

Equality implies proportionality: Assessing the (dis)proportionality of constituencies created for the 2022 Slovak regional elections

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Politics in Central Europe (ISSN 1801-3422)

Vol. 19, No. 4

DOI: 10.2478/pce-2023-0030

Abstract: *In a democratic environment, political equality implies proportionality. Achieving this in an electoral setting can be complicated and unrealistic. The aim of this article is to investigate the logic, approach and method of creating constituencies in the elections for Slovak self-governing regions in 2022. We track the key attributes related to proportionality: the legislation, the actual creation of constituencies, the mechanisms used for the redistribution of mandates and the achievement of proportionality in individual constituencies within particular regions. Our results indicate considerable disproportionality within the constituencies of particular self-governing regions, which is mainly caused by the lack of effective legislation, the different approaches of authorities in creating constituencies and the absence of limits to the violation of electoral and thus political equality.*

Key words: *(dis)proportionality, malapportionment, regional elections, Slovakia, electoral equality*

I. Introduction

Electoral equality refers to the principle that each individual's vote should have an equal weight in the outcome of an election. This means every eligible voter, regardless of race, gender, socioeconomic status or any other characteristic, should have an equal opportunity to participate in the electoral process and should have their voice heard through the ballot box. Similarly, electoral equality is a fundamental component of democracy, as it ensures every citizen's right

to vote is protected and that the outcome of elections should ideally accurately reflect the will of the people. Without electoral equality, certain groups or individuals may be systematically excluded from the political process, leading to a lack of representation and accountability in government (Dahl 1998). Efforts to promote electoral equality often focus on measures such as ensuring fair and accessible voting procedures, combating voter suppression tactics, promoting voter education and engagement and working to eliminate barriers that prevent certain groups from participating in the political process (Mair 2013; Dubrow 2014).

The research on elections and electoral systems, which belongs to the core of political science, has been fairly extensive and robust over recent decades. However, systematic research on electoral imperfections and distortions is underdeveloped, thus creating a void in electoral studies. As suggested by Dančišin (2005), this indicates that electoral mechanisms are always characterised by their imperfections. At the legislative level, therefore, we should logically aim at least to minimise such imperfections, in so far as current knowledge permits.

Despite the fact that there is a large amount of academic literature dedicated to electoral studies in Central Eastern Europe, there is a significant lack of interest in examining the electoral systems and their disparities and imperfections related to particular electoral settings at individual levels of the state. Such research is rather underdeveloped in Slovakia, compared for example to the Czech Republic. The literature review is even narrower if we focus our academic attention beyond the national parliament (National Council of the Slovak Republic), and look at the elections to local self-governing institutions. The most significant works in this area are by Dančišin (2018; 2019) and Bardovič (2023), and the brevity of this list confirms the significant gap and lack of data in this particular research area. Our empirical research has the ambition to build on previously published material to support our main arguments about the malapportionment practice and electoral discrepancies at the regional level in Slovakia.

II. Measuring (dis)proportionality in the electoral systems: A literature review

One of the important criteria for assessing electoral systems is their proportionality. This phenomenon is well covered in the academic literature, and its importance is emphasised by several authors. The title of our paper, inspired by McGann (2006: 35), suggests that equality implies proportionality, which is, in Lijphart's (1984) words, synonymous to political justice. Similarly, Dahl (1998) emphasises that democracy should guarantee equality to all individuals: in other words, the government should give equal consideration to the good and interests of every person (Lawrence 2014). However, Mair (2013) questions formal political equality and argues that democratic principles are not guaran-

teed or sufficient in a society. Horowitz (2006) included the proportionality of the distribution of mandates with respect to the number of votes among the six goals of electoral systems. These can also be understood in some ways to be criteria enabling us to evaluate an electoral system. In addition to proportionality, Horowitz includes accountability to voters, the formation of lasting governments, the Condorcet winner, inter-ethnic and religious reconciliation and minority representation (Horowitz, 2006). Taagepera and Grofman confirm the importance of proportionality when they state that ‘disproportionality is key to considerations of electoral justice’ (Taagepera – Grofman 2003: 660). When looking at changes to elections rules, Taagepera (1973) used the size of constituency and the quantitative aspects of changes to test the seat-vote equality.

In the academic literature devoted to the issue of proportionality and disproportionality, we find that some works bring their own definitions of these terms (Loosemore – Hanby 1971; Lijphart 1985; Lebeda 2008) while others examine and reflect on previously formulated definitions (Dančišin 2013). There are also studies focused on the differences between specific electoral settings, or on mathematical formulas from the point of view of selected indices (definitions) of proportionality (Bedock 2017; Lundell 2012; Lebeda 2006). Other works simultaneously research existing definitions of proportionality and mathematical formulas and at the same time bring their own understanding of this phenomenon (Lebeda 2008; Lijphart 1985). The Czech academic environment concludes that measuring electoral proportionality is still a challenge for researchers, although they propose their own tools for how to measure it (Jarabinský – Líbal – Oreský 2022; Charvát 2010; Lebeda 2006). In general, political scientists recognise two approaches to measuring proportionality. First, they look at Hare’s quota and the largest remainder method which, using distortion indices, comes out as a proportional one (Jarabinský – Líbal – Oreský 2022; Lebeda 2006). Then there is another approach which measures the number of votes per mandate, which corresponds to the D’Hondt method (Jarabinský – Líbal – Oreský 2022; Lebeda 2006).

Given the differences in the varying approaches of political scientists, we believe that currently there is no uniform definition of how to determine proportionality or disproportionality. Evidence of this fact is the existence of several indices. Nevertheless, there is an agreement on the basic indicator that a proportional result should bring a party with a certain share of votes the same share of mandates (Brighouse – Fleurbaey 2010). In mathematical terms, the ideal and thus the desired proportionality could be stated as follows: for each political party $h_i = m_i$ should apply, where h_i represents the share of votes obtained by a specific political party i and m_i the share of its obtained mandates. Pennisi (1998) also expresses this logic as follows: $m_i / M = h_i / H$ or $m_i / h_i = M / H$. In this case, however, we do not work with shares, but with absolute numbers, so for a specific political party i we have mandates obtained m_i , votes

received h_i and subsequently in the elections, H votes were cast and M mandates were allocated.

