PATRYK CIURAK^a

THE RELATIONSHIP BETWEEN THE NUMBER OF STATUTES COMING INTO FORCE AND THE NUMBER OF REGULATIONS COMING INTO FORCE: FINDINGS FROM EMPIRICAL STUDIES

POWIĄZANIE MIĘDZY LICZBĄ WCHODZĄCYCH W ŻYCIE USTAW A LICZBĄ WCHODZĄCYCH W ŻYCIE ROZPORZĄDZEŃ – WNIOSKI Z BADAŃ EMPIRYCZNYCH

The aim of this paper is to empirically test the opinion, common in legislative practice, that there is a relationship between the number of statutes and the number of regulations, and to measure the strength and nature of this relationship, if it exists. The data used in the study were obtained from the Polish legal database System Informacji Prawnej Lex and were analysed using Spearman's correlation and negative binomial regression methods. The results confirmed the existence of the abovementioned relationship, which can be described as strong and exponential. An equation was also formulated to predict the number of regulations that will come into force based on the projected number of statutes coming into force in a given month. The results obtained provide an empirical addition to the extensive legal literature on the regulation as a normative act. They also highlight a possible path for the study of law, particularly in comparative law.

Keywords: statute; regulation; entry into force; correlation; regression

Celem artykułu jest empiryczne sprawdzenie prawdziwości powszechnego w praktyce legislacyjnej poglądu o istnieniu związku między liczbą ustaw i rozporządzeń, a także zmierzenie siły i rodzaju tego związku, jeżeli zachodzi. Do przeprowadzenia badania posłużono się danymi pochodzącymi z Systemu Informacji Prawnej Lex, które przeanalizowano z wykorzystaniem metody określania korelacji Spearmana oraz regresji ujemnej dwumianowej. Przeprowadzone badanie potwierdziło istnienie silnego związku, a zidentyfikowana zależność ma postać wykładniczą. Sformułowano równanie funkcji, aby móc prognozować liczbę rozporządzeń, które wejdą w życie na podstawie zakładanej liczby wchodzących w życie ustaw. Uzyskane wyniki stanowią empiryczne uzupełnienie bogatego piśmiennictwa prawniczego poświęconego rozporządzeniu jako aktowi normatywnemu. Wskazują również możliwą ścieżkę badania prawa, w szczególności w obszarze komparatystyki prawniczej.

Słowa kluczowe: ustawa; rozporządzenie; wejście w życie; korelacja; regresja

^a University of Gdańsk, Poland / Uniwersytet Gdański, Polska patryk.ciurak@prawo.ug.edu.pl, https://orcid.org/0000-0001-8203-4375

I. INTRODUCTION

With the entry into force of the Constitution of the Republic of Poland in 1997¹, the idea of regulation as a normative act became an object of vivid interest for legal science. Here, the 'regulation' is understood as a conceptual category of legal acts defined by the Constitution. The main reason for this renewed interest was the explicit enumeration in Article 92 of the Constitution of the obligatory elements of the authorizing provision, which were then projected onto the content of the regulation.² Among the main publications discussing the status of the regulation, it is necessary to highlight the commentaries on the Regulation of the Prime Minister of 20 June 2002 on the 'Principles of Legislative Techniques'³ by Wronkowska and Zieliński (2012) and by Wierczyński (2016). The regulation as a legal act was also a subject of the monograph by Skwara (2010), as well as many papers, including the works of Zajecki (2003), Brzozowski (2013), Zabicka-Kłopotek (2006, 2011), Giderewicz (2013), Zwierzykowski (2006), and Wierczyński (2011). The abovementioned publications primarily adopt a dogmatic and historical-legal approach (with the exception of Zajecki's paper, 2003, where quantitative methods were used, to a limited extent), and include an exhaustive review of the jurisprudence of the Polish Constitutional Tribunal. Only recently have statistical methods been employed to compare how many statutes and how many regulations enter into force in a given month of the year (Ciurak & Głowacka, 2021). The results indicate that these numbers may be related. At first glance, this may seem obvious. However, if one takes into consideration the variety of regulated topics, the changing dynamics of legislative work, and the political influence on legislation, the existence of such a relationship becomes at least debatable. Moreover, it has never been empirically confirmed using statistical methods, nor has the strength of the possible relationship been investigated.

