
Implications of behavioural economics for public regulation: An experimental study among officials of regulatory bodies in Poland

Piotr Szkudlarek

University of Szczecin, Poland

e-mail: piotr.szkudlarek@usz.edu.pl

ORCID: [0000-0003-0263-7980](https://orcid.org/0000-0003-0263-7980)

©2025 Piotr Szkudlarek

This work is licensed under the Creative Commons Attribution-ShareAlike 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-sa/4.0/>

Quote as: Szkudlarek, P. (2025). Implications of behavioural economics for public regulation: An experimental study among officials of regulatory bodies in Poland. *Argumenta Oeconomica*, 1(54). 43-55.

DOI: [10.15611/aoe.2025.1.03](https://doi.org/10.15611/aoe.2025.1.03)

JEL: D04, D91, H83

Abstract

Aim: Identification and determination of the importance of behavioural factors in public regulation. The study also delved into whether officials working in public regulatory bodies exhibit behavioural patterns similar to those of non-officials when making regulatory decisions.

Methodology: The author used the results from experimental studies conducted among officials from regulatory bodies in Poland, specifically the Office of Electronic Communications (OEC, n = 107) and the Energy Regulatory Office (ERO, n = 157). A control group comprised non-officials (Non-officials, n = 102). The research was conducted during the transition between 2022 and 2023.

Results: The findings revealed that officials in public regulatory bodies (regulators) overseeing network sectors in Poland are not free from behavioural influences. These include the *certainty effect* – leading to risk aversion (positive prospect), *loss avoidance effect* – causing risk-seeking behaviour (negative prospect) and the *reflection effect* in line with *prospect theory*. Additionally, they demonstrated the *risk aversion effect* stemming from the tendency to overestimate losses and underestimate gains, *uncertainty effect*, *status quo effect*, *anchoring heuristic* – the *effect of asymmetric domination* and the *better-than-average effect*, *calibration effect* and *overconfidence effect*, however, the prevalence of these effects varied. Furthermore, statistically significant differences in the occurrence of these behavioural effects were observed between officials of various regulatory bodies and the Non-experts group (78.6% of cases), which were more pronounced than the differences between the regulatory bodies themselves (21.4% of cases).

Implications and recommendations: The research results underline the necessity of augmenting the conventional approach to regulation with an understanding of the behavioural factors that influence

regulatory decision-making. Further research and the replication of the article's findings are necessary, primarily due to the limitations of the research results. The experiments provided an opportunity to test the behavioural effects but they did not explore their relationship with the personality traits of the subjects. This aspect will be the focus of analysis in the forthcoming article. Additionally, future experiments may uncover other behavioural effects.

Originality/value: The conclusions presented in this article contribute a unique perspective to the discourse on public regulation, drawing from empirical research results. This presents findings from a study involving officials from two distinct regulatory bodies. The novelty of research into the behavioural determinants of decisions made by officials in regulatory bodies expands the realm of regulatory research. This could potentially open new avenues for resolving regulatory dilemmas.

Keywords: regulation, behavioural economics, heuristics, cognitive biases, prospect theory

1. Introduction

The issue of state involvement in the economy through regulation has been extensively discussed in the literature (Sherman, 2001; Hantke-Domas, 2003; Hertog, 2010). This discussion primarily centred on two key aspects: first, the alignment of regulation with the public interest, often referred to as the "public interest theory," and second, the influence of interest groups, including government entities, regulators (regulatory bodies, regulatory authorities), regulated companies, and consumers, in shaping regulations, often termed the "private interest theory" (Peltzman, 1989; Rajabiun, & Middleton, 2015; Benoît, 2019; Mizutani, & Nakamura, 2019). Finding the optimal balance between the market (the internal regulator) and the authority of regulatory bodies (the external regulator) is crucial (Scheerlinck et al., 2017). These issues highlight considerations about the foundation of regulation, its legitimacy, and the parties it serves. A significant number of studies in the field of regulation pertain to evaluating the effectiveness and efficiency of regulatory tools (Coletti, & Radaelli, 2013) especially within the context of evolving market dynamics (Maziarz, 2015; Genakos et al., 2018; Weisman, 2019), pricing and quality (Debbichia, & Slama, 2022), fostering investments (Grajek, & Roller, 2012; Li, & Lyons, 2012; Shortall et al., 2015; Cave et al., 2019), unifying legal regulations, such as those within the EU market (Cave et al., 2019) and examining sector-specific differences, such as telecommunications vs. energy (Nagaj, & Szkudlarek, 2012a; Nagaj, & Szkudlarek, 2012b). Research into the impact of regulations on socio-economic development also holds significance (Nardotto et al., 2015; Szkudlarek, 2016; Dziadkiewicz, & Cichowski, 2020). Regulatory studies also encompass the assessment of specific transaction costs (Spiller, 2013; Almlöf, & Bjuggren, 2019; Marjosola, 2021). In addition, research in the field of regulation extends to concerns involving the public regulatory bodies themselves. These concerns encompass their independence (Maggetti, & Papadopoulos, 2018), the preservation of their reputation (Busuioc, & Lodge, 2017), the quality of their work (Hanretty, & Koop, 2018) as well as interactions between national or international regulatory bodies (Mathieu, 2016; Iborra et al., 2017; González, & Verhoest, 2020; Saz-Carranza et al., 2020). This article focuses on the behavioural aspects of regulation. Regulation necessitates the formation of convictions, the rendering of judgments, and most importantly, the making of decisions. These decisions, in addition to being influenced by key legal considerations, are also shaped by the behavioural tendencies of officials within regulatory bodies. It has been observed that a research gap exists in this area, which leads the author to pose two fundamental research questions: are officials within regulatory bodies, operating within specific economic conditions, exempt from behavioural influences? Secondly, do differences exist in decision-making between professionals involved in regulation and those who are not affiliated with regulatory bodies (non-officials of regulatory bodies) that could be defined as a 'behavioural gap'? Given the research questions, the primary objective of the article was to identify and assess the significance of behavioural factors in public regulation. At the same time, it was hypothesised that decisions made by officials of regulatory bodies and individuals not associated with regulatory bodies are influenced by

behavioural factors. This article aims to identify and assess the significance of behavioural factors in public regulation, and also hypothesises that decisions made by officials of regulatory bodies and individuals not associated with regulatory bodies are influenced by behavioural factors.