Proportionality research itself is important, not least because no single electoral system is perfect. Therefore, following Lijphart's (1985) argument, even if there is a very small group of cases (i.e. these are very exceptional situations) when some electoral technique will bring about completely proportional results, it is impossible to expect completely accurate proportional results from any electoral system. Lijphart even adds: 'all electoral systems achieve significantly less proportionality than is mathematically possible' (Lijphart 1985: 10). In connection to the measurement of (dis)proportionality, Gallagher (1991) argues about the existence of two large categories. In both of these, we work with the votes of the party and the mandates it has won, but in the first category the absolute difference between them is monitored, and in the second category it is the share. In the second attempt at categorisation, we find approaches working both with a picture of the election results with regard to a particular political party, or an average political party, or a certain partial rendering of the situation.

One of the most frequently used methods for the evaluation of (dis)proportionality is the Loosemore-Hanby index (Lebeda 2008; Lijphart 1990; Loosemore-Hanby 1971). Authors refer to it as the distortion index (D). The logic of this index is it calculates the difference between the share of votes and the share of mandates for each party. These differences are then added up in absolute values and divided in half. Loosemore and Hanby (1971) interpret the given index as having a value of 0 to 1, but we also encounter an approach (Lebeda 2008) where it ranges from 0 to 100. This difference depends on the form in which the percentages enter the calculation itself. The mathematical expression can thus be as follows: $D = \frac{1}{2} \sum |h_i - m_i|$, where h_i represents the share of votes of a specific party expressed in percentages and m_i its share of mandates. However, we can also see the interpretation in the following form: $D = \frac{1}{2} \sum |h_i / H - m_i / M|$, where the respective values do not express the share but the total number of party votes (h_i), votes cast (H), party mandates (m_i) and allocated mandates (M) (Pennisi 1998). Nevertheless, within both approaches, 0 means absolute proportionality, and any value different from this represents a degree of distortion, or deviation from the desired proportionality.

Like any index, this one has its limits. Lebeda (2008) summarised them in two points. First, he notes its inability to depict the real situation in some circumstances, as it does not provide complete information. Second, it tends to favour Hare's quota and also the largest remainder method. In addition, an excessive sensitivity to the number of political parties that are included in its calculation is considered a limitation (cf. Lijphart 1985). An almost identical approach was chosen by the authors Mackie and Rose (1991), who determined proportionality in the states monitored first by calculating the difference between the share of mandates and the share of votes. The resulting absolute values

for all political parties were calculated and then divided by two. As a last step, this value was subtracted from the number 100. The authors do not explicitly state that absolute values should be used here, but we encounter this when presenting the mathematical formula of this index. It means that it is possible to express it as $RM = 100 - \frac{1}{2} (\sum^n |m_i - h_i|)$ (cf. Lebeda 2008). The subsequent interpretation is in a certain respect different from the Loosemore-Hanby index, despite the fact that the value ranges from 0 to 100. As Lebeda (2008) further states, in this case it is calculated to what extent the results of the election are proportional; in other words, the desired state is to approach the upper limit of this index as nearly as possible.

At first sight, a similar procedure to that used in the Loosemore-Hanby index is also found in the index associated with Rae (1967). In his case, however, the total sum of differences resolving the share of votes and the share of mandates is divided by the total number of political parties included in this calculation. It is worth noting that, according to the author's proposal, not all political parties that participated in the elections should be taken into account here, but only those who gained at least 0.5% of the votes. The logic of dividing by the number of political parties suggests that the resulting value will actually be an average. It does not give a picture for all political parties, but tells us more about the average disproportionality with respect to the political parties taken into account (cf. Gallagher 1991; Lijphart 1985). Lebeda (2008) mentions the problematic nature of the upper limit in connection with this index. While the lower limit is completely clear, at level 0 – it means the desired proportionality, the upper limit is not explicitly defined, as it has a dynamic form. It is determined through the $200 / n$ procedure, which means that the number of political parties (n) affects its score. Among other problems, this index is sensitive with small political parties (cf. Lijphart 1985; 1990). Overall, however, all these three indices have a problem when they are supposed to capture possible changes within over-represented or under-represented political parties (Pennisi 1998).

An alternative to measuring proportionality is, for example, the two-major-party index introduced by Lijphart (1985). He assumed that the inclusion of only the two strongest political parties could create a sufficient image to capture proportionality. Its essence is thus based on the calculation of the difference between the share of votes and the share of mandates for each of the two strongest political parties. The sought index is then the average of these two values. Mathematically, it can be expressed as $AL = [|h_{i1} - m_{i1}| + |h_{i2} - m_{i2}|] / 2$. Looking at the logic of this index and some party systems and election results in the given states (including Slovakia) we can see that this approach has limitations because it fails to capture several attributes associated with the proportionality of the electoral system (Lebeda 2008).

Another possible way of measuring proportionality is through an index known as the Least Squares Index. Some authors (e.g. Pennisi 1998) consider

it a compromise between the Loosemore-Hanby index and the Rae index. In essence it also works with the share of votes and the share of mandates, which are subtracted from each other, while this value is multiplied by the square. This procedure is done for each political party and then the values are added up. This partial result is then divided by two and then squared in the end (cf. Gallagher 1991).

We also find several attempts at compromises with already existing indices. Lijphart (1985) presented, for example, a modified Loosemore-Hanby index, where number two as a divisor should be replaced by the value presented by the authors Laakso and Taagepera (1979), and is referred to as the effective number of parties – $N_2 = 1 / (\sum_{i=1}^n p_i^2)$, where p_i represents the share of votes or mandates of political party i . All parties that won mandates or votes are included in the total (Laakso-Taagepera, 1979). In the same way, the authors suggested adjusting Rae's index so that not only should parties with less than 0.5% support be eliminated, but also all parties with up to 5%.

A specific view on proportionality is given by the so-called advantage ratio (A) which is also known as an index of representation (Lebeda 2011). A similar logic and explanation can be found in Šedo (2007), who, however, refers to it as the deformation index and combines it with the abbreviation I. This approach is aimed at monitoring specific political parties, so it does not monitor the influence of the electoral system on the party system as such. As Taagepera and Laakso (1980) point out, the sought value A is the result of dividing the share of mandates of a particular political party by the share of its votes. Mathematically, it can be expressed as follows: $A = S_i / V_i$. From our point of view, the advantage of this procedure is the focus on specific political parties and that when it is applied we obtain an overview of each of them. Taagepera and Laakso (1980) concur that we can observe whether the observed distortion in representation changes by changing the size of the political party (with respect to votes).