This issue is significant when assessing whether the balance between legislative and executive powers is maintained. Legal norms are often reconstructed from provisions of both statutes and regulations. While Parliament issues statutes, it may delegate a portion of its legislative power to the executive branch – primarily the Council of Ministers or its members – and authorize them to issue regulations that focus on specific matters (i.e. technical issues). In general, this approach is acceptable, as it allows the legal system to remain flexible and adaptive. However, under certain circumstances, it may indicate a violation of the principle of the separation of powers. Therefore, establishing a certain baseline proportion between the number of enacted statutes and issued regulations would be necessary.

¹ Constitution of the Republic of Poland of 2 April 1997, Journals of Law of the Republic of Poland [JL], No. 78, item 483, as amended (hereafter: Constitution; https://www.sejm.gov.pl/prawo/konst/angielski/kon1.htm).

² The relevance of the issue is evidenced by the fact that a separate position on this issue has been taken by the Polish Legislative Council (Rada Legislacyjna, 1998).

³ Regulation of the Prime Minister of 20 June 2002 on the 'Principles of Legislative Techniques', JL 2016, item 283 (consolidated version).

The paper aims to verify whether a relationship between the number of statutes and the number of regulations issued by the Council of Ministers or its members really exists. The purpose of the conducted research was not only to empirically test this commonly held view but also to quantify the strength of the possible relationship.

II. DATA AND METHODS

1. Data

Data from the Polish legal database System Informacji Prawnej Lex (SIP Lex) was used to answer the research question. The choice of data from a commercial product such as SIP Lex, rather than the publicly available Internet System of Legal Acts (Internetowy System Aktów Prawnych [ISAP])⁴ is justified by differences in the methods used by the editors of both systems to determine the date of entry into force of a normative act. The set of metadata describing a normative act in SIP Lex distinguishes between the main date of entry into force of the act and the dates of entry into force of its individual parts if they differ from the main date (so-called partial dates). In ISAP, on the other hand, only the main date of the act functions as separate metadata, while partial dates are mentioned as text in a separate field called Remarks. In the author's opinion, the practice adopted in creating SIP Lex shows better precision in reflecting the dynamics of changes in the legal system.

The temporal scope of the study covers the years 1998-2022. The starting date was chosen because of the entry into force of the Constitution of the Republic of Poland on 17 October 1997. The date of 1 January 1998 was adopted to maintain a full-year period, and 31 December 2022 served as the end date. The assessment of the effectiveness of the model was conducted using data from the year 2023. For the purposes of the research, a time interval of one month was assumed, which gave a total of 300 observations (months) for statutes and the same number for regulations. It should be noted that the total number of statutes as well as regulations coming into force in a given year is not a simple sum of the number of statutes or regulations coming into force in its individual months. This is due to the use of main and partial dates of entry into force (as described above) and the way they are presented by SIP Lex. Using a simple example, if a statute comes into force on two dates -1 January (main date) and 1 April (partial date) of a given year - it is included twice in the dataset.

The scope of the study covers statutes and regulations issued by the Council of Ministers, the Prime Minister, and individual ministers that came into force between 1998 and 2022. Both autonomous and non-autonomous statutes

⁴ https://isap.sejm.gov.pl/

and regulations were analysed, in accordance with the distinction adopted in SIP Lex since its founding. 5

2. Methods

The level of significance adopted in the analyses carried out was $\alpha = 0.05$.⁶ A Shapiro-Wilk test was used to test the normality⁷ of the distribution of the numerical variables.⁸ To test the relationship between the two numerical variables, a correlation estimation was carried out using Spearman's method.⁹ The impact of the number of statutes on the number of regulations was assessed using regression modelling. For this purpose, a general regression model based on a negative binomial distribution was used.¹⁰ The model can be described by the following equations:

 $y_i \sim \text{Negative Binomial}(\mu_i, \phi),$

where y_i – represents the number of regulations for the *i*-th observation, μ_i – is the average number of statutes that is modelled, ϕ – is the dispersion coefficient in the negative binomial system.

The average μ_i is related to the number of statutes using the logarithmic function¹¹ in the regression model:

$$\log(\mu_i) = \beta_0 + \beta_1 x_{il},$$

⁵ As Ciurak and Głowacka (2001) state that an autonomous act is considered to be a normative act containing norms of a general-abstract and self-contained nature. A non-autonomous act, on the other hand, is an act consisting predominantly of meta-provisions: those that produce a single effect in the form of amending, repealing or implementing other provisions (p. 11). This division is not the same as the division into self-contained and non-self-contained acts (see Wiacek, 2016).

 $^{^{6}}$ The significance level is the maximum acceptable probability of making a so-called error of the first kind: rejecting the null hypothesis (H₀) as false, while it was true. For more, see Finkelstein and Levin (2015, p. 123).