The article is divided into the following sections. The introduction presents the primary assumptions of the article, followed by the theoretical part which addresses the debate on regulation in both traditional and behavioural contexts. The next section discusses the research methodology, followed by the presentation of the empirical research results. The final section provides conclusions and recommendations, and the literature references.

The research results presented in the article supplement the existing literature on public regulation in several aspects. First and foremost, they make a valuable contribution to the ongoing discussion about regulating matters concerning the behavioural aspects of decision-making, providing compelling arguments for the necessity of incorporating these aspects into regulation. It should be noted that the article focuses on the decision-making process and not on its consequences. This complements the regulatory impact assessment discussed in the existing literature, emphasising the perspective of the public interest and interest groups. Furthermore, the article highlights the occurrence of behavioural effects in a specific context of decision-making by individuals closely involved in regulation and actively engaged in decision-making within actual organizations. Additionally, the study provided an opportunity to identify a broad spectrum of behavioural effects, not commonly found in the existing literature, and compared the prevalence of these behavioural effects between groups of regulatory authority officials and those who are not professionally associated with regulation. Finally, the article adds value to regulatory practice by offering recommendations derived from the results of the study.

2. Public regulation – traditional and behavioural approaches

In the 1980s, a transformation in the state's influence on the economy commenced in Western European countries. This transformation involved the shift of state-owned assets to the private sector while preserving the option for public regulation. It was recognised that the market mechanism does not address all economic efficiency issues. Spulber (1989, p. 24) defined regulation as "specific rules or actions taken by government bodies that directly or indirectly influence the resource allocation mechanism by impacting consumer and business decisions". The state employs regulation to intervene in the market mechanism, coordinate the behaviour of business entities, and allocate resources (Szydło, 2005). Regulatory actions are carried out through independent regulatory bodies equipped with the statutory and legal tools to intervene in the economic activities of private entities (Koop, & Lodge, 2017; Benoît, 2019). This introduces the central dilemma of regulation, which is evident both in regulatory theory and empirical research (Szkudlarek, 2022), namely determining the effects of regulation in the context of implementing the public interest and the interests of specific groups (Christensen, 2011; Hantke-Domas, 2003). In the first case, it is suggested that the government aims to correct market errors resulting from factors such as its structure that limit its effectiveness. It is also assumed that the government can correct market errors with zero transaction costs. Therefore, the government becomes a benevolent maximiser of social welfare (Laffont, & Tirole, 1991; Viscusi et al., 2005). In the second case, it is indicated that regulation becomes a tool to pursue the interests of both the entities subject to regulation and the regulatory bodies themselves (Posner, 1971; Stigler, 1971; Posner, 1974). Private interest groups generate a constant demand for regulation, specifically in terms of the rules related to market entry and price setting, for instance. At the same time, the acquisition of these regulations equips them to offer numerous advantages to decision-makers, such as securing their support through means like creating jobs in the regulated organizations or receiving financial backing for political campaigns (Veljanovski, 2010; Carrigan, & Coglianese, 2015). This institutional connection between regulators and the entities they oversee was emphasised by Laffont and Tirole (1991) when they introduced an agency theory approach to public regulation, highlighting the

regulatory authority's capacity to compel private entities to adhere to the regulator's decisions while aligning with the regulation's stated objectives (Benoît, 2019). It is essential to note the significant challenge posed by information asymmetry between regulators and the regulated entities (Stiglitz, 2000; Fremeth, & Holburn, 2010).

The article indicates the behavioural aspect of regulation, as seen from the perspective of officials working in regulatory bodies. This response is driven by the increasing significance of behavioural economics in explaining economic processes (Szkudlarek, 2017). It is essential to focus on the psychological factors that influence the formation of beliefs and preferences and take into consideration emotional states during the decision-making process (Szyszka, 2009). The development of beliefs that lead to decision-making is heavily influenced by the perception of reality. Hence, gaining a comprehensive understanding of regulatory practices necessitates in-depth empirical research into the cognitive processes of officials in regulatory bodies (Grimmelhijzen et al., 2017). This holds particular importance in the context of decision-making under conditions of uncertainty, risk, information asymmetry, and the necessity to analyse the costs and benefits of regulation. Focusing on the decision-making process within regulation provides an opportunity to reveal its intricacies and uncover new avenues for research that go beyond the conventional impacts of regulation (Viscusi, & Gayer, 2015; Scheerlinck et al., 2017; Embrey, 2020; González, & Verhoest, 2020). Research to date has primarily focused on the behavioural effects of regulatory officials to a relatively limited extent. Previous studies predominantly addressed the research conducted among general government officials, public sector employees, and politicians, which also explored the potential application of behavioural economics by these officials, as evidenced by studies such as those conducted by Bellé et al. (2018), Sheffer et al. (2018), Battaglio et al. (2019), and Roberts & Wernstedt (2019), as well as Cantarelli et al. (2020). Moreover, Tasic (2009, 2011) drew attention to the fact that regulators tend to show overconfidence and a belief that they possess comprehensive knowledge of the causes and consequences of their regulatory decisions. Similarly, Viscusi and Gayer (2015) demonstrated that regulators do not consistently demonstrate rational decision-making under conditions involving risk. Furthermore, Dudley and Xie (2022) shed light on how the institutional framework or "choice architecture" within which regulatory officials operate can intersect with their cognitive biases. Cooper and Kovacic (2012) also highlighted the potential influence of heuristics and cognitive biases in the process of making regulatory decisions, whilst Schillemans (2022) emphasised the susceptibility of individuals involved in regulation to cognitive biases, which can impact the quality of their judgments. However, it is worth noting that these biases can be mitigated to some extent by the skills, knowledge, and information that individuals possess, hence it is both appropriate and justified to continue research on the behavioural aspects of decision-making among officials working within regulatory authorities.

