PRACE NAUKOWE UNIWERSYTETU EKONOMICZNEGO WE WROCŁAWIU RESEARCH PAPERS OF WROCLAW UNIVERSITY OF ECONOMICS AND BUSINESS

2020, vol. 64, nr 10

ISSN 1899-3192 e-ISSN 2392-0041

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REGULATORY DECISIONS IN THE CONTEXT OF RISK AND UNCERTAINTY

DOI: 10.15611/pn.2020.10.08 JEL Classification: D04, D91, H83

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Quote as: Szkudlarek, P. (2020). Regulatory decisions in the context of risk and uncertainty. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 64(10).

Abstract: The purpose of the article is to identify the propensity of decision-makers of the regulatory authority on the telecommunications market in Poland (Office of Electronic Communications, OEC) in making decisions under risk and uncertainty conditions and comparing them with a group of non-experts. The research outcomes reveal that decision-makers of the regulatory authority make in most cases decisions that are consistent with the prospect theory. In addition, OEC decision-makers in circumstances of uncertainty, retain the status quo and maintain a lower risk tendency in a decision-making situation with the same expected value but different variance. It was pointed out, at the same time, that their decisions did not differ from those taken by the group of non-experts. The findings presented in the article contribute to the discussion on the propensity of public decision-makers to make decisions under conditions of risk and uncertainty.

Keywords: risk, uncertainty, propensity, regulation.

1. Introduction

One of the examples of the institutional influence of the state on management processes is public regulation of the market. By creating an institutional – regulatory environment, through specific tools correcting or replacing the operation of market economy mechanisms, public authorities aim to fulfil the socio-economic functions of the state by considering them to be in accordance with the public interest (Grabowski, 2001, p. 219).

The issue of regulation is related to the necessity of making decisions. The article focuses on the issue of regulatory decisions under conditions of risk and uncertainty on the part of public decision-makers based on the example of Office of Electronic Communications (OEC). Decision-making under risk and uncertainty is one of the key areas of behavioural economics research that has not been analysed among decision-makers of public regulatory authorities. The necessity to continue research in this group, results primarily from the high dynamics of technical and technological changes taking place on the telecommunications services market. This conditions the necessity to make decisions under conditions of risk and uncertainty in order to achieve specific regulatory goals. Secondly, the preferences of choosing a regulator in the context of risk and uncertainty are shaped by the market expectations towards regulatory policy. This is an important element determining the development of operators' business strategies and the agent-principal relationship, allowing for the occurrence of information asymmetry, i.e. making decisions in conditions of risk and uncertainty. Therefore, learning about and considering the propensity of regulatory body decision-makers in terms of risk and uncertainty may contribute to a more comprehensive approach to regulatory issues as part of behavioural public choice. This allows for the greater predictability of decisions by regulatory bodies and the continuous improvement of regulatory policy (Lucas and Tasić, 2015; Smith, 2017).

Two goals were set in the context of research on regulatory decision-making in conditions of risk and uncertainty. The first is empirical testing among decision--makers the OEC (OEC group) of the prospect theory (Kahneman and Tversky, 1979) and the status quo effect strongly associated with it in conditions of uncertainty, and the framing effect in a decision-making situation of the same expected value, but with different variances. The second one is to compare the research results with people not associated with public market regulation (the non-experts group) in order to identify a behavioural gap. Combining both research objectives, it was hypothesized that public decision-makers have a low propensity to risk and their choices are no different than those made by non-experts. In pursuing the research goals and verifying the research hypothesis, the method of economic experiment containing scenarios of decision--making situations was used, which provided empirical evidence on the choices of two research groups. The obtained outcomes of the research were subjected to statistical analysis, including using the chi-square independence test. The analysis of the research was preceded by a theoretical part, which presents brief considerations on regulation and behavioural determinants of the decision-making process. It should be noted that the conclusions drawn relate to the surveyed population groups.