The procedures mentioned are far from covering all possible definitions of proportionality and disproportionality. Other summaries are offered by the authors already mentioned (e.g. Lebeda 2008; Dančišin 2013). In addition, other experts offer attempts to grasp this phenomenon more precisely. For example, some authors (Martínez-Panero et al. 2019; Arredondo et al. 2020) note that the electoral system cannot produce absolutely proportional results. They distinguish between forced and unforced disproportionality. And it is the latter they are trying to capture within the indices they propose.

Moreover, proportionality research is not narrowly limited to the indices themselves. We can find other works that used them to monitor various other phenomena, or the influence of selected variables on the results. For example, there are works that note the important influence on proportionality not only of the electoral formula, but also the size of electoral districts, and Lijphart (1990) follows Rae (1967) in an attempt to update his findings and methodology used.

Looking at the Slovak case, Dančišin (2005; 2013; 2019) produced an important summary of possible criteria for evaluating electoral systems. While in his first publication from 2005, he discussed in particular the unanimity criterion, the Condorcet criterion, the monotonicity criterion, the criterion of independence from irrelevant alternatives, the consistency criterion and the criterion of symmetrical reversal of preferences (Dančišin 2005), in his 2013 publication he had already become more specific as he focused on proportional electoral systems. In addition to the issue of proportionality, which we deal with above, here we find an elaboration of the monotonicity criterion, with an orientation towards mandates (criterion of monotony of mandates) and votes (criterion of monotony of votes). In addition, the criterion of compliance with the electoral quota and also the criterion of exactness, anonymity, equality, homogeneity, consistency and superadditivity are addressed here. In the 2019 publication he again makes a specific point, which in this case is linked to the existence of constituencies and their formation. This includes, as key criteria related to the possible elimination of malapportionment, the criterion of equinumerosity of mandates in individual constituencies, the criterion of compactness and the criterion of continuity (Dančišin 2019).

Another important phenomenon is relevant when discussing the proportionality of constituencies within an electoral system: malapportionment. It is a construct that tells how much deviation exists or does not exist between individual constituencies in an area of comparable size (Samuels – Snyder 2001). One of the definitions says that ‘ideally formed constituencies have the number of inhabitants per member of parliament equal to the average number of inhabitants per mandate’ (Dančišin 2019: 27). Any deviation can then be understood as the presence of malapportionment in the electoral system. Other authors argue (Ong – Kasuya – Mori 2017: 1) that it is a ‘mismatch between the proportion of population in a constituency and its proportion of seats’.

When discussing the formation of constituencies, especially if they are not to be single-member constituencies, the question of determining the mechanism for achieving proportionality and thus equality plays an important role. Academic literature has shown a relatively extensive number of ways in which it is possible to distribute mandates between individual parts of the territory. The distortion (deformation) index is based on mathematical calculations that take into account the number of voters in a district and the percentage of votes for each political party, as well as the location of district boundaries. A high value of the distortion index indicates that the constituency was designed to give an undue advantage to one political party or group of voters at the expense of others. Constituencies are often divided by law, but they can also be customised by political parties or their supporters to gain an advantage in upcoming elections. The distortion index is a tool for tracking and assessing the extent to

which constituencies are subject to malapportionment, and it can help create fairer and more balanced constituencies.

The distortion index can be achieved in a variety of ways, including changing electoral district boundaries to include or exclude certain voter groups, and dividing areas with large numbers of electoral votes to create districts with a majority of votes for a political party or candidate. This process has a negative impact on democracy, as the distortion of constituencies can mean that the voice of a certain group of voters is not fairly represented. In some cases, this behaviour may become illegal or unconstitutional, and it is important that this practice be highly scrutinised and regulated to ensure the fairness and equality of electoral system.

III. Legal regulation in Slovakia: Steps or traps towards constituency proportionality?

In addition to the Constitution of the Slovak Republic itself (Act 460/1992 Coll.), the laws defining the rules for elections to the bodies of self-governing regions are mainly Act 180/2014 Coll. on the conditions for exercising the right to vote and also Act 302/2001 Coll. on the self-government of higher territorial units (Act on Self-governing Regions). Pursuant to Act 180/2014 Coll. for the allocation of seats in self-governing regional councils, a mechanism based on the election of specific persons and not candidate lists is used. This means that it is a highly personalised electoral system, where the winner or winners in an electoral district are the candidates who receive the highest number of votes, taking into account the number of mandates for the given territory. The important variables of this electoral system are linked to constituencies.

The most important adjustments regulating the creation of constituencies can be found in Act 180/2014 Coll. § 134 (1): 'For the elections of council members, single-mandate constituencies or multi-mandate constituencies are established in each self-governing region, in which council members are elected in proportion to the number of residents of the self-governing region.' This general definition is supplemented in other points only by fairly brief requirements for the publication of information about the electoral districts themselves, the number of deputies elected within them, the seats of the district electoral commissions, and the list of municipalities falling into the respective electoral districts (Act 180/2014 Coll.).

These rather vague rules are supplemented by the second of the laws mentioned above (Act 302/2001 Coll.). However, this law directs attention to the actual size of the council in relation to the number of inhabitants and not to the constituencies themselves. Therefore we should consider the given range for the number of inhabitants who should vote for each deputy's mandate – 12,000 to 15,000 inhabitants – as a rough framework for looking at the constituencies

themselves. The legislation lacks a clear regulation for determining proportionality. At the same time, there is no obligation to publish the starting values for determining the proportionality itself, i.e. the number of inhabitants per region and individual constituencies.

The legislation also does not specify on which day the number of inhabitants should be determined and which institution should be the source of this information. Last but not least, the law lacks definite rules regarding the size of constituencies or their borders. In the case of the actual size of constituencies, the law only defines the minimum size (a single-mandate constituency), but the maximum size is not laid down. Likewise, there are no requirements for the size of individual constituencies, so that a self-governing region can create single-mandate constituencies for the election of its council, but also constituencies with 13 mandates or even more.

