinding, then the optimal regulated price is increasing in the regulator's welfare weight on profits, $\underline{\Omega}$, that is to say, $\delta p^{R\,*}/\delta\Omega$

> 0. Meanwhile, the analysis could be generalized to allow uncertainty regarding the regulatory climate as reflected in the parameter $\underline{\Omega}$. This will introduce an additional source of randomness for the firm's investors, and this is just what we mean by regulatory risk. Accordingly, the latter must be rewarded in financial markets.

In certain conditions (see Spiegel and Spulber, 1994), the optimal regulated price also increases when the quality of the firm's debt deteriorates. This shows, once more, the regulator's concerns about the firm's financial integrity and could be parameterised in terms of the functions $\underline{F(\theta_r)}$ and $\underline{F[\ldots]}$, in order to reflect an increase in debt's risk.

However, the most important consideration, for our purposes, is the effect of regulated price on the probability of bankruptcy. A sufficient condition for a higher price to lower the probability of bankruptcy (for all $\underline{I}$ and $\underline{D}^R$) is:

$$\frac{p^{R^*} - C^R_q\left[q^R(p^{R^*}), \theta^m_r, I\right]}{p^{R^*}} < \frac{1}{\eta(p^{R^*})} \qquad (3.5)$$

Where $p^{R\,*} = p^{R\,*}(D^R, I)$, $\underline{C^R_q}$ represents the expected marginal cost of the regulated firm and $\underline{\eta(p^R)}$ is the elasticity of demand. The condition (3.5) implies that the optimal regulated price is less than the monopoly price for a firm with costs evaluated at $\underline{\theta}_r^m$. This is equivalent to the statement that marginal revenues ($\underline{R}_p$) at the critical level of the efficiency parameter ($\underline{\theta}_r$) are positive, which in turn implies that a price increase lowers the likelihood of bankruptcy, as $\delta\theta_r^m/\delta p^R = R_p (p^R, I, \theta_r^m)/C_{\theta r} (q^R, I, \theta_r^m) < 0$, assuming that total costs are decreasing in the efficiency parameter ($C_{\theta,r} < 0$). We can then conclude that if (3.5) holds for all $\underline{I}$ and $\underline{D}^R$, then:

(i) The optimal regulated price is increasing in the firm's debt obligation, or, $\delta p^{R\,*}/\delta D^R > 0$;

(ii) The optimal regulated price is decreasing in the firm's level of investment, or, $\delta p^{R\,*}/\delta I < 0$.

The conclusion is that the price-influence effect of debt is positive. This suggests that the regulated firm will issue debt to raise the regulated price, which can be seen as a limited liability effect. At the same time, the price-influence effect of investment is negative. This reflects regulatory opportunism and suggests that the regulated firm will reduce its investment level (perhaps investing less than the socially optimal level) in order to raise the regulated price.

The occurrence of underinvestment can help us to understand why regulators permit firms to take on debt, despite the possibility of costly bankruptcy. By permitting debt, the regulator makes an implicit commitment to the regulated firm, thereby restricting future opportunism (in terms of allowed prices or rates of return). That is, the regulator makes it more difficult for himself to lower the regulated price after the firm invests in, for example, cost reduction. This suggests that the regulator will permit firms to take on debt only if debt increases the firm's (*ex-ante*) investment level such that the benefits from additional investment (for example, higher expected profits) are sufficiently high to outweigh the expected costs of bankruptcy. Debt can therefore serve as an imperfect substitute for regulatory commitment to rates.[15]

4. Conclusion

This paper presents a model of financial strategies in M&A of regulated and non-regulated firms. The main insight is that capital structure affects the outcome of control contests through its effect on the distribution of cash flows between voting equity and non-voting debt. In particular, higher debt levels result in a lower profitability for a potential acquirer and, therefore, in a lower probability of acquisition. Thus, the choice of the optimal debt level is based on trading off a decrease in the likelihood of acquisition against an increase in the share of the expected synergy gain for the target's shareholders (due to the better ability of the rival management to run the firm).

[15] In equilibrium, however, the problem of underinvestment will subsist. Another reason why regulators may allow firms to use debt financing is suggested in Spiegel (1997). There, debt financing is shown to have a positive effect on a regulated firm's choice of technology and, in addition, it eliminates the firm's incentive to engage in goldplating. In this paper, however, as we have shown, the use of debt is justified in terms of potential m&a if allowed by the regulator and/or the government.

Moreover, we discuss the impact of those financial strategies in product markets, in particular for the case of regulated firms. In such situations, the crucial (but often neglected) aspect refers to the effect of that strategic use of debt in terms of the regulatory game. The adaptation of our general model to the regulatory process shows that capital structure can play a role in the strategic interaction between regulators and firms, with important implications in terms of regulatory policy. In equilibrium, the regulated firm issues a positive amount of debt as a consequence of regulation (and, in our general model foreseeing a potential acquisition) despite the existence of bankruptcy costs. Debt serves to raise the regulated rates as the regulator seeks to reduce expected bankruptcy costs, although the probability of bankruptcy remains positive at the equilibrium.

In the regulatory process, regulators set rates after the firm selects its investment and capital structure. The managers of the regulated firm, acting on behalf of shareholders, maximize (*ex-ante*) the market value of the firm, making their strategic choices about capital structure and the investments plan, anticipating regulator's decisions and capital market's responses.

The regulated firm is shown to invest less than the socially optimum, which in turn raises regulated rates above the optimal level. However, the issuance of debt mitigates the regulator's incentive to act in an opportunistic manner, and may therefore provide the firm with an incentive to increase its level of investment above that of an all-equity firm. This has important implications for regulatory policy. In particular, the strategic issuance of debt by the firm may create incentives for regulators to place limits on debt as a means of controlling the risk of bankruptcy. However, as has been shown in financial market models, the firm's capital structure can provide information regarding its costs and performance (Spiegel and Spulber, 1997). This suggests the need for additional investigation of the informational aspects of capital structure in regulated industries.

In the same vein, the model presented has important implications in what concerns regulators and/or policy makers' decisions to authorize (or not) mergers and acquisitions of regulated firms, in particular public utilities.[16]

[16] One intuition of the model is that the same reasoning applies to potential acquirers. This issue, as well as several types of m&a (with the associated financial strategies), is addressed in Valente (2001).

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