The results of the research presented in the article extend the findings from previous studies conducted by the author among decision-makers at the OEC (Office of Electronic Communications) as mentioned in the author's studies (Szkudlarek, 2020, and 2021). This time, the research focuses on two regulatory bodies within the network sector, which has been under public regulation in Poland since the 1990s.

3. Methodology

The experimental study was conducted among officials of the regulatory authority of the telecommunications services market in Poland (OEC, n=107) and officials of the regulatory authority of the energy market in Poland (ERO, n=157). Additionally, a study was conducted among individuals not professionally associated with regulation (Non-officials, control group, n=102). In line with the research objective, experiments involving specific scenarios simulating hypothetical decision-making situations were prepared, aimed at identifying specific behavioural effects. According to Kahneman and Tversky, "the use of the method relies on the assumption that people often know how they would

behave in actual situations of choice, and on the further assumption that the subjects have no special reason to disguise their true preferences" (Kahneman, Tversky, 1979, p. 265). The selection of these behavioural effects was influenced by the regulatory conditions, primarily stemming from decision-making in circumstances involving risk, uncertainty, information asymmetry, and the authoritative role of the regulatory authority over entities they govern (referred to as agent-principal).

Statistical analysis was employed to test the null hypothesis, confirming that decisions made by officials from regulatory authorities and non-officials are convergent. The frequency of behavioural effects within individual research groups was found to be consistent. The empirical data are presented on a dichotomous scale: 0 – no effect, 1 – effect. Five levels of behavioural effects were established:

- a) <20.0%, never occurring or very rare effect,
- b) <20.0–40.0%), rare effect,
- c) <40.0–70.0%), moderately frequent effect,
- d) <70.0–90.0%), very frequent effect,
- e) ≥90.0%, almost constant or constant effect.

The *behavioural gap* was defined as the difference in the distribution of individual effects between the research groups. As a result, it became crucial to identify this gap between the groups of regulators and non-officials. Statistical analyses of empirical data were performed using the Statistica software package, employing descriptive statistics, the Kruskal-Wallis test. The following null hypothesis was tested at a significance level of $\alpha = 0.05$:

- H0: research groups come from the same population,
- H1: research groups are not from the same population.

4. Results

The first four experiments presented hypothetical decision situations involving uncertainty and risk. The regulator, as an integral part of the economic system, makes decisions in conditions of uncertainty and risk, stemming from information asymmetry, for instance. Therefore, it becomes imperative to understand how the preferences of officials evolve when faced with diverse decision-making circumstances. Consequently, variations in the conditions of decision-making were introduced in distinct situations for this purpose.

The aim of **Experiment 1** was to identify risk preferences under conditions involving both benefits (positive prospects) and losses (negative prospects) and to examine the rebound effect as per the *prospect theory proposed* (Kahneman, & Tversky, 1979). The results are presented in Table 1.

Table 1. Regulatory decisions in the context involving benefits (positive prospect) and losses (negative prospect) – *prospect theory*

Effects	OEC	ERO	Non-officials	Behavioural gap: OEC and ERO	Behavioural gap: OEC and Non-officials	Behavioural gap: ERO and Non-officials
<i>Certainty effect</i> – an aversion to risk in the context of benefits (positive prospect)	0.785	0.847	0.696	-0.062	0.089	0.151
<i>Loss avoidance effect</i> – risk seeking (negative prospect)	0.748	0.752	0.794	-0.004	-0.046	-0.042
<i>Reflection effect</i>	0.579	0.637	0.549	-0.058	0.030	0.088

Source: author's own work.

In the first decision scenario (the context of benefits, positive prospect), the majority of OEC officials (78.5%) opted for a decision that could offer some benefits to consumers (a very frequent *certainty effect*). The officials rarely made a decision that would yield double the benefits to consumers ($p = 0.5$) or no benefit to consumers ($p=0.5$). This pattern was also quite prevalent among officials in the ERO (84.7%). Their inclination to avoid risk was more pronounced when compared to officials in the OEC group (OEC-ERO behavioural gap was -6.2 p.p.). The *certainty effect* was moderately frequent among Non-officials (69.6%), whose risk-seeking behaviour in terms of benefits was the highest. The behavioural gap with OEC was 8.9%, and with ERO as much as 15.1%. In the second decision-making scenario (the context of losses, negative prospect), a very frequent *loss of avoidance effect* – the risk-seeking behaviour among OEC officials was found. In most cases (74.8%), when faced with a choice of making a certain loss ($p = 1.0$) or risking a double loss ($p = 0.5$) vs. complete avoidance of losses ($p = 0.5$), the subjects chose the latter. The ERO officials also very often succumbed to the *loss avoidance effect* (very frequent effect, 75.2%). The behavioural gap OEC-ERO was -0.4 p.p. In the context of losses, the Non-officials group showed the greatest risk-seeking behaviour. The behavioural gap in relation to OEC was -4.6 p.p., and with ERO -4.2 p.p. The comparison of the two decision scenarios allowed for identifying the *reflection effect*, moderately frequent among the respondents in each research group. The largest behavioural gap was found between the officials of the ERO and the individuals from the non-experts group (8.8 p.p.).