Some self-governing regions are aware of several of the shortcomings mentioned. For example, the council of the Bratislava Self-governing Region issued an explanatory report on its proposal for determining its electoral districts and the number of deputies elected in them (Council of Bratislava Self-Governing Region 2022) which reflected on the fact that they are not bound by any legislation that would determine the source of information about number of inhabitants.

For these reasons, the legal regulation of the electoral rules, especially in the area of constituency creation, is inadequate for avoiding disproportionality. On the contrary, there may be a crucial discrepancy between the allocation of seats and the share of population, which means that malapportionment may occur within a given constituency.

IV. Data and methods

The aim of this article is to investigate the logic, approach and method used for creating constituencies within self-governing regions in Slovakia in the 2022 regional elections. We seek to investigate the key attributes for achieving proportionality in the legislation and the real constituency proportionality created prior to the elections. Second, the aim is to identify the mechanisms actually used for the distribution of mandates between individual constituencies and the achievement of proportionality on the part of individual regions with regard to the procedures used.

The article therefore seeks to answer three research questions:

1. What is the approach of self-governing regions to publishing information on the mechanism for creating electoral districts?
2. What methods do self-governing regions use when determining the size of constituencies (and thus the distribution of mandates) with regard to the number of inhabitants?

3. Does the resulting distribution of mandates between individual constituencies bring proportional results and enable the achievement of voting equality?

To achieve the article's goal and provide answers to the research questions, the official documents of the individual self-governing regions (resolutions, legal regulations and minutes of council meetings) and data from the Statistical Office of the Slovak Republic serve as data sources. The basic set consists of all eight self-governing regions.

In an attempt to identify the approach of individual municipalities in creating electoral constituencies, the following indicators have been monitored in the official documents of local governments:

- the number of inhabitants in the region and the number of inhabitants belonging to individual electoral districts;
- the source for determining the number of inhabitants;
- the date on which the number of inhabitants is based;
- the mechanism for determining the size of constituencies.

These indicators enable us to identify the extent to which the local governments communicate openly with the public about key factors related to the creation of constituencies. Subsequently, on the basis of the data obtained, we identify the mechanisms used in individual self-governing regions for distributing mandates between individual constituencies.

However, due to the legislative vagueness of the rules for the creation of constituencies (e.g. their number, in essence also size or territorial limits), monitoring only the attributes mentioned above will not provide a sufficient picture for capturing whether the desired proportionality is achieved when creating constituencies. To put it simply, this phenomenon is also conditioned by other factors that shape it (e.g. size, number, territory).

This is also why the final size of constituencies in the case of self-governing regions is confronted with a deformation index. This is linked to reference values of the number of inhabitants belonging to individual constituencies, while we operate with the share of the population and mandates and thus make it possible to identify the deviation from the desired state for each constituency separately.

In addition, we monitor other important indicators:

- the number of inhabitants who are represented by one mandate within the district;
- the difference from the determined value (calculated Q or artificially determined Q) in real numbers and in percentages.

By doing this, it is possible to identify discrepancies which may indicate the need for a more fundamental regulation of the rules for the creation of constituencies due to the potential scope for violating the equality of electoral rights. In the case of the number of inhabitants voting for one mandate within one electoral district, we consider as a reference value the range of 12,000–15,000

inhabitants, which is not defined in the legislation (Act No. 302/2001 Coll.) as a condition for individual electoral districts, but only for the entire territory of the region when determining the number of deputies in the council. This may play a significant role in researching proportionality.

V. Results

Before we move on to the main objectives of this article, we examine the development of the number of constituencies in individual self-governing regions from the first elections in 2001 to the latest elections in 2022. There are three indicators monitored: the number of elected deputies, the number of constituencies and the number of single-mandate constituencies. As can be seen, most of the self-governing regions did not make significant adjustments over this period and even in the three cases marked as bold in Table 1, it can be concluded that no changes were made in the areas monitored. However, there is one notable exception in the list of eight self-governing regions, which is the Bratislava Self-governing Region. The latter adjusted the numbers in all three monitored indicators. This was most pronounced in the number of constituencies (from the original 8 to a total of 24) and also in the number of single-mandate constituencies (from the original 0, to 13 in the previous elections, and with a slight reduction to 10 in the elections of 2022). As we will see below, this significant fragmentation of the territory has certain consequences.

Table 1: Development of constituencies formed for elections to councils of self-governing regions

Region (SGR)	Number of elected deputies						Number of constituencies						Number of single-mandate constituencies					
	2001	2005	2009	2013	2017	2022	2001	2005	2009	2013	2017	2022	2001	2005	2009	2013	2017	2022
Bratislava	46	50	44	44	50	53	8	8	18	18	24	24	0	0	8	8	13	10
Trnava	40	40	40	40	40	40	7	7	7	7	7	7	0	0	0	0	0	0
Trenčín	45	45	45	45	47	44	9	9	9	9	9	9	0	0	0	0	0	0
Nitra	52	52	54	54	54	54	7	7	8	8	8	8	0	0	0	0	0	0
Žilina	52	57	57	57	57	57	11	11	11	11	11	11	1	1	1	1	1	1
Banská Bystrica	49	49	49	49	49	49	13	13	13	13	13	13	1	1	1	1	1	1
Prešov	60	62	62	62	62	65	13	13	13	13	13	13	1	1	1	1	1	1
Košice	57	57	57	57	57	57	11	11	11	11	11	11	0	0	0	0	0	0

Source: Authors, based on The Statistical Office of the Slovak Republic

The following table captures how individual self-governing regions approach the publication of information on the creation of constituencies. This means how openly they inform the public about important attributes related to the essential principles of free and democratic elections, which in their essence condition compliance with the equality of votes declared by the constitution. At the same time, it captures the significant space offered to self-governments by the current lack of regulation regarding the formation of constituencies in the Electoral Act, which is the competence of the individual councils of the self-governing regions. In direct connection with the published information, we identify what mechanism is used by individual self-governing regions for the distribution of mandates between individual constituencies.