 $^{^{7}}$ A normal distribution of data is a distribution characterized by several important properties, including that it has a symmetrical 'bell' shape, and that the mean and median coincide and lie in the middle of the distribution. Meeting the requirement of normality of the distribution is a condition for the application of some statistical tests. In this case, as the requirement is not met, the Spearman's method for estimating correlation was used. For more, see more Finkelstein and Levin (2015, pp. 116–120).

 $^{^{\}rm 8}$ For more information about the meaning and application of the Shapiro-Wilk test, see Ruppert and Matteson (2015, p. 64). The statistic calculated as the result of the Shapiro-Wilk test is denoted as *W*.

⁹ For more information on estimating correlation using the Spearman method, see Finkelstein and Levin (2015, p. 366). The reason for choosing this method was that the data distribution of the sample deviates from the normal data distribution.

¹⁰ Negative binomial regression is used when the sample data is a count of cases, so there are no negative values, and at the same time, there is significant dispersion in the data. For more on negative binomial regression, see Finkelstein and Levin (2015, pp. 499–500).

¹¹ The logarithmic function is also referred to as the log-link function.

where β_0 – is the intercept, β_1 – is the regression coefficient corresponding to the independent variable (number of statutes), x_{il} – is the number of statutes for the *i*-th observation.

The fit of the model was assessed using $R^2_{\text{Nagelkerke.}}^{12}$ The approximation of the confidence intervals¹³ (CI 95%) and the *p*-values¹⁴ for the model coefficients were performed using the Wald method¹⁵.

During the research, the author used the R language version 4.3.1 for Windows 64-bit (R Core Team, 2023) along with the packages: tidyverse (Wickham et al., 2019), ggplot2 (Wickham, 2016), ggpubr (Kassambara, 2023), lubridate (Grolemund & Wickham, 2011), car (Fox & Weisberg, 2019), FSA (Ogle et al., 2023), moments (Komsta & Novomestky, 2022), ggridges (Wilke, 2023), hrbrthemes (Rudis, 2020), lmtest (Zeileis & Hothorn, 2002), MASS (Venables & Ripley, 2002), sjPlot (Lüdecke, 2023), ggeffects (Lüdecke, 2018), epiDisplay (Chongsuvivatwong, 2022), AER Kleiber & Zeileis, 2008, p. vi), gridExtra (Auguie, 2017) and pscl (Zeileis et al., 2008). The analyses and graphs were produced in RStudio version 2023.06.0 Build 421 by Posit Software.

3. Research hypothesis

Based on the research problem indicated above, the following hypothesis was formulated: there is a relationship between the number of statutes and the number of regulations coming into force in each month between 1998 and 2022 and the relationship is statistically significant.

4. Sample characteristics

The sample included 300 months during which 7,363 statutes and 38,486 regulations came into force. Basic descriptive statistics for the sample (size, mean,¹⁶ standard deviation,¹⁷ median,¹⁸ first and third quartiles,¹⁹ minimum and maxi-

¹² The coefficient of determination R^2 takes values from 0 to 1 and is used to determine what percentage of the observed values of the dependent variable (regulations) can be explained by the values of the independent variable (statutes). The higher the value, the better the fit of the model. A value of 1 indicates that the model explains 100% of the variability observed among the regulations (in the dependent variable) to be explained. In this case, due to the use of negative binomial regression, the Nagelkerke version was used. For more, see Finkelstein and Levin (2015, pp. 390–391).

¹³ The confidence interval is the range of expected mean values of a given statistic in the population. For more, see Finkelstein & Levin (2015, pp. 171, 235).

¹⁴ A *p*-value is otherwise the probability that a test result is due to chance. For more on the significance of the *p*, see Ruppert and Matteson (2015, p. 64).

¹⁵ For more on the method used, see Brown et al. (2001). This method is used in the sjPlot package (Lüdecke, 2023).

¹⁶ For more, see Finkelstein and Levin (2015, p. 2).

¹⁷ The standard deviation is a measure of the clustering of observations around the mean. For more on this measure, see Finkelstein & Levin (2015, p. 21).

¹⁸ The median is the middle value in a sample; 50% of the observations lie below and the other 50% above this value. For more on this concept, see Finkelstein and Levin (2015, p. 4).

¹⁹ Quartiles divide the collected data into four equal parts. For the first quartile, 25% of the observations lie below this value and 75% above. For the third quartile, the situation is reversed:

mum) are included in Table 1. The data distributions of both parameters showed a deviation from the normal distribution at the p < 0.001 level (see Table 1).²⁰ A visualization of the data distributions is shown in Figure 1.

