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Reduction of Regulatory Risk: A Network Economic Approach

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Discussion Paper

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Abstract:

Several definitions of regulatory risk are known from the literature. From the perspective of regulatory reform it is important to differentiate between the impact of a given regulatory scheme on the firm's risk exposure and the risk arising from discretionary behavior of regulatory agencies. Whereas the consequences of effective regulation in principle are known and accepted, excessive regulatory discretion may cause a strong need for regulatory reform. Regulatory reform focussing on the regulatory base risk and the regulatory instrument risk has to solve the problem of the optimal division of labour between regulatory discretion and statutory constraints. Therefore, in this paper the design of a disaggregated regulatory mandate is elaborated; its major elements being the restriction of regulation to monopolistic bottlenecks and a disaggregated application of sector-specific regulatory instruments.

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1. Alternative definitions of regulatory risk

According to Kolbe, Tye, Myers (1993, p. 33) “there appears to be no generally accepted definition of regulatory risk”. However, the analysis of different versions of regulatory risks has a long tradition within the economic theory of regulation (e.g. Ahn, Thompson, 1989), and becomes increasingly relevant within debates of regulatory reform of network industries (e.g. Ergas et al. 2001).

Several definitions of regulatory risks are known from the literature. According to Wright et al. (2003, p. 118) the most obvious definition states that “regulatory risk arises whenever regulation affects the cost of capital of the regulated firm”.¹ According to Kolbe et al. (1993, p. 33) “Here we define regulatory risk as the risk due to an asymmetric distribution of possible plant value outcomes”, and explicitly reject the application of the definition of regulatory risk as the impact of regulation on the cost of capital (see p. 33 footnote 56). Kolbe et al. (1993, pp. 37) focus on the regulatory risks due to some disallowances of the invested capital from the rate base or changes in the regulatory oversight. Ahn and Thompson (1989) analyze the way in which uncertainty in the application of a given regulatory instrument itself affects value (differing from the effect of regulation on the cost of capital). They analyze the risks involved in the process of rate of return regulation differentiating between the uncertainty of the initiation of a rate case (triggering rule risk) as well as the uncertainty involved in the actual assignment of the allowed rate of return (setting rule risk). Buckland, Fraser (2001) analyze the links between regulation and the risk faced by the regulated firm investigating the extent to which observed variation in betas is associated with regulatory factors (regulatory structure, regulatory review procedures etc.). Robinson, Taylor (1998, p. 333) investigate the effects of heterogeneous regulatory intervention, considered as significant, on the variance of the returns to holding shares in regional electricity companies. Such regulatory events include price-control consultation procedures, interventions to change a price-cap, etc. “The very personalized nature of the UK regulatory regime and lack of a

¹ For similar definitions see e.g. Ergas et al. (2001, p. 6): “Regulatory risk arises when the interaction of uncertainty and regulation changes the cost of financing the operations of a firm.”

broad regulatory framework is felt to engender unpredictability” (p. 337). The empirical analysis by Buckland and Fraser (2001) focuses on the impact of regulatory review procedures on the risks for the regulated firms involved. Ergas et al. (2001, p. 7) consider the existence of regulatory discretion as one type of regulatory risk.² Furthermore, the risk of regulatory inconsistencies motivates the definition “factors that are under the regulator’s control and the choice of which is regarded as uncertain by the regulated firm and investors” (Wright et al., 2003, pp. 118-119).

2 Regulatory impact versus regulatory risk

From the perspective of regulatory reform it is important to differentiate between the impact of a given regulatory scheme on the firm’s risk exposure and the risk arising from discretionary behavior of regulatory agencies. Whereas the consequences of effective regulation in principle are known and accepted, excessive regulatory discretion may cause a strong need for regulatory reform.