As we can see, the Nitra and Banská Bystrica self-governing regions publish only a minimum of information relating to the formation of constituencies. The Banská Bystrica region does not, in its official documents, list reference values for forming the size of the constituencies, i.e. the number of inhabitants, or the source for determining the number of inhabitants, or the date on which the size of the constituencies was determined or, last but not least, the mechanism for calculating proportionality. It is followed by the Košice Self-governing Region, which has at least published data on the number of inhabitants belonging to electoral districts, even if it has not yet published a specific mechanism for calculating the mandates for individual electoral districts. The Trnava Self-governing Region has a specific stance in monitoring the number of inhabitants, and, unlike the other regions, did not publish data on the number of inhabitants belonging to the electoral district, but only the total number of inhabitants for the entire territory of the region. In total, we can identify seven self-governing regions that indicated the date on which they determined the number of inhabitants. Three approaches can be identified in this area. In the first approach, the size is determined as of 31 December 2021 (four self-governing regions), in the second approach as of 28 February 2022 (one self-governing region) and in the third approach as of 31 March 2022 (two self-governing regions).

The last of the monitored indicators in the following table, which (similarly to the previous ones listed in this table) does not have to be published according to current legislation, is the mechanism for determining the size of individual constituencies – i.e. the definition of proportionality or the mathematical formula. In total, five self-governing regions stated this in some form in their official materials, and we can identify two approaches. In the first approach, municipalities determine size based on calculations. Even if it is not explicitly mentioned or named in official materials, they use what in political science literature is known as Hare's quota, in combination with the method of the largest remainder (three self-governing regions). The second approach was chosen by those municipalities where the quota is defined artificially: 13,000 inhabitants

per mandate in the Prešov Self-governing Region and 12,000 inhabitants per mandate in the Trenčín Self-governing Region.

The absence of a definition of proportionality in the legislation creates conditions where individual municipalities can adopt different approaches to determining what it means. This ultimately gives scope for targeting a mechanism that can favour or disadvantage selected areas of the region. Moreover, as we will see below, it creates an opportunity for potentially distorting the results in a way that could not be achieved by any established mechanism for determining proportionality.

Table 2: Publication of information on creating constituencies for the 2022 elections by self-governing regions (SGR)

Region (SGR)	Number of inhabitants listed	Explicit indication of the source (number of population)	Population as of date	Listed conversions for size determination
Bratislava	yes – constituency included	Statistical Office of the Slovak Republic	31.12.2021	yes; unnamed but listed calculations corresponding to Hare's quota and largest remainder
Trnava	yes – only total number	Statistical Office of the Slovak Republic	31.12.2021	no; not listed but the value of one mandate determined by Hare's quota is explicitly stated
Trenčín	yes – constituency included	Statistical Office of the Slovak Republic	31.12.2021	yes; Q not calculated but fixed at 12,000
Žilina	yes – constituency included		31.3.2022	yes; Q not calculated but corresponds to Hare's quota and largest remainder
Nitra	Not listed	Statistical Office of the Slovak Republic	31.12.2021	no
Banská Bystrica	Not listed		Not listed	no
Prešov	yes – constituency included		28.2.2022	yes, fixed value of 13,000 per mandate + the largest remainder
Košice	yes – constituency included		31.3.2022	no

Sources: Authors, based on official documents of self-governing regions

We start with one of the more problematic self-governing regions in the field of electoral district formation, namely the Bratislava Self-governing Region. It proposed up to 24 constituencies for filling seats in the representative body, ten of which are single-mandate. Even the openness of this region in revealing their calculations for determining the size of constituencies was not helpful in preventing disproportionate results. There are significant differences in the number of inhabitants per mandate. The lowest value is achieved by Electoral District No. 21 (10,066), while Electoral District No. 22 has the highest value (19,097). The difference between these two constituencies is thus 9,031, representing 89.7% of the population voting for one mandate in Electoral District

Table 3: Bratislava Self-Governing Region and constituencies in the 2022 elections

Constituency	Inhabitants	Mandates	Inhabitants / mandate	Difference	Difference %	Inhabitants share	Mandates share	Distortion index
1	46,432	3	15,477	1 822	113	6.42	5.66	0.88
2	80,951	6	13,492	- 163	99	11.19	11.32	1.01
3	20,559	2	10,280	- 3 376	75	2.84	3.77	1.33
4	23,491	2	11,746	- 1 910	86	3.25	3.77	1.16
5	44,638	3	14 879	1 224	109	6.17	5.66	0.92
6	32,056	2	16,028	2,373	117	4.43	3.77	0.85
7	35,420	3	11,807	- 1,848	86	4.89	5.66	1.16
8	19,069	1	19,069	5,414	140	2.63	1.89	0.72
9	36,024	3	12,008	- 1,647	88	4.98	5.66	1.14
10	14,641	1	14,641	986	107	2.02	1.89	0.93
11	122,296	9	13,588	- 67	100	16.90	16.98	1.00
12	23,756	2	11,878	- 1,777	87	3.28	3.77	1.15
13	13,035	1	13,035	- 620	95	1.80	1.89	1.05
14	12,271	1	12,271	- 1,384	90	1.70	1.89	1.11
15	13,930	1	13,930	275	102	1.92	1.89	0.98
16	15,817	1	15,817	2,162	116	2.19	1.89	0.86
17	24,838	2	12,419	- 1,236	91	3.43	3.77	1.10
18	16,539	1	16,539	2,884	121	2.29	1.89	0.83
19	16,122	1	16,122	2,467	118	2.23	1.89	0.85
20	13,643	1	13,643	- 12	100	1.89	1.89	1.00
21	20,131	2	10,066	- 3,590	74	2.78	3.77	1.36
22	19,097	1	19,097	5,442	140	2.64	1.89	0.72
23	25,565	2	12,783	- 873	94	3.53	3.77	1.07
24	33,393	2	16,697	3,042	122	4.61	3.77	0.82
Total	723,714	53	13,655 →	Calculated Q	100	100	100	
	Hare's quota		13,655					

Source: Authors, based on The Statistical Office of the Slovak Republic

No. 21. The first of these constituencies is thus significantly overrepresented while the second is significantly underrepresented. The consequence of this is that while in the first case the voter has the vote power of 1/10,066, in the second case it is only 1/19,097. This raises a fundamental question about equal voting rights. This is all the more important because looking at Table 3, we see that 13 electoral districts do not fit into the legislatively-defined interval (12,000–15,000) for determining the number of inhabitants per member of the council. The existence of distortion is underlined by the deformation index, which ranges from 1.36 to 0.72.