Basic descriptive statistics for the sample and the result of

Table 1

testing the normality of the data distribution										
Parame- ter	Descriptive statistics								Testing for normality of distribution	
	size	Mean	SD	Me- dian	Q1	Q3	Min	Max	W	р
Statutes	300	24.54	19.61	20	13.75	27	3	188	0.70	< 0.001
Regula- tions	300	128.29	67.03	112	89	141	37	620	0.77	< 0.001

Note. Columns: size – number of months (records) in the sample; Mean – arithmetic mean; SD – standard deviation; Median; Q1 – first quartile, Q3 – third quartile; Min and Max – the lowest and highest value in the sample, W – the result of the Shapiro-Wilk test; p – the probability that the test result is the effect of chance.

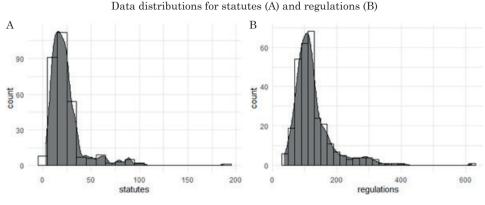
Source: The author's calculations based on data obtained from SIP Lex.

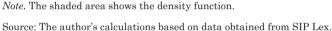
An analysis of the averages for both groups (Table 1) shows that more than 24 statutes and more than 128 regulations came into force each month during the time studied. These statistics are larger than the medians for both groups; these are 20 for statutes and 112 for regulations, respectively. This means that some of the observed values are large enough to inflate the average. A comparison of the means and standard deviations for both groups is also noteworthy. For statutes, the ratio of the standard deviation to the mean is close to 0.8, while for regulations the ratio is just over 0.5. This means that the clustering of observations around the mean is greater for regulations than for statutes. In other words, the number of regulations coming into force in a month fluctuates less than in the case of statutes, as depicted in Figure 1.

^{25%} of the observations lie above this value, and 75% below. As a result, 50% of the observations lie between the first and third quartile; this is known as the interquartile range (IQR). For more, see Finkelstein and Levin (2015, p. 25).

²⁰ Additionally, measures of skewness and kurtosis were examined. For the statutes, the skewness coefficient was 3.37 and the kurtosis 18.43. For the regulations, the skewness was 2.69 and the kurtosis 11.66. The skewness indicates how symmetrical the distribution of the sample data is. If most measurements are concentrated on the left-hand side of the distribution, with fewer on the right, the distribution is right-skewed, and the skewness coefficient is positive. The opposite of this is a left-skewed distribution, with a negative coefficient value. A normal distribution, on the other hand, is symmetric and its coefficient is 0. Kurtosis is a measure of the soaring nature of a distribution; the higher the kurtosis coefficient, the higher the centre of the distribution reaches and the smaller the edges. The kurtosis for a normal distribution is 0. For more, see Finkelstein and Levin (2015, p. 139).







The minima in both groups fall in 1998; for statutes, this occurs in October, while for regulations, it occurs in November. The maxima in both groups fall in the same month: May 2004. The most likely explanation for this is that the legislator made the date of entry into force of a large group of normative acts dependent on the moment of Poland's accession to the European Union. It should be noted, however, that the method of research may be partly responsible for such unusually high numbers. This is because the entry into force of a normative act as a whole (described by the main date) was treated the same as the coming into force of a part of it (described by a partial date). However, this does not change the fact that May 2004 was a record month in terms of changes in the Polish legal system.

The histograms of the data distributions for the statutes and regulations, which are shown in Figure 1, indicate that the two distributions have a very similar shape to each other.

III. RESULTS

1. Assessment of the relationship between the number of statutes and the number of regulations

After conducting the correlation test, a coefficient of rho = 0.58 was obtained. Thus, there is a positive correlation: as the number of statutes increases, the number of regulations also increases. The correlation can also be considered as strong²¹ and statistically significant, as the significance test

 $^{^{21}}$ The correlation coefficient takes values ranging from -1 (perfect negative correlation: as one variable increases, the value of the other variable decreases) to +1 (perfect positive correla-

yielded p < 0.001. Therefore, the research hypothesis formulated in section II.3 can be considered valid.

2. Estimating the effect of the number of statutes on the number of regulations

The Table 2 shows the result of fitting a model describing the impact of the number of statutes on the number of regulations.