Effective regulation may have an impact on all relevant performance parameters of the regulated firm. Within the framework of legal entry barriers and rate of return regulation the buffering hypothesis states that regulation should reduce conventional measures of owner risk. By buffering the firms against demand and cost changes the variability of profits should be lower than otherwise (Peltzman, 1976, p. 230). In the context of free entry and price-cap regulation it can be shown that owner risk may increase or decrease. For the case of cost uncertainty the price-cap regulated firm’s profit varies more than the profit of the unregulated firms, translating into a higher beta. Conversely, for the case of demand uncertainty the regulated firm’s profit varies less than the profit of the unregulated firm, translating into a lower beta (Wright et al., 2003, pp. 122-129).

² However, Ergas et al. (2001, p. 6) also include the impact of regulation as part of regulatory risk.

A familiar concept in regulatory finance to determine the cost of capital is the capital asset pricing model (CAPM), which allows to differentiate between unsystematic and systematic risk. The systematic risk is measured by calculating the way its stock price moves in relation to market indices. The focus of regulatory impact is on the systematic risk measured by means of the beta-concept. As a consequence, effective regulation changes the systematic risk of the regulated activities, thereby (*ceteris paribus*) increasing or decreasing the opportunity costs of the invested capital (e.g. Knieps, 2003; Gaggero 2007). This performance impact of regulation, however, should never be a primary objective and justification for regulation, but only a (positive or negative) side effect. Myers (1972, p. 80) already stated (within the context of rate of return regulation) that the principle of “fair return” says nothing about whether regulation should aim to make utilities safe or risky enterprises. In competitive markets regulation should obviously never be introduced in order to mitigate the risk of the firms involved. In those parts of network industries where active and/or potential competition is absent, a fully competitive market is not a realistic alternative. In order to avoid the nirvana fallacy of regulation (Demsetz, 1969, p. 1) the risk of the business under regulated conditions has to be taken into account. Neither the risk of the unregulated monopolist nor the risks of the business under hypothetical conditions of competition should be considered as relevant reference points.³

3 Different types of regulatory risks

Instead of the impact of an *ex ante* well known regulatory action, regulatory risk mirrors the uncertainty of regulated firms and investors, due to discretionary regulatory behavior. Regulatory impact should therefore not be confused with regulatory risk. Consequently, the broad definition of regulatory risk, i.e. regulatory risk exists whenever regulation affects the cost of capital of the regulated firm, should be rejected.

³ For the discussion of alternative reference points of risks, in particular if competition is only hypothetical, see Myers (1972, p. 79) and Buckland, Fraser (2001, p. 879).

Regulatory risk due to discretionary regulatory behavior may occur on different levels of regulatory activities. Within the context of the application of a specific regulatory instrument regulatory discretion may cause *application risk*. Ahn and Thompson (1989), for example, analyze the risk involved in the application of rate of return regulation caused by uncertainties of the triggering rule (the timing of rate procedures) and the setting rule (the allowed rate of returns). Application of price-cap regulation is also involved in setting risk due to periodic intervention of regulators (resetting RPI – X, quality control, changing the commodity basket etc.).

In the literature on regulatory risk the most attention has been devoted to the *truncation risk* due to an asymmetric distribution of possible plant value outcomes. This identifies the risk of some disallowance of the invested capital and the subsequent negative incentives for investments caused by expected regulatory opportunism. Translated into the context of the truncation problem, stated e.g. in Gans and King (2003), ex post regulatory opportunism of the regulatory agency is taken as (exogenously) given. In the decision trees considered, the only asymmetry between ex ante and ex post is a random state of the world, which materialises between the ex post and ex ante periods, observable as common knowledge. Due to the sequential nature of investment decisions (ex ante) and regulation of access tariffs (ex post) a regulation-induced hold-up problem would arise. The truncation problem would result in rewarding only ex post successful projects, whereas the ex ante risks of project failure would not be compensated.⁴

Although some authors point out the relevancy of the regulatory framework, a common denominator of the literature on regulatory risk is to take the regulatory framework (regulatory basis, regulatory instruments) as exogenous. As a consequence, the *regulatory base risk* as well as the *regulatory instrument risk* is not considered. As long as the competency to specify the areas as well as the instruments of sector specific regulation is delegated to regulators a clear and