2. Literature review

Public market regulation, as an example of a formal institution, is a set of specific standards concerning what enterprises, consumers and other entities can or cannot do, and what their behaviour desired by the regulator (Dudley and Brito, 2012,

pp. 1-10). The discussion highlights the division of issues related to regulations into those related to public and to private interests (Hantke-Domas, 2003; Hertog, 2010). The authors try to explain who and what influences the regulatory policy and indicate the benefits and costs of its pursuing (Levy and Spiller, 1996). Attention is drawn particularly to the compliance of regulations with the public interest (Peltzman, 1989; Shleifer, 2005), the ability to preserve the independence of regulators and the ability to intercept them by interest groups (Posner, 1974; Shleifer, 2005; Stigler, 1971), the 'rent-seeking' effect occurrence (Congleton, Arve, and Kai, 2008; Tullock, 1980), redistribution of regulation (Becker, 1983), bearing of transaction costs (Coase, 1937; Spiller, 2011; Williamson, 2010;), enforcement of and compliance with regulation (Short, 2019), institutional design (Farhang and Yaver, 2016; Levi-Faur, 2011) and the regulatory impact assessments in selected economy sectors (Szkudlarek, 2011). The article focuses on behavioural considerations of regulation, i.e. decision-making by public decision-makers - the regulatory body, i.e. the conscious and non-random choice of one of many possible alternatives, consisting of a specific action that changes or leaves a given reality (Bolesta-Kukułka, 2000, pp. 110-113). According to the neoclassical economics approach, the individual - homo oeconomicus makes decisions that are consistent with the axioms of rationality. However, this approach is criticized, among others by behavioural economics. This indicates that people succumb to heuristics and cognitive-biases resulting from cognitive dualism (Grayot, 2019). This applies also to public decision-makers who succumb to the effect of excessive self-confidence (Szkudlarek, 2018; Tasić, 2009), the cropping effect, anchor heuristics and the status quo effect (Battaglio, Belardinelli, Bellé, and Cantarelli, 2019). They also demonstrate limited rationality in perceiving risks and losses and in ensuring the consistency of their decisions in various spheres of public policy structuring (Bellé, Cantarelli and Belardinelli, 2018).

One of the key achievements of behavioural economics in the context of making decisions under uncertainty and risk is the prospect theory (Adriaenssen and Johannessen, 2016; Kahneman and Tversky, 1979; Pasquariello, 2014). By dividing the decision-making stage into the phases of editing and evaluation, the first one indicates that by making a preliminary analysis of the decision-making situation, people tend to simplify it by using heuristics and orderliness regarding the reference point. The degree of perceiving change depends on how much the given condition is different from the reference point. In the benefit-evaluation phase, people exhibit risk aversion, which is related to the occurrence of the effect of certainty, at the same time overestimating the results considered as relative to the less likely ones. On the other hand, people tend to behave in a more risky way in a situation of potential losses, which follows from the effect of avoiding losses. There is therefore a symmetrical change in risk preferences (the reflection effect). In addition, in the evaluation phase, people often disregard the elements that connect alternatives and focus on the factors that differentiate them (the isolation effect). The operation of these effects and the adopted reference point defining the change in wealth causes

arising up of the *S-shaped* value function that substitutes the utility function. The curve is convex for losses and concave for profits and steeper for losses than for profits. In the prospect theory attention is also drawn to overestimating low probabilities and underestimating medium and high probabilities (Hamid, Rangel, Taib, and Thurasamy, 2013). Hence, people often make risky decisions when the possibility of making a profit is small and they are reluctant to make risky decisions when loss is unlikely (Kahneman and Tversky, 2012, pp. 590-591).