In **Experiment 2**, the participants faced a choice between two probabilistic options that had the same expected value but differed in terms of variance. Opting for Decision 1 allowed the opportunity to achieve benefits ($p = 0.5$) or costs ($p = 0.5$) of regulation with half the values than opting for Decision 2. It was assumed that opting for the first regulatory decision represents a lower risk-seeking behaviour, and opting for the second regulatory decision a higher risk-seeking behaviour. This was due to the fear of the possibility of incurring a greater loss in the event of opting for Decision 2, although the expected values for both regulatory decisions were the same – an *aversion to risk effect* resulting from the overestimation of losses and underestimation of benefits. The 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	ERO	Non-officials	Behavioural gap: OEC and ERO	Behavioural gap: OEC and Non-officials	Behavioural gap: ERO and Non-officials
Lower risk seeking behaviour (decision 1) – an <i>aversion to risk effect</i> resulting from overestimation of losses and underestimation of benefits	0.692	0.783	0.471	-0.091	0.221	0.312
Higher risk seeking behaviour (decision 2)	0.308	0.217	0.529	0.091	-0.221	-0.312

Source: author's own work.

Officials of regulatory bodies made a decision aimed at reducing risk-seeking behaviour. In the case of OEC, such a choice was made by 69.2% of the respondents (moderate frequency effect), whereas for ERO, 78.3% opted for this decision (very frequent effect). The behavioural gap between OEC and ERO was -9.1 p.p. Notably, a considerably higher tendency towards risk-seeking behaviour was observed in the Non-officials group, where 52.9% often made decisions that indicated a willingness to take risks. The behavioural gap between the OEC group and the Non-officials was 22.1 p.p., and between the ERO and Non-officials 31.2 p.p. In **Experiment 3** the respondents made a choice either between a decision under uncertainty or under risk. It was assumed that opting for the first decision means greater risk-seeking and avoidance of the uncertainty effect. The results are presented in Table 3.

Table 3. Decision under uncertainty and risk

Effects	OEC	ERO	Non-officials	Behavioural gap: OEC and ERO	Behavioural gap: OEC and Non-officials	Behavioural gap: ERO and Non-officials
Decision under uncertainty – <i>uncertainty effect</i>	0.121	0.134	0.108	-0.013	0.021	0.026
Decision under risk	0.879	0.866	0.892	0.013	-0.021	-0.026

Source: author's own work.

Among the officials of the regulatory bodies, the choice of decisions made under risk prevailed. Such a choice was very often made by respondents from the OEC group (87.9%) and the ERO group (86.6%). The behavioural gap between those groups was only 1.3 p.p. Similarly, the respondents from the Non-officials group frequently made decisions in this manner, with 89.2% of them choosing the same approach. The behavioural gap between the OEC group and the Non-officials group amounted to 2.1 p.p., whilst the difference between the OEC and Non-officials groups was 2.6 p.p.

In **Experiment 4** the respondents made a choice either between a decision under uncertainty or no decision, which meant the status quo effect. It was assumed that the choice of the former indicates greater risk-seeking behaviour. The results are presented in Table 4.

Table 4. Decisions in the context of uncertainty vs. *status quo effect*

Effects	OEC	ERO	Non-officials	Behavioural gap: OEC and ERO	Behavioural gap: OEC and Non-officials	Behavioural gap: ERO and Non-officials
No decision – <i>status quo effect</i>	0.551	0.350	0.167	0.201	0.384	0.183
Decision under uncertainty	0.449	0.650	0.833	-0.201	-0.384	-0.183

Source: author's own work.

The *status quo effect* was particularly pronounced among officials, occurring quite frequently at 55.1%. However, in the case of ERO, the status quo effect was much less common, with a rate of only 35.0%. This translates to a substantial difference of 20.1 p.p. in behavioural tendencies between these two groups; on the other hand, this effect was quite rare among the Non-officials, with only 16.7% exhibiting this behaviour. This creates a significant 38.4 p.p. gap in behavioural patterns between the OEC and Non-officials. Furthermore, there is also an 18.3 p.p. difference between the ERO and the Non-officials group.

The aim of **Experiment 5** was to identify the *anchoring heuristic – asymmetric dominance effect*. The information provided to regulators by the entities they oversee in a given context could play a significant role in the cognitive processes of these officials and influence their decision-making. The scenario for the decision-making situation was constructed based on an experiment conducted by Bateman, Munro, and Poe in 2008. The respondents were asked to choose one of two regulatory decisions in two different decision-making situations. Additionally, two other regulatory decisions were presented that could not be selected, but might have influenced the assessment of the other decisions. It was assumed that the *asymmetric dominance effect* occurs when a change in the choice of a regulatory decision takes place. The results are presented in Table 5.