⁴ Under certain conditions it can even be shown that regulated access prices equal to short run variable costs would result in a unique Nash-equilibrium and the utility would not invest (Newbery, 2000, pp. 34-36).

economically well founded regulatory basis will not be applied. Market power regulation may either be oversized including competitive markets or undersized leaving areas of network specific market power unregulated. Irrespective of whether the application of a specific regulatory instrument increases or decreases regulatory risks, its application may be justified or not. Application of price-cap regulation in competitive parts of network industries may reduce economic risk but should be rejected because functioning market signals are disturbed. If application of price-cap regulation increases regulatory risk due to changing demand decisions this does not constitute a valid argument against this regulation. Although an increase of risk may also be in the interest of a firm as long as it is concomitant with increasing expected profit, the focus of producer interest chosen in the literature of regulatory finance seems too narrow. Instead, the change of consumer surplus as a consequence of regulation should also be taken into account. It may even be the case that increasing risk for firms is necessary for increasing consumer welfare.

4 Compensation of regulatory risk?

Since the literature on regulatory finance takes the regulatory framework as exogenously given, its focus is on application risk as well as truncation risk. Whereas with respect to application risk explicit recommendations remain vague (e.g. Ahn, Thompson, 1989, p. 256; Wright et al., 2003), the major effort is on dealing with the truncation problem. Regarding compensation we have to differentiate between ex ante and ex post truncation.

As Kolbe et al. (1993, pp. 25-27 and 46-51) have shown, the risk of ex ante-truncation due to the probability that the investors earn less than the promised rate of return can be calculated and also compensated by means of a risk premium. In the case of ex post truncation this solution does not work, because the promise of a risk premium would encounter the same commitment problem (see Kolbe et al., 1993, pp. 53ff.; Gans/King, 2003, p. 166). In this context the role of access holidays has also been discussed. Access holidays mean a significant period during which an investor is free from access regulation. The idea is that

such a holiday will increase investment incentives by allowing profits unhindered by regulatory intervention (Gans, King, 2003, p. 164).

The question arises whether access holidays are the adequate answer to the problem of regulatory opportunism. The starting point is how markets solve the problem of opportunism. Opportunistic behaviour between market participants can be credibly excluded by means of incentive compatible contracts. As long as all parties may benefit from the ex ante investment decisions, incentives occur to apply credible devices for dealing with ex post cheating behaviour. Under the assumption of complete information a well-specified contract can be designed between all parties involved, creating incentives for ex ante irreversible investments and no ex post cheating incentives (e.g. Kleindorfer, Knieps, 1982). As Williamson (1983, p. 526) has shown, a security bond equal in amount to the irreversible investment would serve the purpose of a perfect hostage. In a world of incomplete information and subsequent incentives for idiosyncratic contracts (e.g. Williamson, 1979) the ex ante risk of investments cannot be perfectly determined. Consequently, perfect hostages to avoid opportunistic behaviour by the firm involved do not exist; nevertheless, adequate imperfect hostages can be developed (Williamson, 1983, pp. 527 f.).

Under the assumption of a welfare-maximising regulator in a similar way a complete incentive-compatible regulatory contract can be implemented. In particular, instead of postulating ex post regulatory power, under such circumstances of complete information it is feasible to design a complete regulatory contract ex ante such as to allow the compensation of the ex ante risk of irreversible investment. In a world of incomplete information again only an incomplete regulatory contract can be designed.

Since it is well known that regulatory authorities cannot be forced into welfare-maximising behaviour, the question arises whether opportunistic behaviour can be excluded by the design and implementation of adequate hostages. Within the relevant institutional context it cannot be expected that the regulatory authorities can be disciplined by such an adequate hostage. Regulatory authorities as part of the bureaucracy cannot be fined for inadequate behaviour. As a consequence, it

is only by means of a statutory constraint that opportunistic behaviour by the regulatory authorities can be disciplined. Therefore the regulatory agency has to be committed by statutes to allow the compensation of the ex ante risk of irreversible investment.