Table	2
-------	---

	Estimated value	SE	р
Intercept	4.4186493	0.027	<i>p</i> < 0.001
Statutes	0.0155039	0.001	<i>p</i> < 0.001
Number of obse	300		
$R^2_{ m Nagelkerke}$			0.818

Properties of the developed model

Source: The author's calculations based on data obtained from SIP Lex.

The dispersion coefficient for the model was $\theta = 13.313.^{22}$ To assess the fit of the model, a likelihood-ratio χ^2 test was performed, which resulted in a value of 2350.80; $p < 0.001.^{23}$ This indicates that the model is well-fitted.²⁴

Referring to section II.2, the equations obtained are as follows:

 $y_i \sim \text{Negative Binomial}(\mu_i, 13.313)$

 $\log(\mu_i) = 4.4186493 + 0.0155039 \times x_{il}$

tion: as one variable increases, the value of the other variable increases). The principles for interpreting the correlation coefficient are discussed in more detail by Evans (1996) and Cohen (1998). It should be noted that if one ignores the requirement of normality of data distributions and uses Pearson's parametric method to calculate the correlation, then the correlation coefficient reaches 0.84, a result indicating a strong positive correlation, as well as statistically significant one; the result of the significance test is p < 0.001

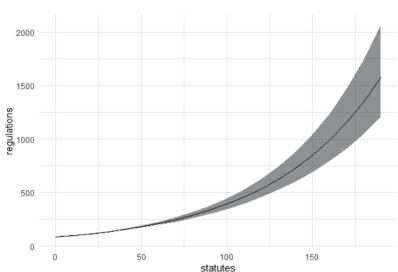
²² The dispersion coefficient indicates the extent to which the observed measurements are clustered around the regression line. The higher the coefficient, the better the clustering and therefore the more fitted the model. For more, see Finkelstein and Levin (2015, pp. 499–500).

²³ A detailed description of the test can be found in Finkelstein and Levin (2015, pp. 201–202).

 $^{^{24}}$ As a control variable, the number of items published in the Journal of Laws in a given month was designated. This should be interpreted as an illustration of the dynamics of the legislative process. The control variable is correlated both with the number of statutes (rho = 0.36, p < 0.001, using Spearman's method) and the number of regulations (rho = 0.47, p < 0.001, using Spearman's method) coming into force in a given month. However, a model created with a control variable added did not differ much from the original model, with $\theta = 14.670$, $R^2_{\rm Nagelkerke} = 0.858$ and likelihood-ratio χ^2 test = 2307.09, p < 0.001. Therefore, no substantial moderating effect can be observed.

A prediction graph illustrating the relationship between the number of regulations and the number of statutes is shown in Figure 2.

Figure 2



The relationship between the number of statutes and the number of regulations, with the confidence interval marked

Note. The solid line indicates the centre of the 95% confidence interval, and the shaded area represents the range of the 95% confidence interval.

Source: The author's calculations based on data obtained from SIP Lex.

To assess the effectiveness of the model, the number of regulations was estimated based on the number of statutes that came into force in each month of 2023. The estimates were then compared with real-life data from SIP Lex. The results are shown in Table 3.

Table 3

Comparison between the number of regulations that came into force in a given month of 2023 and the predicted number of regulations based on the abovementioned equation

Month	Statutes	Regulations (observed)	Prediction	95%	% CI
January	67	278	234	217.36	252.97
February	16	93	106	102.60	110.23
March	20	157	113	109.31	117.13
April	23	127	119	114.61	122.61

Month	Statutes	Regulations (observed)	Prediction	95% CI		
May	17	122	108	104.18	111.98	
June	17	127	108	104.18	111.98	
July	25	124	122	118.24	126.45	
August	46	164	169	161.30	177.76	
September	45	180	167	159.00	174.81	
October	24	233	120	116.41	124.51	
November	8	181	94	89.90	98.16	
December	15	136	105	100.86	108.71	

Table 3 (continued)

Source: SIP Lex and the author's calculations.

IV. DISCUSSION AND CONCLUSIONS

The most important – and perhaps most surprising – conclusion is that a relationship between the number of statutes and regulations coming into force actually exists. Given the complexity of socio-economic and political relations, the diversity of the regulated matters, the complexity of the legislative process, and the differences in workflows, one would expect the absence of any discernible pattern in lawmaking, a 'white noise' of legislative activity. Yet, a certain regularity can be observed; one that is clear enough to create a model to predict the approximate number of regulations that will come into force in a selected month.