Among the officials of regulatory bodies, the *asymmetric dominance effect* was very frequent (OEC 75.7%, ERO 77.7%). The behavioural gap between the respondents from the OEC and ERO was -2.0 p.p. Similar results were found in the Non-officials group, where the *asymmetric dominance effect* was observed in 70.6% of the respondents, making it a very common phenomenon. The behavioural difference between the OEC group and Non-officials was 5.1 p.p., while between the ERO and Non-officials, this was 7.1 p.p.

Table 5. *Anchoring heuristic – asymmetric dominance effect*

Effects	OEC	ERO	Non-officials	Behavioural gap: OEC and ERO	Behavioural gap: OEC and Non-officials	Behavioural gap: ERO and Non-officials
Change in decision – <i>anchoring heuristic – asymmetric dominance effect</i>	0.757	0.777	0.706	-0.020	0.051	0.071
No change in decision	0.243	0.223	0.294	0.020	-0.051	-0.071

Source: author's own work.

Experiment 6 was conducted to identify the *better-than-average effect*, *calibration effect* and *overconfidence effect* as a synthesis of the two previous effects. Confidence in the decision-making process among officials is crucial, as it helps establish the credibility of regulatory bodies. However, an excessive amount of self-confidence can hinder the ability to collaborate and engage in dialogue with other market entities.

To investigate the *overconfidence effect*, a question was posed regarding one's self-assessment of competence in the field of regulation, specifically examining the *better-than-average effect*, in line with Russo and Schoemaker (1992), known as the *calibration effect*. The hypothesis was that the synthetic overconfidence effect manifests when a respondent rates their competence in the field of regulation as above average while simultaneously providing incorrect answers to questions related to regulations. The results are presented in Table 6.

Table 6. *Better-than-average effect, calibration effect and overconfidence effect*

Effects	OEC	ERO	Non-officials	Behavioural gap: OEC and ERO	Behavioural gap: OEC and Non-officials	Behavioural gap: ERO and Non-officials
<i>Better-than-average effect</i>	0.551	0.389	0.000	0.162	0.551	0.389
<i>Calibration effect</i>	0.897	0.726	0.931	0.171	-0.034	-0.205
<i>Overconfidence effect</i>	0.449	0.236	0.000	0.213	0.449	0.236

Source: author's own work.

The *better-than-average effect* was relatively common among OEC officials (55.1%). In the case of the ERO, this effect was less frequent (38.9%); the difference in behaviour between the respondents from the OEC and the ERO groups was 16.2 p.p. None of the respondents from the Non-officials group indicated above-average competence in the field of regulation. Therefore, the value of the behavioural gaps is proportional to the prevalence of the *better-than-average effect* in the groups of regulators. Frequently, officials from regulatory bodies fell victim to the *calibration effect*: OEC at 89.7% and ERO at 72.6%; the behavioural gap between OEC and ERO was 17.1 p.p. Non-officials almost always experienced the *calibration effect* (93.1%). The behavioural gap between OEC and Non-officials was -3.4 p.p., and between ERO and Non-officials -20.5 p.p. The research results on the synthetic *overconfidence effect* indicate that it was moderately common in OEC (44.9%) and rare in ERO (23.6%) – the behavioural gap between them was 21.3 p.p. This effect was not found in the Non-officials group (non-occurring effect). Yet again, the value of behavioural gaps corresponds to the prevalence of the *overconfidence effect* in groups of regulators.

In the final part of the analysis the null hypothesis test was carried out (Table 7).

Table 7. Kruskal-Wallis test results

Itemisation	H statistics	p-value
Experiment 1		
– <i>certainty effect</i> – risk aversion (positive prospect)	8.3930	0.0150
– <i>loss avoidance effect</i> – risk-seeking (negative prospect)	0.7935	0.6725
– <i>reflection effect</i>	2.1431	0.3425
Experiment 2		
– <i>risk aversion effect</i> resulting from overestimation of losses and underestimation of benefits	27.6063	0.0000
Experiment 3		
– <i>uncertainty effect</i>	0.3870	0.8241
Experiment 4		
– <i>status quo effect</i>	58.0222	0.0000
Experiment 5		
– <i>anchoring heuristic</i> – effect of asymmetric domination	1.6984	0.4278
Experiment 6		
– <i>better-than-average effect</i>	76.4300	0.0000
– <i>calibration effect</i>	37.4906	0.0000
– <i>overconfidence effect</i>	58.7942	0.0000

Source: author's own work.

In six out of ten cases, grounds were identified to reject the null hypothesis that the groups had been drawn from the same population. A multiple comparison test was employed to determine which groups exhibited statistically significant differences. Therefore, it can be inferred that:

- a) Experiment 1: *certainty effect* – statistically significant difference between OEC (more often) and Non-officials (less often);
- b) Experiment 2: *risk aversion effect* resulting from overestimation of losses and underestimation of benefits – statistically significant difference between OEC (less risk-seeking) and Non-officials (more risk-seeking) and between ORE (less risk-seeking) and Non-officials (more risk-seeking);
- c) Experiment 4: *status quo effect* – statistically significant difference between all groups. Officials OEC most often succumbed to the *status quo effect*, and Non-officials did it least often;
- d) Experiment 6: *better-than-average effect* – statistically significant difference between OEC (more often) and Non-officials (less often) as well as between ORE (more often) and Non-officials (less often). *The calibration effect*: statistically significant difference between OEC (more often) and ORE (less often) as well as between ORE (less often) and Non-officials (more often). *The overconfidence effect*: statistically significant difference between all groups. OEC officials most often succumbed to the *overconfidence effect*, ORE did it less often. None of the non-expert group was affected by this effect.