The second of the regions shows several interesting situations. That is also why it is represented by means of two tables (Table 4 and Table 5). The first captures the original proposal submitted to the council, which operated with an artificially defined quota. We see that even here there are several problematic constituencies: six of the total number of 13 did not fit into the interval of 12,000–15,000 inhabitants for one mandate. This indicator is valid only for the territory of the entire region, but not necessarily within individual constituencies. The electoral district with the smallest number of inhabitants per one mandate is at the level of 9,860 (No. 11), while the electoral district with the highest number of inhabitants per mandate has 15,686. The difference between them is thus 5,826 inhabitants, which represents 59.1% of the population belong-

Table 4: Prešov Self-governing Region and constituencies in the 2022 elections (according to the original proposal)

Constitu- ency	Inhabit- ants	Man- dates	Inhabitants / mandate	Difference	Difference %	Inhabitants share	Mandates share	Distortion index
1	75,740	6	12,623	- 377	97	9.38	9.38	1.00
2	59,435	5	11,887	- 1 113	91	7.36	7.81	1.06
3	74,290	6	12,382	- 618	95	9.20	9.38	1.02
4	33,088	3	11,029	- 1 971	85	4.10	4.69	1.14
5	10,847	1	10,847	- 2 153	83	134	1.56	1.16
6	102,409	8	12,801	- 199	98	12.68	12.50	0.99
7	173,334	13	13,333	333	103	21.46	20.31	0.95
8	60,639	5	12,128	- 872	93	7.51	7.81	1.04
9	34,596	3	11,532	- 1 468	89	4.28	4.69	1.09
10	52,854	4	13,214	214	102	6.55	6.25	0.95
11	19,719	2	9,860	- 3 141	76	2.44	3.13	1.28
12	31,371	2	15,686	2 686	121	3.88	3.13	0.80
13	79,204	6	13,201	201	102	9.81	9.38	0.96
Total	807,526	64	13,000 →	artificially determined Q	100	100	100	
	Hare's quota		12,618					

Source: Authors, based on The Statistical Office of the Slovak Republic

ing to one mandate in the No. 11 district. The existence of a considerable level of distortion in the distribution of mandates is also reflected in the distortion index, which ranges from 0.8 to 1.28.

However, the Prešov region is also interesting because the original proposal submitted to the council was modified by the deputies. Table 5 captures its final form.

The need to make the legislation more specific can be illustrated by the discussions that took place on this point within the council of the Prešov Self-governing Region. Individual deputies argued, for example, over the number of municipalities within a specific electoral district or even the number of roads in it. At the same time, they often neglected the key reference element for determining the number of mandates, namely the number of inhabitants. As a result, the number of mandates allocated for Electoral District No. 12 was changed. This step was taken without any particular mathematical mechanism. The total number of members of the council was simply increased by one mandate (from the originally planned 64 to 65) in that particular electoral district. However, we should also mention that the difference between the electoral district with the lowest number of inhabitants for one mandate (No. 11) and the highest number of inhabitants for one mandate (No. 7), namely 3,473 inhabitants, was narrowed, representing 35.22% of No. 11's inhabitants.

Table 5: Prešov Self-governing Region and constituencies in the 2022 elections (on the basis of the final resolution)

Constituency	Inhabitants	Mandates	Inhabitants / mandate	Difference	Difference %	Inhabitants share	Mandates share	Distortion index
1	75,740	6	12,623	- 377	97	9.38	9.23	0.98
2	59,435	5	11,887	- 1 113	91	7.36	7.69	1.05
3	74,290	6	12,382	- 618	95	9.20	9.23	1.00
4	33,088	3	11,029	- 1,971	85	4.10	4.62	1.13
5	10,847	1	10,847	- 2,153	83	1.34	1.54	1.15
6	102,409	8	12,801	- 199	98	12.68	12.31	0.97
7	173,334	13	13,333	333	103	21.46	20.00	0.93
8	60,639	5	12,128	- 872	93	7.51	7.69	1.02
9	34,596	3	11,532	- 1,468	89	4.28	4.62	1.08
10	52,854	4	13,214	214	102	6.55	6.15	0.94
11	19,719	2	9,860	- 3,141	76	2.44	3.08	1.26
12	31,371	3	10,457	- 2,543	80	3.88	4.62	1.19
13	79,204	6	13,201	201	102	9.81	9.23	0.94
Total	807,526	65	13,000 →	artificially determined Q	100	100	100	
	Hare's quota		12,423					

Source: Authors, based on The Statistical Office of the Slovak Republic

The Žilina Self-governing Region took the route of calculating the quota. However, even that was not enough to avoid several deviations from the desired state. In this case, the majority of constituencies fall outside the 12,000–15,000 range determined for the territory of the region as such. The difference between the largest number of inhabitants (No. 9) and the smallest number of inhabitants (No. 1) having one mandate within the electoral district is in this region 5,448 inhabitants, which represents 52.44% of the inhabitants per mandate in No. 1 Electoral District. The deformation index varies from 0.76 to 1.16.

Table 6: Žilina self-governing region and constituencies in the 2022 elections

Constituency	Inhabitants	Mandates	Inhabitants / mandate	Difference	Difference %	Inhabitants share	Mandates share	Distortion index
1	31,168	3	10,389	- 1,697	86	4.52	5.26	1.16
2	87,805	7	12,544	458	104	12.75	12.28	0.96
3	38,904	3	12,968	882	107	5.65	5.26	0.93
4	32,602	3	10,867	- 1,219	90	4.73	5.26	1.11
5	71,651	6	11,942	- 144	99	10.40	10.53	1.01
6	93,675	8	11,709	- 377	97	13.60	14.04	1.03
7	63,581	5	12,716	630	105	9.23	8.77	0.95
8	56,961	5	11,392	- 694	94	8.27	8.77	1.06
9	15,837	1	15,837	3,751	131	2.30	1.75	0.76
10	35,803	3	11,934	- 152	99	5.20	5.26	1.01
11	160,914	13	12,378	292	102	23.36	22.81	0.98
Total	688,901	57	12,086 →	undetermined but Q calculated	100	100	100	
	Hare's quota		12,086					

Source: Authors, based on The Statistical Office of the Slovak Republic

The Trenčín Self-governing Region is currently an exception. It set a relatively low artificial quota of 12,000 inhabitants for one mandate, which appears to have caused the fewest problems. All constituencies exceed the set value of 12,000 in terms of the number of inhabitants per one mandate, but at the same time they do not exceed the value of 15,000. Nevertheless, we also have slightly overrepresented but also slightly underrepresented constituencies in this region. However, it is not as pronounced an issue as in some other regions. The difference between the lowest number of inhabitants with one mandate (No. 1) and the highest number with one mandate (No. 5) is 2,699, which represents 22.44% of the inhabitants per mandate in No. 1.