The positive correlation coefficient indicates that as the number of statutes increases, the number of regulations also increases – a conclusion that is unsurprising. However, the strength of this relationship is high, as evidenced by the correlation coefficient of 0.58. The legislative authority rightly regards the transfer of part of its powers to the executive as standard practice. In doing so, it ensures that technical matters or issues subject to more frequent change are addressed through regulations which, in turn, enhances the stability and conciseness of statutory regulation (see Wiacek, 2016).

However, the observed correlation is not perfect (the value of the coefficient is different from 1), which is likely explained by the diversity of matters regulated by statutes. Some of these issues can be covered exclusively by statutes, as they pertain, among other things, to the rights and obligations of citizens. Therefore, the applicability of regulations will be strongly limited (see Wiacek, 2016). On the other hand, in the area of organizational or technical regulations, more frequent use of regulations is even advisable for the reasons indicated in the previous paragraph. The analysed sample includes normative acts from both groups, so the ratio is a resultant for the entire

force 181

system of law. It can be assumed that the application of a substantive criterion in the construction of the sample (selection of normative acts according to a specific branch of law) would affect the results obtained. It should also be borne in mind that only formal criteria were used in the construction of the sample: type of act, author, and date of entry into force. Therefore, the analysed sample also includes acts that apply the law²⁵ as well as normative acts. There is a high probability that this has a significant impact on the final value of the correlation coefficient.

In interpreting the results of the study, it is important to bear in mind the fundamental principle that correlation does not imply causation. It is true that the entry into force of a regulation depends on the entry into force of the authorizing provision. However, on the basis of the data analysed, it is not possible to conclude unequivocally that the number of authorizing provisions coming into force in a given month is the sole factor explaining the number of regulations coming into force. Other variables, not included in the dataset analysed, may also influence this number.²⁶

Following this line of thought, when interpreting the equation, it is important to remember the famous adage by George P. Box, professor of statistics, that all models are wrong, but some are useful (Box, 1976). In the equation, only the number of statutes coming into force was included as an independent variable. This formula should therefore be regarded as an imperfect tool, as can be seen in the prediction of the number of regulations coming into force in each month of 2023. While for most months the predicted number is very close to the observed values, the model stops working properly for October and November – months during which parliamentary elections and the transfer of power took place.²⁷ Thus, these can be considered as anomalies or outliers. Similar issues can be observed in the analysed sample.²⁸ One explanation for this phenomenon may be the principle of the discontinuation of the work of the Parliament, which, combined with the different tempos at which the lawmakers resumed work, may affect the efficiency of legislative work. In the case of the executive, this principle does not apply, hence no decrease in efficiency is observed.

With the above caveats in mind, it is important to emphasize the fact that the function describing the relationship is exponential, as illustrated in

 $^{^{25}}$ As examples of this type of acts, one may point to the regulations issued pursuant to Article 10(1) of the Nature Protection Act [NPA] of 16 April 2024 (JL 2023, item 1336, as amended) on the determination and amendment of the boundaries of the national park or Article 27a(1) of the same Act, by which an area of special bird protection or a special area of habitat protection is designated.

 $^{^{\}rm 26}$ This can serve as motivation for further research on improving the model described above by including the identified factors.

²⁷ An analysis of the thematic scope of the regulations entering into force in the 2023 showed a numerous group of regulations concerning special areas of habitat protection, which were issued on the basis of Article 27a, para. 1 of the NPA. Apart from the above, no other issue has been noted to dominate the legislative activities of the executive.

²⁸ For example, in November 2005 (and thus also at the turn of the term), only 6 statutes came into force, while as many as 167 regulations.

Figure 2, not linear as might have been assumed. The graph of the function shows that the ratio of the number of regulations to the number of statutes is not constant but increases with the number of statutes. Thus, the delegation of legislative powers to the executive increases exponentially as the number of statutes increases. The formulated equation can serve as a reference point when there are concerns about the overuse of regulation as a form of lawmaking. Conversely, if the number of regulations were to remain below projections for a prolonged period, this could indicate an above-average legislative backlog or potential executive dysfunction.²⁹

The author is aware that the presented results may have limited application in practice. However, they enrich the understanding of two important constitutional principles: correct legislation and legality. They do so by introducing a quantitative criterion that can help in assessing whether a violation of these principles really took place. Therefore, the principle may consist not only of a theoretical layer, based largely on the jurisprudence of the Constitutional Tribunal but also an empirical layer grounded in numerical data.³⁰ The research carried out should also be treated as basic research in the field of legal studies. In particular, it may serve as a starting point for comparative research covering different areas of law. It remains an open question whether a similar relationship could be identified between normative acts in areas such as environmental law or food law. Moreover, the findings from empirical research on the Polish legal system, as well as designed metrics, may create a useful input for comparative law, in particular when analysing the differences in the effectiveness of a legislative process, the stability of a legal system, and their relationship to the interpretation of the rule of law various countries.