5 Reduction of regulatory risk by regulatory reform

5.1 The concept of the regulatory mandate

Only a few institutional reform proposals appear in the literature, all focussing on the regulatory truncation risk:

“[C]onstitutional limits on regulatory discretion can reduce the risk of regulatory failure provided that the utility responds as vigorously as before to any deviation. Whether this is plausible is an interesting question.” (Newbery, 2000, p. 47)

“Eliminate asymmetric payoff distributions by changing regulatory practices” (Kolbe, Tye, Myers, 1993, S. 34)

“[C]hange in regulatory oversight ...” (Kolbe, Tye, Myers, 1993, S. 38)

Regulatory reform focussing on the regulatory base risk and the regulatory instrument risk has to solve the problem of the optimal division of labour between regulatory discretion and statutory constraints (rules). Statutory constraints are necessary to avoid regulatory incentives with respect to overregulation by extending the regulatory basis and by detailed price regulation. Statutory constraints may also guarantee the necessary regulatory interventions. Nevertheless, regulatory discretion should not be completely avoided. The required regulatory base may change over time requiring a careful regulator initiating phasing-in or phasing-out of sector-specific regulation. Regulatory discretion may also be required for a proper application of regulatory instruments. For example, the risk involved in the application of rate of return regulation caused by uncertainties

may reflect the necessities of dealing with changing market conditions over time. Similar conclusions also hold for the application of price-cap regulation.

In order to guarantee consistent economically founded regulatory actions, the development and the implementation of sector-symmetric statutory constraints seems necessary. Therefore, in the following the design of a disaggregated regulatory mandate is elaborated; its major elements are the restriction of regulation to monopolistic bottlenecks and a disaggregated application of sector-specific regulatory instruments (Knieps, 2005; Knieps, 2007, chap. 9).

5.2 Limiting regulation to monopolistic bottlenecks

The reform potentials on the level of network infrastructure and the remaining regulatory problems are focused on the basic question whether the providers of network services need access to a network infrastructure with characteristics of a monopolistic bottleneck (e.g. Knieps, 1997, p. 327; Knieps, 2006a, pp. 53-55). Remaining reform potentials therefore centre on the vertical perspective of non-discriminatory access to infrastructures complementary to the network service level. However, this does not imply the necessity of an end-to-end regulation including the competitive segments.

The conditions necessary for a monopolistic bottleneck facility are fulfilled

- (1) if a facility is essential in order to reach customers, i.e. if there is no second or third such facility, in other words if no *active* substitute is available. This is the case if, due to bundling advantages, there is a natural monopoly situation, meaning that one supplier can make the facility available more cost-efficiently than several suppliers;
- (2) and if at the same time the facility cannot be duplicated on reasonable economic terms, i.e. if there is no *potential* substitute available. This is the case if the facility's costs are irreversible and if, as a result, there is no functioning second hand market for these facilities.

The criterion for the localisation of the remaining sector-specific need for regulation within network infrastructures is always the question whether access to these facilities is an indispensable prerequisite for offering a complementary service at an upstream or downstream production level. It is therefore necessary to ensure non-discriminatory access to the bottleneck through tailor-made bottleneck regulation. In all other network areas, however, the situation is completely different because there is active and potential competition.

The bottleneck theory is not a theory developed specifically for a single network sector. Whereas there are no monopolistic bottlenecks on the level of network services and infrastructure management, monopolistic bottlenecks do exist on the infrastructure level. Examples are: airports, railway infrastructure, electricity transmission and distribution networks. Nevertheless, not every network infrastructure does possess the characteristics of a natural monopoly in combination with irreversible costs. For example, supra-regional high-pressure gas pipeline transmission in Germany is not a monopolistic bottleneck, due to the broad competition potential created by pipelines operated by project companies, through ownership in undivided shares and through access options to competing backbone pipelines (Knieps, 2002). Long-distance telecommunications networks are characterised by the existence of alternative network providers and the remaining bottleneck problem is limited to the local loop (e.g. Knieps, 1997, pp. 331 f.; Laffont, Tirole, 2000, p. 98).

