

CROSS-SECTORAL

The influence of regulatory uncertainty on investments

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Understanding firm reactions to regulatory uncertainty is vital for the functioning of a market. Deficient investments, particularly in the power generation sector, could jeopardize the market in the long run.

The question of how uncertainty influences investment decisions has been explained by a number of researchers. In the specific case of regulatory uncertainty it is agreed that organizational strategies and decision processes are influenced. However, it is not agreed whether regulatory uncertainty triggers or hampers investments. Some historic examples have shown that regulatory uncertainty resulted in reducing, postponing or cancelling investments. In business theory, however, there are valid arguments that proactive investing under uncertainty can lead to a competitive advantage. As a remedy, the real-option perspective helps to identify the right conditions when proactive investments promise to be successful.

Impact of regulatory uncertainty

In the pre-liberalized power markets, vertically integrated power companies were fully able to recover their investments through the cost-plus regime. Under this regime, investment decisions were done under relative high certainty as investment risks were entirely transferred to the ratepayers. With the emergence of the competitive market, firms nowadays have to consider the business risk when deciding on an investment, which can alter the outcome. The liberalization of the EU electricity market introduced new challenges for firms. Power firms have to face uncertainties not only due to the unpredictability of market developments like fuel prices, but also due to regulatory uncertainty that can, for example, influence the market design, set new environmental constraints, approve or disapprove new technologies, or set standards for energy efficiency. All uncertainties faced by a firm significantly influence investment decisions. However, on the contrary to market uncertainty, regulations can change abruptly, from one day to the other, and can have a huge business impact on the firms. A single new policy can thus turn the profitability of an investment from positive to negative or even prevents any value generation of the investment (due to, for example, the blockage of a technology). In sum, regu-

latory uncertainty do affect investment projects and may delay or deter investment choices. The understanding of how firms react to regulatory uncertainty is particularly important for regulators, to be able to react promptly with adequate reforms if required. Reasons for regulatory intervention as a result of missing or wrong investments could be, for example, if generation adequacy or sustainability goals are at risk.

History shows investment impediments due to regulation

Some authors support the view that regulatory uncertainty results in reducing, postponing or cancelation of investments. One example is the analysis of the US synfuels program from the 1970s and 1980s, which was for a short period the cornerstone of the US national energy policy (Marcus and Kaufmann, 1986). The goal of this industrial policy was to incentivize businesses to invest in the development of synthetic fuels, but companies hesitated and reactions were uncertain and inconsistent. Because of several flaws in the policy implementation, uncertainty could not be removed and the level of investment was not successful.

Besides this individual case, another study empirically analyzed the impact of regulatory uncertainty on investment decisions through the level of antitrust enforcements (Bittlingmayer, 2001). In the large data set of over 21 major industry groups in the US, the author observed investment decisions over a four decades period from 1947-91. He came to the conclusion that lower investments were made in periods with higher regulatory uncertainty and businesses preferred a 'wait and see' strategy. The aforementioned historic examples of investment hesitance refer to situations where the regulation can be viewed as detrimental to the industry. In cases where the regulatory environment is contradicting or different policies are not well aligned, investments are discouraged by the simple principle of their bad design.

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Proactive investment strategies can lead to competitive advantage

Drawing on Porter's competitive advantage of nations (Porter, 1990), it can be argued that 'properly crafted environmental regulations' are able to trigger innovation and thus offset the cost for complying with regulation for private companies. By means of innovation firms strengthen their competitive advantage in relation to other firms. Innovative firms can even be more internationally competitive than firms with cheaper input factors or higher production numbers. Properly crafted regulations can ideally solve two issues at a time, triggering investments and helping firms becoming more competitive (Porter & van der Linde, 1995). For example, flexible regulation is likely to lead to a competitive advantage for firms because of the firms' discretion to choose between different efficient and productive technologies.