5. Conclusion and implications

This research focused on the specific empirical context of making regulatory decisions. In Experiment 1 it was discovered that officials from both regulatory bodies and non-official individuals typically made decisions that aligned with *prospect theory*. The only exception was observed in the case of the *certainty effect*, where statistically significant differences were noted between regulatory officials and

non-officials. Experiment 2 revealed a much more substantial distinction between regulators and non-officials. Statistically significant differences were observed between these groups. Officials from ERO and OEC frequently yielded to choosing an alternative option when facing decisions under risky conditions, as shown in Experiment 3. In the case of the alternative presented as the option to maintain the *status quo* (Experiment 4), it was observed that the uncertainty effect occurred with medium frequency (referred to as OEC) or rarely (referred to as ERO). The status quo effect was quite rare among Non-officials. Once again, statistically significant differences were noted between regulators and Non-officials. To sum up, officials dealing with uncertainty and risk often struggle to maintain consistent preferences, however these decisions rather reflect their uncertainty and aversion to risk. Although such decisions may appear to be safe, they can potentially lead to an overestimation of the risks associated with regulatory actions or hinder the exploration of new regulatory solutions. It is crucial to establish the margin of risk and determine the actions that regulators can undertake within the boundaries of the law in conditions of uncertainty and risk.

The research findings suggest that officials from regulatory authorities frequently fall prey to the *anchoring heuristic*, often influenced by the presence of an *asymmetric domination* (medium frequency). This tendency also extends to non-official individuals, with no statistically significant behavioural discrepancies. It is crucial to highlight that an essential concern in the regulator's role is the necessity for an accurate and unambiguous evaluation of information, which serves as the foundation for decision-making. Inconsistencies in information assessment can be exploited by regulated entities using specific language, sequencing, and data presentation methods. Consequently, the implication of this effect is the incorrect determination of the quantifiable impacts of regulation, leading to the overestimation or underestimation of benefits and costs. It is of the utmost importance to precisely define the methods for presenting data by regulated entities, as they form the basis for regulatory decision-making.

This research also provided an opportunity to identify the *better-than-average effect*, *calibration effect*, and *overconfidence effect*. ERO officials rarely, and OEC officials often, succumbed to the *better-than-average effect*. The value of the behavioural gap between officials of regulatory bodies (OEC and ERO) and Non-officials turned out to be statistically significant. Officials of regulatory authorities succumbed to the calibration effect much more often, and the value of the behavioural gap between ERO and Non-officials also proved to be statistically significant. Regarding the *overconfidence effect*, it should be noted that it affected OEC more frequently than ERO – it is essential to emphasise that fewer than half of the respondents experienced this effect. This is particularly important because succumbing to the overconfidence effect limits the ability to cooperate in agent-principal relations, such as during market consultations. Respecting substantive feedback from regulators is essential for fostering a constructive dialogue. It is valuable to establish a cooperative model within the regulatory system that promotes effective collaboration and shared responsibility for the decisions made.

The research results suggest that one is not dealing with officials entirely free from behavioural effects, but rather that the extent of their occurrence varies. It can be assumed that the disparities in behaviour, and notably, the statistically significant differences between regulators (OEC and ERO) and non-officials (in 78.6% of cases), stem from differences in expertise in the field of regulation and the associated decision-making responsibilities. It should be emphasised that legal conditions can both bolster and suppress behavioural effects, as stated by Petrażycki: “the law is a psychological factor... This activity involves reinforcing and cultivating certain inclinations of human character traits while weakening and extinguishing others” (Petrażycki, 1959, p. 16, Zyzik, 2021, p. 25). Further research and the replication of the article's findings are necessary, primarily due to the limitations of the research results. While the experiments provided an opportunity to test the behavioural effects, they did not explore their relation with the personality traits of the subjects. This aspect will be the focus of analysis in the forthcoming article. Additionally, future experiments may uncover other behavioural effects. The research conducted encompassed a broader scope, and additional behavioural effects will also be addressed in forthcoming articles. The reliance on hypothetical choices presented during experiments

also gave rise to questions regarding the validity of the research method. The author is aware of these doubts, which are applicable to other research methods as well. Strengthening the conclusions of experimental research is possible through means such as analysing protocols or formal meetings of officials, which can unveil patterns that shed light on how officials respond to specific information within a given context. The novelty of research into the behavioural determinants of decisions made by officials in regulatory bodies expands the realm of regulatory research. This could potentially open new avenues for resolving regulatory dilemmas.

