Munich Social Science Review, New Series, vol. 3 (2020)

Alternative voting, alternative outcomes: 2018 Presidential election in the Czech Republic

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Abstract: In this paper, the official two-round system is compared to the D21-Janeček method, using representative data collected during the 2018 presidential election in the Czech Republic. Under the D21-Janeček method, voters were allowed to cast up to three plus votes, with the option of casting one minus vote for the nine presidential candidates. Because of the systematically capped multiple votes, the outcome of the Janeček method differed significantly from the actual election. Additional votes provided more information about voters' preferences and candidates' profiles. Here it showed that the Janeček method favours inclusive candidates who are able to attract the support from voters of other candidates, and disadvantages polarising candidates. Furthermore, the overlap of plus and minus votes reveals which candidates are most hurt by the splitting of votes under plurality voting. A relatively large overlap of plus votes between the main two contenders also suggests that the differences between them were not as big as was presented by the media.

Keywords: Czech Republic, presidential election, representative study, D21-Janeček method, alternative voting system

JEL Classification: D72 ; D78 ; H10 ; Z18

ISSN 0170-2521
ISBN 978-3-88278-312-4
www.accedoverlag.de

1. Introduction

Which voting method should we choose for electing our representatives? Every social choice scientist wishes for a simple solution to this question. Arrow's (1963: 59) Impossibility Theorem proved that no ranked voting method can satisfy a (small) set of important conditions. Later, the Gibbard-Satterthwaite Theorem demonstrated that all voting methods where voters rank-order candidates are susceptible to strategic voting (Gibbard 1973: 593; Satterthwaite 1975: 193). Now we know that any method we choose is "flawed" to a certain extent (see, e.g., Felsenthal & Nurmi 2018: 76, 121). However, ongoing research reveals that some methods perform better in certain criteria, e.g., Condorcet efficiency (Lepelley, Pierron, & Valognes 2000: 181-193), and resistance to strategic voting (Green-Armytage, Tideman, & Cosman 2015: 201). Fruitful theoretical research emerged mainly in the 1970s, with mathematical and computer studies by Peter C. Fishburn and William V. Gehrlein (Fishburn 1970, 1973; Fishburn & Gehrlein 1976a, 1976b, 1977; Gehrlein & Fishburn 1976a, 1976b). The theoretical approach was accompanied by empirical studies realised, e.g., in France (Baujard et al. 2007, 2014; Farvaque, Jayet & Ragot 2009; Laruelle 2018; Laslier & Van der Straeten 2008), Germany (Alós-Ferrer & Granić 2011), Benin (Kabre et al. 2017), Romania (Roescu 2014) and Austria (Darmann, Grundner & Klamler 2017). Thanks to the combination of both approaches, we are now certain that different methods can produce different rankings (Saari 2008: 1335), motivate different voting behaviour (Baujard et al. 2014: 138) and perform better/worse in distinct contexts, e.g., more or fewer candidates (see Merrill 1984: 28-39).

In recent years, there seems to be an agreement between political scientists that plurality voting should be dismantled because of its apparent shortcomings (Laslier 2011). However, there is extensive discussion on which method should be used instead. Some argue for approval voting (e.g., Brams & Fishburn 1978), others praise the Borda count (e.g., Saari 1990; Emerson 2013), while still others lobby for Condorcet consistent methods (e.g., Felsenthal & Machover 1992). Although these established alternative voting methods[1] are now the centre of theoretical discussions,

[1] Further in the paper we use the term "alternative voting method" as a set of voting methods which are not commonly used. This should not be confused with instant-runoff voting, which is sometimes referred to as "alternative vote".

new alternative voting methods are also coming to light. One of these is the D21-Janeček method (hereinafter referred to as the "Janeček method") created by the Czech mathematician Karel Janeček. In this paper, we focus on the question: What would happen if the Janeček method had been used for the 2018 Czech presidential election? It is important to note that should an alternative voting method really be implemented for official elections, it would completely change the political environment, the number of candidates participating in the election, the style of their campaigns, etc. Therefore, the results of the study need to be considered with a pinch of salt.

The Janeček method allows voters to use up to X plus votes and up to Y minus vote(s). No accumulation of votes is allowed. In order to cast a minus vote, one must cast at least two plus votes. The number of votes depends on the number of seats to be filled and the number of competing candidates. The Janeček method recommends three plus and one minus vote for single winner elections with nine candidates – as was the case in the Czech 2018 presidential election. Specific numbers of votes for other scenarios can be found in Institute H21's guidelines[2] on how to use the method.

The main principle of the Janeček method, similarly to approval voting, is the effect of multiple votes. It reduces vote splitting in comparison with first-past-the-post and motivates candidates to lead positive campaigns because they also need to gain votes from the voters of other candidates (see, e.g., Kabre et al. 2017: 19). However, in comparison with approval voting and other multi-vote methods, the Janeček method takes into account only strong preferences (e.g., the first three in the rankings and the last one in this scenario). A limited number of plus votes still prevents vote splitting to a certain extent, but at the same time voters need to consider their choices more carefully than under approval voting, e.g., voters cannot just approve all the candidates of one political spectrum, but have to choose those candidates who are closest to their own opinions. Minus votes under the Janeček method help to uncover controversial candidates and thus prevent the polarisation of society (Institute H21 n.d.).