References

- Auguie, B. (2017). _gridExtra: Miscellaneous functions for "grid" graphics. (R package version 2.3). https://CRAN.R-project.org/package=gridExtra
- Box, G. (1976). Science and statistics. Journal of the American Statistical Association, 71(356), 791–799. https://doi.org/10.2307/2286841
- Brown, L., Cai, T., & DasGupta, A. (2001). Interval estimation for a binomial proportion. Statistical Science, 16(2), 101–133. https://doi.org/10.1214/ss/1009213286
- Brzozowski, W. (2013). Wytyczne dotyczące treści rozporządzenia (uwagi na tle formułowania upoważnień ustawowych) [Guidelines for the content of regulations (comments on the formulation of statutory authorisation provisions)]. Przegląd Sejmowy, 4(117), 65–82.
- Chongsuvivatwong, V. (2022). epiDisplay: Epidemiological Data Display Package. (R package version 3.5.0.2). https://CRAN.R-project.org/package=epiDisplay
- Ciurak, P., & Głowacka, A. (2021). Analiza statystyczna liczby ustaw i rozporządzeń wchodzących w życie w latach 1992–2018 w kontekście zachowania odpowiedniej vacatio legis [Statistical

²⁹ In this respect, the Statutory Mandates database, which is part of the Public Law Information Portal maintained by the Government Legislation Centre (https://ppiop.rcl.gov.pl/index. php?r=upowaznienia/index), can be a control tool.

³⁰ A comprehensive discussion of the jurisprudence of the Court in the context of principle of correct legislation was presented by Zalasiński (2008).

analysis of the number of acts and ordinances coming into force in the years 1992–2018 in the context of maintaining adequate vacatio legis]. *Studia Prawnicze*, 1(223), 7–24. https://doi.org/10.37232/sp.2021a

- Cohen, J. (1998). Statistical power analysis for the behavioural sciences. Routledge. https://doi. org/10.4324/9780203771587
- Evans, H. R. (1996). An analysis of criterion variable reliability in conjoint analysis. Perceptual and Motor Skills, 82(3), 988–990. https://doi.org/10.2466/pms.1996.82.3.988
- Finkelstein, M., & Levin, B. (2015). Statistics for lawyers. Springer.
- Fox, J., & Weisberg, S. (2019). An R companion to applied regression. Sage.
- Giderewicz, S. (2013). Pozorne wytyczne w przepisach upoważniających do wydania rozporządzenia [False guidelines in provisions authorizing issuance of a regulation]. Przegląd Legislacyjny, 4, 49–66.
- Grolemund, G., & Wickham, H. (2011). Dates and times made easy with lubridate. Journal of Statistical Software, 40(3), 1–25. https://doi.org/10.18637/jss.v040.i03
- Heiberger, R., & Holland, B. (2015). Statistical analysis and data display: An intermediate course with examples in R. Springer Science+Business Media. https://doi.org/10.1007/978-1-4939-2122-5
- Kassambara, A. (2023). ggpubr: 'ggplot2' Based Publication Ready Plots. (R package version 0.6.0). https://CRAN.R-project.org/package=ggpubr
- Kleiber, C., & Zeileis, A. (2008). Applied econometrics with R. Springer Science+Business Media. https://doi.org/10.1007/978-1-4939-2122-5
- Komsta, L., & Novomestky, F. (2022). Moments: Moments, cumulants, skewness, kurtosis and related tests. https://CRAN.R-project.org/package=moments
- Lüdecke, D. (2018). ggeffects: Tidy data frames of marginal effects from regression models. Journal of Open Source Software, 3(26), 772. https://doi.org/10.21105/joss.00772
- Lüdecke, D. (2023). sjPlot: Data visualisation for statistics in social science. (R package version 2.8.15). https://CRAN.R-project.org/package=sjPlot
- Ogle D., Doll J., Wheeler P. & Dinno A. (2023). FSA: Simple Fisheries Stock Assessment Methods. (R package version 0.9.4). https://CRAN.R-project.org/package=FSA
- R Core Team. (2023). R: A language and environment for statistical computing. https://www. R-project.org/
- Rada Legislacyjna. (1998). Stanowisko w sprawie "konstruowania" upoważnień do wydawania rozporządzeń [Position on the 'construction' of authorisations to issue regulations]. Przegląd Legislacyjny, 3–4, 185–190.
- Rudis, B. (2020). hrbrthemes: Additional themes, theme components and utilities for 'ggplot2'. (R package version 0.8.0). https://CRAN.R-project.org/package=hrbrthemes
- Ruppert, D., & Matteson, D. (2015). Statistics and data analysis for financial engineering with R examples. Springer. https://doi.org/10.1007/978-1-4939-2614-5
- Skwara, B. (2010). Rozporządzenie jako akt wykonawczy do ustawy w polskim prawie konstytucyjnym [Regulation as an act implementing a statute in Polish constitutional law]. Wolters Kluwer Polska.
- Venables, W., & Ripley, B. (2002). Modern applied statistics with S (4th ed.). Springer. https://doi. org/10.1007/978-0-387-21706-2
- Wiącek, M. (2016). Komentarz do art. 92 Konstytucji RP [Commentary on Article 92 of Constitution of the Republic of Poland]. In M. Safjan & L. Bosek (Eds.), Konstytucja RP: Vol. 2. Komentarz do artykułów 87–243 (pp. 171–190). C. H. Beck.
- Wickham, H. (2016). ggplot2: Elegant graphics for data analysis. Springer. https://doi.org/10.1007/ 978-0-387-98141-3
- Wickham, H., Averick, M., Bryan, J., Chang, W., D'Agostino McGowan, L., François, R., Grolemund, G., Hayes, A., Henry, L., Hester, J., Kuhn, M., Pedersen, T., Miller, E., Bache, S., Müller, K., Ooms, J., Robinson, D., Seidel, D., Spinu, V., Takahashi, K., Vaughan, D., Wilke, C., Woo, K., & Yutani, H. (2019). Welcome to the tidyverse. *Journal of Open Source Software*, 4(43), 1686. https://joss.theoj.org/papers/10.21105/joss.01686. https://doi.org/10.21105/joss.01686
- Wierczyński, G. (2011). Utrata mocy przez akt wykonawczy jako skutek zmian upoważnienia ustawowego. [Derogation of an executive act as a result of changes in statutory authorization]. Państwo i Prawo, 66(4), 49–60.