References

- Almlöf, H., & Bjuggren, P.-O. (2019). A regulation and transaction cost perspective on the design of corporate law. *European Journal of Law and Economics*, 47(3), 407-433.
- Bateman, I. J., Munro, A., & Poe, G. L. (2008). Decoy effects in choice experiments and contingent valuation: Asymmetric dominance. *Land Economics*, 84(1), 115-127.
- Battaglio, R.C.P., Belardinelli, P., Bellé, N., & Cantarelli, P. (2019). Behavioral Public administration ad fontes: A synthesis of research on bounded rationality, cognitive biases, and nudging in public organization. *Public Administration Review*, 79(3), 304-320.
- Bellé, N., Cantarelli, P., & Belardinelli, P. (2018). Prospect theory goes public: Experimental evidence on cognitive biases in public policy and management decisions. *Public Administration Review*, 78(6), 828-840.
- Benoît, C. (2019). The new political economy of regulation. *French Politics*, 17(4), 482-499.
- Busuioac, M., & Lodge, M. (2017). Reputation and accountability relationships: Managing accountability expectations through reputation. *Public Administration Review*, 77(1), 91-100.
- Cantarelli, P., Bellé, N., & Belardinelli, P. (2020). Behavioral Public HR: Experimental evidence on cognitive biases and debiasing interventions. *Review of Public Personnel Administration*, 40(1), 56-81.
- Carrigan, C., & Coglianese, C. (2015). George Stigler, the theory of economic regulation. In M. Lodge, E. Page, S. Balla, (Eds.), *The Oxford Handbook of Classics in Public Policy and Administration* (pp. 287-299). Oxford University Press.
- Cave, M., Genakos, Ch., & Valletti, T. (2019). The European framework for regulating telecommunications: A 25-year appraisal. *Review of Industrial Organization*, 55(1), 47-62.
- Christensen, J. (2011). Competing theories of regulatory governance: reconsidering public interest theory of regulation. In D. Levi-Faur (Ed.), *Handbook on the Politics of Regulation*. Edward Elgar.
- Coletti, P., & Radaelli, C. (2013). Economic rationales, learning, and regulatory policy instruments. *Public Administration*, 91(4), 1056-1070.
- Cooper, J. C., & Kovacic, W. E. (2012). Behavioral economics: implications for regulatory behavior. *Journal of Regulation Economics*, 41(1), 51-52.
- Debbichia, S. & Slama, R. B. (2022). Impact of regulatory process on telecom firm performance: Evidence from non parametric approach. *Quantitative Economics and Management Studies*, 3(1), 44-57.
- Dudley, S. E., & Xie Z. (2022). Nudging the nudger: Toward a choice architecture for regulators. *Regulation & Governance*, 16(1), 261-273.
- Dziadkiewicz, M., & Cichowski, P. (2020). Real estate management against state policy regarding the development of the fiber optic network. *Ekonomia i Prawo. Economics and Law*, 19(3), 467-478.
- Embrey, I. P. (2020). States of nature and states of mind: A generalized theory of decision-making. *Theory and Decision*, 88(1), 5-35.
- Fremeth, A. R., & Holburn, G. L. F. (2010). Information asymmetries and regulatory decision costs: An analysis of U.S. electric utility rate changes 1980–2000. *Journal of Law, Economics, and Organization*, 28(1), 127-162.
- Genakos, C., & Valletti T. (2015). Evaluating a decade of mobile termination rate regulation. *Economic Journal*, 125(586), 31-48.
- Genakos, C., Verboven, F., & Valletti, T. (2018). Evaluating market consolidation in mobile communications. *Economic Policy*, 33(93), 45-100.
- González, C. I., & Verhoest, K. (2020). De facto regulatory decision-making processes in telecommunications regulation: Explaining influence relationships with exponential random graph models. *Journal of Public Policy*, 40(1), 144-170.
- Grajek, M., & Roller, L.-H. (2012). Regulation and investment in network industries: Evidence from European telecoms. *Journal of Law and Economics*, 55(1), 189-216.
- Grimmelikhuijsen, S., Jilke, S., Olsen, A., & Tummers, L. (2017). Behavioral public administration: Combining insights from public administration and psychology. *Public Administration Review*, 77, 45-56.
- Hanretty, C., & Koop, C. (2018). Political independence, accountability, and the quality of regulatory decisionmaking. *Comparative Political Studies*, 51(1), 38-75.