Table 7: Trenčín Self-governing Region and constituencies in the 2022 elections

Constitu- ency	Inhabit- ants	Man- dates	Inhabitants / mandate	Difference	Difference %	Inhabitants share	Mandates share	Distortion index
1	36,081	3	12,027	27	100	6.29	6.82	1.08
2	57,511	4	14,378	2,378	120	10.02	9.09	0.91
3	25,363	2	12,682	682	106	4.42	4.55	1.03
4	61,512	5	12,302	302	103	10.72	11.36	1.06
5	44,179	3	14,726	2,726	123	7.70	6.82	0.89
6	61,211	5	12,242	242	102	10.67	11.36	1.07
7	130,616	10	13,062	1,062	109	22.77	22.73	1.00
8	44,133	3	14,711	2,711	123	7.69	6.82	0.89
9	113,093	9	12,566	566	105	19.71	20.45	1.04
Total	573,699	44	12,000 →	artificially determined Q	100	100	100	
	Hare's quota		13,039					

Source: Authors, based on The Statistical Office of the Slovak Republic

The last of the self-governing regions examined is the Košice Self-governing Region. As mentioned earlier, it did not publish the specific mechanism used for allocating mandates to individual constituencies. For this reason, the most frequently used mechanism in Slovak regions, the classic Hare's quota in combination with the largest remainder method, has only been applied for illustrative purposes. However, it was still possible to capture the key values. In this case, there are only two constituencies in the range of 12,000–15,000 inhabitants per mandate. In the case of the constituencies with the smallest number of inhabitants per mandate, it is 11,185 inhabitants (No. 9), while in the case of the one with the highest number, it is 15,822 inhabitants per mandate (No. 6). The difference between these two constituencies is 4,647 inhabitants, which represents 41.83% of the inhabitants per mandate in No. 9 district.

VI. Conclusion

Our findings and data from the 2022 regional elections in Slovakia align with the findings of previous works (Dančišin 2018, 2019; Bardovič 2023) dealing with election regulations and the (dis)proportionality of election results in Slovakia. Dančišin (2019) examined violations of equality in elections and found them present both in self-governing regions and at the municipal level. As confirmed by Bardovič (2023), there are also clear indications of this problem and the presence of disproportionality in the 2017 elections to the self-governing regions. He researched the question of input values for determining the size

Table 8: Košice Self-governing Region and constituencies in the 2022 elections

Constitu- ency	Inhabit- ants	Man- dates	Inhabitants / mandate	Difference	Difference %	Inhabitants share	Mandates share	Distortion index
1	63,917	5	12,783	- 896	93	8.20	8.77	1.07
2	78,916	6	13,153	- 526	96	10.12	10.53	1.04
3	27,884	2	13,942	263	102	3.58	3.51	0.98
4	56,457	4	14,114	435	103	7.24	7.02	0.97
5	129,464	9	14,385	706	105	16.60	15.79	0.95
6	31,644	2	15,822	2,143	116	4.06	3.51	0.86
7	108,383	8	13,548	- 131	99	13.90	14.04	1.01
8	58,867	4	14,717	1,038	108	7.55	7.02	0.93
9	22,350	2	11,175	- 2,504	82	2.87	3.51	1.22
10	98,614	7	14,088	409	103	12.65	12.28	0.97
11	103,187	8	12,898	- 781	94	13.23	14.04	1.06
Total	779,683	57	13,679 →	undeter- mined	100	100	100	
	Hare's quota		13,679					

Source: Authors, based on The Statistical Office of the Slovak Republic

of electoral districts in the form of the number of inhabitants compared to the number of eligible voters.

Our results show, with regard to the first research question, that several self-governing regions do not approach the publication of information about the formation of electoral districts in a completely transparent manner. This makes it impossible to properly check the chosen procedure on the basis of officially published documents. We can therefore conclude that there are three groups of self-governing regions. The first group publishes all the necessary information related to the formation of constituencies with regard to their size. The second group publishes only partial information, and the last group only offers the information defined by law, which is not sufficient to identify the chosen procedures for forming constituencies, given the vague legislation in this context.

Answering the second research question, the data show that there is a relatively heterogeneous approach by individual self-governing regions. In addition to those that do not disclose the mechanism for calculating the number of inhabitants for the assigned mandates at all, it is possible to identify two specific ways of operating. With the first, self-governing regions calculate a quota based on the number of inhabitants and the specified number of council mandates, which, even if it is not directly defined based on the logic of procedures or values, represents the basic quota, and thus Hare's quota in combination with the largest remainder method. In other cases, the councils of self-governing regions

determine the quota artificially. At the same time, it aligns within the interval defined in Act no. 302/2001 Coll.

Subsequent findings related to the third research question also show differences between individual self-governing regions. Answering this question produces data showing potentially the most serious problems related to the formation of constituencies. It is most pronounced in the case of the Bratislava Self-governing Region, where a clear disproportion is visible in the formation of electoral districts. In the largest single-mandate electoral district, the number of inhabitants with one mandate is 1.9 times greater than the number of inhabitants with one mandate in the smallest single-mandate electoral district. Basically, it can be concluded that in the same elections for the same council, one group has about half the vote weight of another group in another electoral district. This clearly opens the question of whether the constitutionally defined equality of the right to vote is met, or whether it is violated. However, the solution to this problem would require more complex interventions in the legislation due to the fact that the problem does not lie only in the mechanism intended for the distribution of mandates between individual constituencies, but already begins when drawing borders and creating them.

Our findings have confirmed the dangers stemming from the vagueness of the current legislation and also the fact that a comprehensive amendment of the law in this area is necessary so that the local councils are not left with an almost free hand when creating constituencies. What we would expect are established limits in order to avoid any major violation of the basic principle of democratic elections, which is equality.