An argument that regulatory uncertainty triggers investments is based on the firms' aspiration to develop their resources, which should ideally be valuable, rare, imperfectly imitable and not substitutable in order to gain a sustained competitive advantage (for the 'resource-based view' see also: Barney, 1991). A proactive environmental strategy can thus help firms to keep their resources valuable and inimitable by means of innovation. Several authors argue that regulatory uncertainty initiate firms to develop, for example, a proactive environmental strategy, which helps reaching a good performance (Aragón-Correa & Sharma, 2003). Regulatory uncertainty thus increases the probability that a company invests proactively. Rugmann & Verbeke (1998) strengthen the argument that 'green investments' in an uncertain business environment can be successful. A firm can thus achieve a 'green success' if the investments promise a high leverage potential for the environmental performance and the investment offers a high flexibility. As organizations generally try to avoid irreversible investments if they do not have a clear understanding of the future's environment they conclude that firms prefer flexible investments with high potential on the performance.

Investments through the option lens

A fundamental change in thinking about investments under uncertainty came with the real option theory, a term principally coined by Myers (1977) (see also, Dixit & Pindyck, 1994). If one considers the 'cost of waiting', uncertainty can, under certain circumstances, act as a trigger for investments. The real option approach compares investments in real assets to financial options, but with the involvement of managerial decisions in a firm. It basically builds on the concepts of irreversibility and delay. Like in a financial option, the real option offers the right

to invest at a later stage without any obligation. The cost for this choice is the initial investment, which also limits a potential loss if the right to invest is not carried out. This choice to sequence an investment is particularly relevant for irreversible investments, which are sunk and cannot be recovered at a later date.

If a company is exposed to uncertainty, real options offer an approach to analyze the right timing of the investment and the associated value or cost to postpone an investment. According to the real option approach, the value of waiting becomes more valuable the more volatile the underlying asset. Combined with uncertainty triggered by regulation this means that the option to wait is more valuable the greater the regulatory uncertainty. As a consequence, a firm that realized an initial investment, for example in a multi-stage investment, has thus the possibility to benefit from the upside potential of the option, but the loss is limited to the initial investment made.

Strategic responses to regulatory uncertainty

Principally, firms evaluate investment decisions based on the financial profitability of the investment opportunity. This evaluation is based on the firm's calculations influenced by subjective perceptions and valuations of the organizational environment including uncertainty about regulation. One common approach of evaluating different available investment opportunities is a risk-return matrix that analyzes the investment in the context of the entire portfolio. The disadvantage of this approach is the negligence of the option to wait and to invest later, which is particularly important for regulatory decisions.

Therefore, a firm has thus to compare the flexibility of the investment with the degree of the regulatory uncertainty. Flexibility of resource commitment refers to the ability of the investment to be used in alternative purposes. The ideal case for a company would be the combination of low uncertainty and high flexibility. The option value to wait is very low and therefore, proactive investment strategies are most suitable to increase a firm's performance. The investment is done immediately without waiting until the uncertainty resolves. In the opposite case, if uncertainty and flexibility are high, the option value of waiting is highest and strategies of uncertainty avoidance promise highest return. Strategies that avoid uncertainty include postponements of investment decisions or withdrawal from the respective market.

For the two other combinations, when either low uncertainty is combined with low flexibility or both are high, the strategic response is less clear. Incremental investments could be one alternative to respond to these combinations, including staged or multi-phase investments where investments are done step by step according to the regula-

tory decision process until uncertainty has been resolved. Staged investments offer the advantage to position early in the market, for example, to secure market share or to benefit from early technology development. Alternatively, the company may adapt its own organization to enhance its flexibility, cooperating with competitors or restructure its business.

Conclusion

In summary, investments are generally favored without delay if investments offer high flexibility and regulatory uncertainty is low. In this case, the full investment amount is devoted in order to reach the optimal return. On the contrary, if resource commitments are inflexible and high regulatory uncertainty is perceived by the firm, strategies of uncertainty avoidance, in other words, postponing or deferring the entire investments, promise highest returns. Finally, in alternative situations, the company will rather follow option based or multi-phase investments to maximize the expected return. In these cases, a firm may try to invest in technologies that even offer a large upside potential in return, but at fixed cost. Investments in new technologies bring along the two advantages, large upside for the generation portfolio and pre-determined cost.

It can be therefore concluded that uncertainty per se does not automatically trigger or hamper investments. It

rather depends on the firm's specific internal and external circumstances. The influence of uncertainty on investment decisions strongly depends on the uncertain variable as perceived by the managers as well as the flexibility of the investment. ★

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