5.3 Disaggregated application of sector-specific regulatory instruments

Regulating the parts of network infrastructures characterised as monopolistic bottlenecks remains an important task even after full market opening. Where network sectors have monopolistic bottleneck areas, they need specific regulation to discipline remaining market power. This requires, above all, symmetric access to the monopolistic bottleneck areas for all active and potential providers of network services to allow (active and potential) competition to fully develop. Moreover, price cap regulation should be applied, limited to the monopolistic

bottleneck areas. It is important to differentiate between unregulated pricing structure and regulated price level (e.g. Knieps, 2006b, pp. 17-20).

Price cap regulation in the monopolistic bottleneck areas and accounting separation are sufficiently capable of disciplining the remaining market power and ensuring non-discriminatory access. Detailed input regulation contradicts the spirit of a price cap regulation. One of the main reasons for limiting the scope of regulation to the level of output prices is to keep the information needs of the regulatory authority as low as possible. This will not only reduce regulatory work, but also create entrepreneurial incentives to seek out cost savings and innovative price structures. The decisive advantage of price cap regulation over the individual rate approval procedure is the fact that the former does not impede the entrepreneurial quest for innovative price structures.

Not only in competitive subparts of networks, but also in the monopolistic bottleneck areas pricing structures should be flexible and the result of endogenous market process. A salient feature of the markets for network capacities (even after the full opening of the market) is the fact that economies of scope and scale play a significant role in the provision of services. Competitive prices must therefore be allowed to freely find their level between stand-alone costs and short-term marginal costs, depending on demand. An abuse of market power cannot be said to exist in this case. Upper limits for access charges on the basis of uniform mark-ups on incremental costs are not consistent with the new competitive environment. Rather, the short-term marginal costs (variable costs) represent the short-term price floor without constituting predatory pricing. Long-term incremental costs, on the other hand, which also contain the relevant fixed costs, represent the long-term price floor.

Furthermore, market-oriented allocation of overhead costs is necessary. The coverage of product group-specific joint costs and company-specific common costs must be determined in accordance with the prevailing demand conditions (price elasticity of demand). The information required for this purpose is spontaneously generated in the market. Therefore, the resulting allocation of overhead costs may be determined only *ex post*. Administrative allocation proce-

dures established by the regulator *ex ante* are fundamentally incapable of anticipating the overhead cost allocation which should be an endogenous result of the market process. The information deficit of the regulatory authorities is too great, especially considering the substantial variation of the relevant demand elasticities over time (time of day, season, etc.). Both at European and national levels there is a requirement for discrimination-free access to monopolistic bottleneck services at non-discriminatory prices. These regulations, however, may not be allowed to restrict the diverse welfare-increasing potential of price differentiation in the markets for infrastructure capacities.

As already indicated (short-run) variable costs represent the short-term price floor and (long-run) incremental costs the long-term price floor: in addition, both the product group-specific joint costs and the company-specific common costs (overhead costs) must be covered (viability condition). Therefore a substantial price differentiation potential exists which should be exploited for the benefit of consumers, regardless of the underlying market form selected (Willig, 1978). In order to evaluate different price differentiation schemes in economic terms, the schemes must be compared in their entirety. It is inadmissible to infer general conclusions about the welfare effects of price differentiation from arbitrary comparisons of individual prices. In particular, a price differentiation required to ensure the survival of the network operator must not be confused with anti-competitive discrimination. In fact, it is the instrument of price differentiation that allows for undistorted infrastructure and service competition.

The welfare-increasing effects of price differentiation should not be impeded by asymmetrical regulatory intervention. The development of innovative rate structures must be an option open to all providers. One should not hamper the development of new rate structures by extending the requirement for rate approval by the regulatory authority to cover new rates as well. All market participants should have the opportunity of providing optional rates, multiple rates, non-linear price structures, etc.

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