- Wierczyński, G. (2016). *Redagowanie i ogłaszanie aktów normatywnych. Komentarz* [Drafting and promulgation of normative acts: Commentary]. Wolters Kluwer.
- Wilke, C. (2023). ggridges: Ridgeline plots in 'ggplot2'. (R package version 0.5.4). https://CRAN. R-project.org/package=ggridges
- Wronkowska, S., & Zieliński, M. (2012). Komentarz do Zasad Techniki Prawodawczej z dnia 20 czerwca 2002 r. [Commentary on the Rules of Legislative Technique of June 20, 2002.]. Wydawnictwo Sejmowe.
- Żabicka-Kłopotek, M. (2006). "Wytyczne" jako element upoważnienia do wydania rozporządzenia (na tle art. 92 Konstytucji RP) [Guidelines as an element of an authorization to issue a regulation (based on Article 92 of Poland's Constitution)]. Przegląd Sejmowy, 3, 29–46.
- Żabicka-Kłopotek, M. (2011). Rozporządzenie wykonawcze jako element systemu źródeł prawa powszechnie obowiązującego. Wybrane zagadnienia. [A regulation as a part of the system of sources of universally binding law. Selected issues.] Przegląd Legislacyjny, 2–4, 24–37.
- Zajęcki, M. (2003). Przepisy upoważniające do wydania rozporządzenia. Analiza formalna [Statutory provisions which authorize to issue a regulation: A formal analysis]. Przegląd Legislacyjny, 2, 175–200.
- Zalasiński, T. (2008). Zasada prawidłowej legislacji w poglądach Trybunały Konstytucyjnego [The principle of proper legislation in the views of the Constitutional Tribunal]. Wydawnictwo Sejmowe.
- Zeileis, A., & Hothorn, T. (2002). Diagnostic checking in regression relationships. *R News*, 2(3), 7–10.
- Zeileis, A., Kleiber, C., & Jackman, S. (2008). Regression models for count data in R. Journal of Statistical Software, 27(8), 1–25. https://doi.org/10.18637/jss.v027.i08
- Zwierzykowski, P. (2006). W poszukiwaniu wytycznych co do treści rozporządzenia. Studium przypadku. [In search of guidelines on the content of the regulation: A case study]. Przegląd Legislacyjny, 6, 74–80.