References

Act no. 180/2014 Coll. on the conditions for exercising the right to vote.

Act no. 302/2001 Coll. on self-government of higher territorial units (Act on self-governing regions).

Act no. 460/1992 Coll. The Constitution of the Slovak Republic.

Arredondo, V. – Martínez-Panero, M. – Palomares, A. – Peña, T. – Ramírez, V. (2020): New Indexes for Measuring Electoral Disproportionality. *Revista Electrónica de Comunicaciones y Trabajos de ASEPUMA* 21 (2020): 161–178.

Bardovič, J. (2023): *Volebné systémy na úrovni samosprávnych krajov a ich limity*. UCM.

Bedock, C. (2017): When Electoral Competition Determines Disproportionality Majority Bonus and Regional Elections in France and Italy. *CEVIPO Working Papers 1* (2017), Université Libre de Bruxelles.

Brighouse, H. – Fleurbaey, M. (2010): Democracy and proportionality. *Journal of Political Philosophy* 18 (2): 137–155.

- Council of Bratislava Self-Governing Region (2022): Proposal for the determination of constituencies, the number of deputies elected in them, the headquarters of the electoral commission of the self-governing region and the headquarters of district electoral commissions: available at <https://bratislavskykraj.sk/wp-content/uploads/2022/06/20-volby-2022.pdf> (20 April, 2023).
- Dahl, R.A. (1998): *On Democracy*. Yale University Press.
- Dančišin, V. (2005): *O nedokonalosti volebných procedúr*. Reproma.
- Dančišin, V. (2018): Problematicky utvorené volebné obvody pre voľby do VÚC v Slovenskej republike, in Dudinská, I. – Cirner, M. – Székely, G., eds., *Politologická analýza regionálnych volieb 2017 na Slovensku*, 11–30, Vydavateľstvo Prešovskej univerzity.
- Dančišin, V. (2019): *Priestorová organizácia volieb a diferenciácia volebných výsledkov a ich vplyv na vytváranie zastupiteľských zborov*. Prešovská univerzita v Prešove.
- Dubrow, J. (ed.) (2014): *Political Inequality in an Age of Democracy: Cross-national Perspectives*. Routledge.
- Gallagher, M. (1991): Proportionality, Disproportionality and Electoral Systems. *Electoral Studies* 10 (1): 33–51.
- Horowitz, D.L. (2006): A primer for decision makers, in Diamond, L. – Plattner, M.F., eds., *Electoral Systems and Democracy*, 3–15, The Johns Hopkins University Press.
- Charvát, J. (2010): Proporcionalita volebních výsledků: měření, problémy, vlivy. *Slovenská politologická revue* 10 (1): 2–38.
- Jarabinský, I. – Líbal, M. – Oreský, Jan (2022): Poměrnost, ale jaká? Srovnání různých úrovní a typů proporcionalit zvažovaných alternativ volební reformy z roku 2021. *Acta Politologica* 14 (2): 36–56.
- Laakso, M. – Taagepera, R. (1979): "Effective" Number of Parties. A Measure with Application to West Europe. *Comparative Political Studies* 12 (1): 3–27.
- Lawrence, M. (2014): *Political inequality: Why British democracy must be reformed and revitalised*. Institute for Public Policy Research.
- Lebeda, T. (2006): The Proportionality of Electoral Formulas for Systems of Proportional Representation. *Sociologický časopis/Czech Sociological Review* 42 (5): 883–912.
- Lebeda, Tomáš (2008): *Volební systémy poměrného zastoupení. Mechanismy, proporcionalita a politické konsekvence*. Karolinum.
- Lebeda, T. (2011): Volební systémy, in Novák, M. – Brokl, L., eds., *Úvod do studia politiky*, 600–637, SLON.
- Lijphart, A. (1984): *Democracies. Patterns of Majoritarian and Consensus Government in Twenty-One Countries*. Yale University Press.
- Lijphart, A. (1985): The Field of Electoral Systems Research: A critical Survey. *Electoral Studies* 4 (1): 3–14.
- Lijphart, A. (1990): The Political Consequences of Electoral Laws 1945–85. *American Political Science Review* 84 (2): 481–496.

- Loosemore, J. – Hanby, V.J. (1971): The Theoretical Limits of Maximum Distortion: Some Analytic Expressions for Electoral Systems. *British Journal of Political Science* 1 (4): 467–477.
- Lundell, K. (2012): Disproportionality and Party System Fragmentation: Does Assembly Size Matter? *Open Journal of Political Science* 2 (1): 9–16.
- Mackie, T.T. – Rose, R. (1991): *The International Almanac of Electoral History. Fully Revised Third Edition*. Macmillan Academic and Professional LTD.
- Mair, P. (2013): *Ruling the Void: The Hollowing of Western Democracy*. Verso.
- Martínez-Panero, M. – Arredondo, V. – Peña, T. – Ramírez, V. (2019): A New Quota Approach to Electoral Disproportionality. *Economies* 7 (1): 1–17.
- McGann, A.J. (2006): *The Logic of Democracy. Reconciling Equality, Deliberation, and Minority Protection*. University of Michigan Press.
- Ong, K.-M. – Kasuya, Y. – Mori, K. (2017): Malapportionment and democracy: A curvilinear relationship. *Electoral Studies* 49 (2017): 118–127.
- Pennisi, A. (1998): Disproportionality Indexes and Robustness of Proportional Allocation Methods. *Electoral Studies* 17 (1): 3–19.
- Rae, D.W. (1967): *The Political Consequences of Electoral Laws*. Yale University Press.
- Samuels, D. – Snyder, R. (2001): The Value of a Vote: Malapportionment in Comparative Perspective. *British Journal of Political Science* 31 (4): 651–671.
- Šedo, J. (2007): *Volební systémy postkomunistických zemí*. CDK.
- Taagepera, R. – Grofman, B. (2003): Mapping the indices of seats-votes disproportionality and inter-election volatility. *Party Politics* 9 (6): 659–677.
- Taagepera, R. – Laakso, M. (1980): Proportionality Profiles of West European Electoral Systems. *European Journal of Political Research* 8 (4): 423–446.
- Taagepera, R. (1973): Seats and votes. A generalization of the cube law of elections. *Social Science Research* 2 (3): 257–275.

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