- Hantke-Domas, M. (2003). The public interest theory of regulation: Non-existence or misinterpretation? *European Journal of Law and Economics*, 15(2), 165-194.
- Hertog, J. (2010). *Review of economic theories of regulation*. Tjalling C. Koopmans Research Institute, Utrecht School of Economics, Utrecht University.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decisions under risk. *Econometrica*, 47, 313-327.
- Koop, C., & Lodge M. (2017). What is regulation? An interdisciplinary concept analysis. *Regulation & Governance*, 11(1), 95-108.
- Iborra, S. S., Saz-Carranza, A., Fernández-i-Marín, X., & Albareda, A. (2017). The governance of goal-directed networks and network tasks: An empirical analysis of European regulatory networks. *Journal of Public Administration Research and Theory*, 28(2), 270-292.
- Laffont, J.-J., & Tirole, J. (1991). The politics of government decision-making: A theory of regulatory capture. *The Quarterly Journal of Economics*, 106(4), 1089-1127.
- Li, Y., & Lyons, B. (2012). Market structure, regulation and the speed of mobile network penetration. *International Journal of Industrial Organization*, 30(6), 697-707.
- Maggetti, M., & Papadopoulos, Y. (2018). The principal-agent framework and independent regulatory agencies. *Political Studies Review*, 16(3), 172-183.
- Marjosola, H. (2021). The problem of regulatory arbitrage: A transaction cost economics perspective. *Regulation & Governance*, 15(2), 388-407.
- Mathieu, E. (2016). When Europeanization feeds back into EU governance: EU legislation, national regulatory agencies, and EU regulatory networks. *Public Administration*, 94(1), 25-39.
- Maziarz, W. M. (2015). Strategiczne aspekty funkcjonowania operatorów na rynku usług telefonii komórkowej w Polsce. *Firma i Rynek*, 1(48), 33-44.
- Mizutani, F., & Nakamura, E. (2019). Regulation, public interest, and private interest: An empirical investigation of firms in Japan. *Empirical Economics*, 56(4), 1433-1454.
- Nagaj, R., & Szkudlarek, P. (2012a). Regulacja na rzecz konkurencji w wybranych sektorach sieciowych. *Ekonomia*, 2(19), 70-86.
- Nagaj, R., & Szkudlarek, P. (2012b). Regulacja na rynkach sieciowych w Polsce w kontekście ekonomii dobrobytu. *Studia Ekonomiczne*, 102, 205-213.
- Nardotto, M., Valletti, T., & Verboven, F. (2015). Unbundling the incumbent: Evidence from the UK broadband. *Journal of the European Economic Association*, 13(2), 330-362.
- Peltzman, S. (1989). *The Economic Theory of Regulation after a Decade of Deregulation*. University of Chicago.
- Petrażycki, L. (1959). *Wstęp do nauki prawa i moralności. Podstawy psychologii emocjonalnej*. Państwowe Wydawnictwo Naukowe.
- Posner, R. A. (1971). Taxation by regulation. *The Bell Journal of Economics*, 2(1), 22-50.
- Posner, R. A. (1974). Theories of economic regulation. *The Bell Journal of Economics and Management Science*, 5(2), 335-358.
- Rajabiun, R., & Middleton, C. (2015). Public interest in the regulation of competition: Evidence from wholesale internet access consultations in Canada. *Journal of Information Policy*, 5, 32-66.
- Roberts, P. S., & Wernstedt, K. (2019). Decision biases and heuristics among emergency managers: Just like the public they manage for? *The American Review of Public Administration*, 49(3), 292-308.
- Russo, J. E., & Schoemaker, P. J. H. (1992). Managing overconfidence. *Sloan Management Review*, 33(2), 7-17.
- Saz-Carranza, A., Albareda, A., & Federo, R. (2020). Network tasks and accountability: A configurational analysis of EU regulatory networks. *Public Administration*, 98(2), 480-497.
- Scheerlinck, G., Buts, C., Reniers, G., & Cools, M. (2017). Law in action in the private security industry: The impact of regulation on competition. *European Competition and Regulatory Law Review*, 1(2), 96-114.
- Schillemans, T. (2022). Accountability and the quality of regulatory judgment processes. Experimental research offering both confirmation and consolation. *Public Performance & Management Review*, 45(3), 473-498.
- Sheffer, L., Loewen, P. J., Soroka, S., Walgrave, S., & Sheaffer, T. (2018). Nonrepresentative representatives: An experimental study of the decision making of elected politicians. *American Political Science Review*, 112(2), 302-321.
- Sherman, R. (2001). The future of market regulation. *Southern Economic Journal*, 67(4), 782-800.
- Shortall, T., & Cave, M. (2015). Is symmetric access regulation a policy choice? Evidence from the deployment of NGA in Europe. *Communications and Strategie*, 1(98), 17-41.
- Spiller, P. T. (2013). Transaction cost of regulation. *Journal of Economic Behavior & Organization*, 89(C), 232-242.
- Spulber, D. F. (1989). *Regulation and Markets*. MIT Press.
- Stigler, G. (1971). The theory of economic regulation. *The Bell Journal of Economics and Management Sciences*, 2(1), 3-21.
- Stiglitz, J. E. (2000). The contributions of the economics of information to twentieth century economics. *Quarterly Journal of Economics*, 115(4), 1441-1478.
- Szkudlarek, P. (2016). Rynek usług telekomunikacyjnych w Polsce w kontekście budowy potencjału gospodarczego. *Studia Ekonomiczne*, 286, 165-174.

- Szkudlarek, P. (2017). Regulacja rynku – ujęcie behawioralne. *Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania*, 47(1), 57-68.
- Szkudlarek, P. (2020). Regulatory decisions in the context of risk and uncertainty. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 64(10), 107-117.
- Szkudlarek, P. (2021). Choice preferences in the process of making regulatory decisions under risk and uncertainty conditions: an experimental study. *European Research Studies Journal*, XXIV(2B), 1127-1141.
- Szkudlarek, P. (2022). *Regulacja z perspektywy ekonomii instytucjonalnej i ekonomii behawioralnej na przykładzie rynku usług telekomunikacyjnych w Polsce*. Wydawnictwo Naukowe Uniwersytetu Szczecińskiego.
- Szydło, M. (2005). *Regulacja sektorów infrastrukturalnych jako rodzaj funkcji państwa wobec gospodarki*. Wydawnictwo Prawo i Praktyka Gospodarcza.
- Szyska, A. (2009). *Finanse behawioralne. Nowe podejście do inwestowania na rynku kapitałowym*. Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu.
- Tasic, S. (2009). The illusion of regulatory competence. *Critical Review*, 21(4), 423-436.
- Tasic, S. (2011). Are regulators rational? *Journal des Economistes et des Etudes Humaines*, 17(1), 1-21.
- Veljanovski, C. (2010). Economic approaches to regulation. In R. Baldwin, M. Cave, & M. Lodge (Eds.), *The Oxford Handbook of Regulation* Oxford University Press, 17-38.
- Viscusi, W. K., Harrington, J. E., & Vernon, J. M. (2005). *Economics of Regulation and Antitrust*. The MIT Press.
- Viscusi, W. K., & Gayer, T. (2015). Behavioral Public Choice: The Behavioral Paradox of Government Policy. *Harvard Journal of Law and Public Policy*, 38(3), 973-1007.
- Weisman, D. L. (2019). The power of regulatory regimes reexamined. *Journal of Regulatory Economics*, 56(2), 125-148.
- Zyzik, R. (2021). *Behawioralna analiza prawa*. Wydawnictwo Naukowe Akademii Ignatianum w Krakowie.

Received: July 2023, revised: January 2024

Acknowledgement: Project financed by the Minister's of Science and Higher Education Programme entitled "Regionalna Inicjatywa Doskonałości" in 2019-2022, no. 001/RID/2018/19, financing amount 10 684 000,00 PLN.