In the context of making decisions under conditions of risk and uncertainty, the article also discusses the issues of the status quo effect (Ortoleva, 2010; Samuelson and Zeckhauser, 1988) resulting from the effect of aversion to ambiguity. This is an expression of reluctance and fear of undertaking new challenges and preferring the current state of affairs, which is assessed as better than the available alternatives. Until the decision-maker receives a strong impulse to act, they prefer what there is without making any changes. The strength of the status quo effect increases in line with increase of the number of selection options (Kempf and Ruenzi, 2006). The status quo effect is included in the model of aversion to losses by Tversky and Kahneman (1991), or the selection model in the framing conditions proposed by Salant and Rubinstein (2008). In the context of the framing effect, the study used a risk-tendency test technique with two probabilistic alternatives of the same expected value but with different variances (Tyszka, 2010, p. 207; Wärneryd, 1996). Both the status quo effect and the framing effect are cognitive prejudices derived from the theory of perspective studied in the context of public policy (Bellé and Cantarelli, 2018).

The arrangements for making decisions in terms of risk and uncertainty indicate that this is an extremely complex issue. This also applies to decisions made by the market regulator, therefore conducting research in this area seems interesting and fully justified.

3. Methodology

The direct study was carried out in two groups. The first group was the management of OEC, i.e. the regulatory body for the telecommunication services market in Poland. The research group consisted of 30 people, but ultimately the study results were obtained from 29 respondents (96.7%). In this group men constituted 82.8% of respondents and women 17.2%. In most cases they were people over 40 (52.6%) with professional experience in telecommunication of over ten years (69.0%). The second research group (the non-experts group) were students of Finance and Accounting and Management of the Faculty of Economic Sciences and Management at the University of Szczecin; 136 people responded to the invitation to participate in the study, but 30 people were drawn to keep the strength comparable with the OEC group, 30.0% of them were male and 70.0% female. The average age of the research group was around 22.

In line with the research objective, a set of proprietary experiments was prepared covering scenarios of hypothetical decision-making situations in conditions of risk and uncertainty. Changes in the conditions for making decisions related to risk and uncertainty were introduced in the following presented scenarios. This gave the opportunity to identify the tendencies in accordance with the changing conditions of the decision-making process. Such hypothetical behaviour does not necessarily concur with actual behaviour in situations of risk and uncertainty, but it can prove decision-makers' cognitive tendencies and choice preferences (Tyszka, 2004).

Experiment no. 1

Research goals:

- a) identification of the certainty effect,
- b) identification of an aversion to uncertainty and of the reflection effect,
- c) identification of risk preferences under gain and loss conditions.

Please imagine a situation where you can make one out of two regulatory decisions in two different, independent situations concerning empowerment of the consumer on telecommunications market. They bring different expected profits and losses for the market. Which option would you choose? (please indicate "x")

situation 1:

| a) decision 1: certain (100%) benefits for consumers amounting to PLN 10 M | |
|---|--|
| b) decision 2: possibility of bringing benefits for consumers amounting to PLN 20 M with the probability of 50% or no effects for consumers | |
| 1 5 1 | |

situation 2:

| a) decision 1: certain (100%) losses for consumers amounting to PLN 10 M) | |
|--|--|
| b) decision 2: possibility of incurring loss of PLN 20 M) for consumers with the probability | |
| of 50% or no effects for consumers | |

Experiment no. 2

Research goals: identification of a tendency to risk in a decision-making situation of different variance. It has been assumed that choosing the first regulatory decision represents a lower, and choosing the other regulatory decision represents higher tendency to risk.

Please imagine situations where you have a dilemma concerning regulatory decision on boosting competition on the telecommunication market. Which option would you choose? (please indicate "x")

- a) decision 1: possibility of bringing benefits for the telecommunications market amounting to PLN 10 million, 50% probability) or the possibility of incurring a loss amounting to PLN 10 million, 50% probability)
- b) decision 2: possibility of bringing benefits for the telecommunications market amounting to PLN 50 million, 50% probability) or the possibility of incurring a loss amounting to PLN 50 million, 50% probability).

Experiment no. 3

Research goal: identification of the status quo effect (no regulatory decision) arising out of the ambiguity aversion. It has been assumed that no decision and preserving the status quo is a sign of an aversion to risk, and choosing the other decision is a sign of the decision-maker's tendency to make risky decisions.

Please imagine that you have a dilemma concerning a regulatory decision on boosting competition in one of the relevant markets. Which option would you choose? (please indicate "x")

| a) no regulatory decision and no consequences for the telecommunications market | |
|---|--|
| b) taking the regulatory decision that may bring benefits for the market amounting to PLN 2 mln) or may incur a loss amounting to PLN 2 mln). Unfortunately the probability of achieving benefits or incurring a loss is unknown. | |

Using the statistical material collected in the null hypothesis that the share of cognitive tendencies and choice preferences among OEC decision-makers are the same employing the Chi-Square test were verified (on a dichotomous scale No - 0 and Yes -1, the experimental research results were recorded). The behavioural gap was defined as the difference in the share of individual effects between the research groups.

4. Research results

According to the research procedure in the first experiment, the scenarios of two decision-making situations in the context of benefits and losses were presented to the research groups. The survey results are presented in Table 1.

In the first situation, the vast majority of OEC decision-makers (82.8%) chose a regulatory decision which could bring some benefit to consumers (non-experts: 56.7%). This is related to the certainty effect and thus they exhibited a strong aversion to risk or the possibility of securing higher gains for the consumers, but with a 50% probability of securing them. On the other hand, the OEC decision-makers exhibited a higher tendency for risk in the second decision-making situation in most cases (82.8%), which is related to the loss avoidance effect (non-experts 76.7%). The juxtaposition of the two decision-making situations also made it possible to

| Effects OEC | OEC | Non- | Behavioural |
|---|-------|----------|-------------|
| | | -experts | gap |
| An aversion to risk in the context of gains (the certainty effect) | 0.828 | 0.567 | 0.261 |
| A propensity to risk in the context of losses (the loss avoidance effect) | 0.828 | 0.767 | 0.061 |
| A change in choice preferences (the reflection effect) | 0.724 | 0.467 | 0.257 |

Table 1. Regulatory decisions in the context of benefits and losses - prospect theory

Source: author's own work.

identify the reflection effect. In the case of OEC decision-makers, a change in the risk preferences, depending on the context of the decision-making situation, occurred in 21 respondents (72.4%), and in 14 (46.7%) for the non-experts group. Definitely the largest value of the behavioural gap was found in the case of the certainty effect and the reflection effect, the smallest in the case of the loss avoidance effect.

In the following experiment the OEC and non-experts group representatives had the task of making a choice between two probabilistic alternatives with the same expected value, but with different variance. The survey results are presented in Table 2.

Table 2. Regulatory decisions in a decision-making situation with probabilistic alternatives of the same expected value but with different variations

| Effects | OEC | Non-experts | Behavioural gap |
|--|-------|-------------|--------------------|
| Lower propensity to risk (decision 1) | 0.724 | 0.667 | 0.057 |
| Higher propensity to risk (decision 2) | 0.276 | 0.333 | -0.057 |

Source: author's own work.

The vast majority of OEC decision-makers (72.4%) made a regulatory decision in which the gains or losses for the consumers are of a lower value (non-experts group: 66.7%). This choice represents a lower tendency to take a risk emphasizing the fact that not only is the probability of the occurrence of a specific development (the same development in both cases) important to them but also the value of the potential gains or losses. The behavioural gap between research groups was only 5.7 percentage points.

In the last experiment, the status quo effect was identified (Table 3).

In this case, the survey results prevent the drawing of any unequivocal conclusions. Only a slim majority of those OEC decision-makers (51.7%) who made a regulatory decision under conditions of uncertainty (non-experts group: 53.3%) can be observed. Without fear of the consequences of this decision they, therefore, exhibited a tendency to make more risky decisions. A slightly smaller share of OEC decision-makers (48.3%) who did not make any decisions, preserving the *status quo*

being a result of the ambiguity avoidance effect (non-experts: 46.7%), was observed. The behavioural gap between the research groups was only 1.6 percentage point.

Table 3. Decisions in the conditions of uncertainty – the status quo effect

| Effects | OEC | Non-experts | Behavioural gap |
|---------------------------------------|-------|-------------|-----------------|
| No decision – the status quo effect | 0.483 | 0.467 | 0.016 |
| Decision under uncertainty conditions | 0.517 | 0.533 | -0.016 |

Source: author's own work.

In the final part of the analysis the null hypotheses verification was carried out, showing that the share of cognitive tendencies and choice preferences among the OEC and non-experts group are the same. The following null hypotheses were verified with a significance level of $\alpha = 0.05$:

- H_0 : the variables are independent,
- H₁: the variables are dependent. The results of the chi-square test of independence are presented in Table 4.

Table 4. Results of the chi-square test of independence

| | Itemisation | <i>p</i> -value |
|------------------|---|-----------------|
| E | | |
| • | an aversion to risk in the context of gains – the certainty effect | 0.0296 |
| • | a tendency for risk in the context of losses - the loss avoidance effect | 0.7856 |
| • | a change in choice preferences – the reflection effect | 0.0442 |
| E | xperiment no. 2 | |
| • | a higher propensity to risk (decision under the conditions of bigger gains or losses) | 0.6317 |
| Experiment no. 4 | | |
| • | the status quo effect | 0.9015 |

Source: author's own elaboration.

The results of the test are not unambiguous. The test results in two cases allowed for rejecting the null hypotheses, while in three cases there were no grounds for rejecting the null hypotheses.

5. Conclusion

Making binding decisions is the most important element of public market regulation. Despite the formalized administrative procedures optimizing the processes of searching, making a choice and implementing solutions that are the basis for making decisions, they all contain certain elements which are unknown. Hence, decisions are not only accompanied by the certainty of making thereof, but also by risk and uncertainty.

The research results indicate that OEC decision-makers under profit conditions very often show risk aversion due to the certainty effect, while in the context of losses they often demonstrate a risk tendency due to the loss-avoidance effect. They do not maintain the stability of choices by making choices dependent on the context (reflection effect), which is contrary to one of the axioms of rationality. In addition to the research results, they indicate that in the same probability situation, decision-makers make a choice between the smaller value of potential benefits or losses, thus revealing a lower risk tendency. In addition, OEC decision-makers make ambiguous choices when able to make decisions in conditions of uncertainty or maintaining the status quo. It can also be partly assumed that the choices made by OEC decision-makers proved to be convergent with those in the non-experts group.

Undoubtedly, aversion to risk and ambiguity or maintaining the status quo provides the regulator a sense of security and can be assessed as rational. It can also provide certain limitation of the use of market opportunities and searching for new regulatory solutions. This is particularly important in such a dynamically developing market as telecommunications services. The key issue here is determining the risk margin and operation in conditions of uncertainty that the regulatory body is ready to tolerate under the determinants of formal institutions. Risk management should take place as part of the cooperation of all interested parties under the regulatory system (OEC and operators).

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DECYZJE REGULACYJNE W KONTEKŚCIE RYZYKA I NIEPEWNOŚCI

Streszczenie: Celem artykułu jest identyfikacja skłonności decydentów organu regulacyjnego rynku usług telekomunikacyjnych w Polsce (Office of Electronic Communications, OEC) w podejmowaniu decyzji w warunkach ryzyka i niepewności oraz ich porównanie z grupą nieekspertów. Wyniki badań wskazują, że decydenci organu regulacyjnego w większości przypadków podejmują decyzje, które są zgodne z teorią perspektywy. Ponadto decydenci OEC w warunkach niepewności zachowują *status quo* i przejawiają mniejszą skłonność do ryzyka w sytuacji decyzjenej o tej samej oczekiwanej wartości, ale różnej wariancji. Jednocześnie wskazano, że ich decyzje nie odbiegają od tych podejmowanych przez grupę nieekspertów. Ustalenia zawarte w artykule stanowią wkład w dyskusję na temat skłonności decydentów publicznych w podejmowaniu decyzji w warunkach ryzyka i niepewności.

Słowa kluczowe: ryzyko, niepewność, skłonności, regulacja.