The purpose of this study is to compare voting behaviour and the results of plurality voting with the alternative voting method in the context

[2] Available at https://www.ih21.org/en/guidelines. Theoretical introduction of the method can be found in the working paper of Karel Janeček (2016) available at https://www.ih21.org/workingpaper.

of the 2018 Czech presidential election and to answer the main research question: *"What type of candidates does the Janeček method favour/ disadvantage in comparison with the official voting system?"*

The paper is organised as follows: Section 2 introduces the context of presidential elections in the Czech Republic; Section 3 describes the methodology of the empirical study and Section 4 then focuses on the results of the study. Based on the results, Section 5 discusses the typology of candidates and Section 6 analyses the impact of the Janeček method on the different types of candidates. The Conclusion in Section 7 compares the effects of the alternative voting system to the results of the 2018 official presidential elections in the Czech Republic.

2. Presidential election context

The presidential election process in the Czech Republic is a majoritarian two-round voting system, whereby voters can cast a single vote. If no candidate receives a majority of votes in the first round, a second round is held two weeks later with only the top two candidates. Candidates qualify for the elections either by gathering 50 000 signatures from the public, or 10 signatures from senators, or 20 signatures from members of the Chamber of Deputies (MPs).[3]

2.1 Overview of presidential candidates

Nine candidates ran for office in the 2018 presidential election: Miloš Zeman, Jiří Drahoš, Pavel Fischer, Michal Horáček, Marek Hilšer, Mirek Topolánek, Jiří Hynek, Petr Hannig and Vratislav Kulhánek (Czech Statistical Office 2018). Here we provide brief descriptions of the candidates and their backgrounds (for presidential candidate profile overview, see, e.g., iROZHLAS 2017; Ministry of the Interior 2017).

Miloš Zeman: a former leader of ČSSD[4] and the Prime Minister of the Czech Republic from 1998 to 2002. He won the first direct presidential

[3] Based on the Constitution of the Czech Republic. Constitutional Act no. 1/1993 Coll., Chapter 3, Article 56.

[4] Throughout the paper, we use official abbreviations of political parties. ČSSD = Czech Social Democratic Party - centre-left to left-wing party; ANO = ANO 2011 - catch-all party of Czech billionaire and Prime Minister Andrej Babiš; ODS = Civic Democratic Party - centre-right to right-wing party; KDU-ČSL = Christian and Democratic Union – Czechoslovak People's Party - centre-right party; STAN

election in the Czech Republic in 2013 and became the third President of the Czech Republic. He collected 103 817 signatures from citizens for the candidacy.

Jiří Drahoš: Czech scientist, physical chemist, teacher and former President of the Academy of Sciences of the Czech Republic. He collected 141 234 signatures from citizens for the candidacy.

Pavel Fischer: an expert in domestic and foreign policy. He served as the Czech Ambassador to France from 2003 to 2010. He promotes a western orientation and strong cooperation with the EU and key allies in NATO (iDNES 2017). He received support from 17 senators.

Michal Horáček: a well-known lyricist, poet and co-founder of Fortuna, major Czech sports betting company. He received 86 940 signatures from citizen support.

Marek Hilšer: studied Medicine and International Relations at Charles University and has been a lecturer and researcher at the First Faculty of Medicine. He was supported by 11 senators.

Mirek Topolánek: a leader of the Civic Democratic Party (major centre-right to right-wing party) from 2002 to 2010 and Prime Minister of the Czech Republic between 2006 and 2009. Soon after, he was removed from the Party. His political career was linked to several scandals and corruption practices (see, e.g., Horák 2017; and Hradílková Bártová 2017). He was supported by 10 senators.

Jiří Hynek: graduated from the Faculty of Mathematics and Physics at Charles University. He is associated with the arms industry. Furthermore, he co-founded the Realists' Party (minor, non-parliamentary, right conservative party). He gained the support of 29 MPs.

Petr Hannig: graduated from the Prague Conservatory and completed his studies at the Music Academy of Performing Arts. In 2002, he founded the Party of Common Sense (minor, non-parliamentary, right conservative party). He ran both in the Senate and Parliamentary elections, but was not successful. He was supported by 26 MPs.

Vratislav Kulhánek: graduated from the University of Economics in Prague. He managed the Czech branch of Robert Bosch and then moved to Škoda Auto, where he served as Chairman of the Board of Directors and

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= Mayors and Independents - centre-right party; Piráti = Czech Pirate Party – centre-left party; TOP 09 - conservative centre-right party; SPD = Freedom and Direct Democracy - right-wing to far-right party.

then Chairman of the Supervisory Board. Later, he left for AAA Auto (used car dealership). He was supported by 24 MPs.

2.2 Pre-election expectations

The incumbent Miloš Zeman was expected to be a clear winner of the first round of the election. The latest opinion poll of the election projected Miloš Zeman to receive as much as 42.5 %, followed by Jiří Drahoš with 27.5 % and Michal Horáček with 12.5 % (iROZHLAS 2018). However, Miloš Zeman was seen as someone who had polarised/divided the Czech nation with his pro-Moscow stance, hostility to Muslim immigration and his close relations with Beijing. The vote was often perceived as a referendum on Miloš Zeman and the direction of the country. In contrast, for most of the other candidates, restating the Czech Republic's western orientation was high on the agenda (Shotter 2018).

Candidate	**1st round**
Zeman	42.5 %
Drahoš	27.5 %
Horáček	12.5 %
Fischer	7 %
Topolánek	6 %
Hilšer	2.5 %
Kulhánek	1.5 %
Hynek	0.5 %
Hannig	0.5 %

Table 1: Pre-election survey, Kantar TNS and Median, Election model
Source: iROZHLAS (2018).

The pre-election atmosphere could have been described such as all against one, one against all. In one of the polls executed before the first

round of the election, respondents were asked whether they would vote for Miloš Zeman or anyone else should they be in the second round? And in this particular poll 44 % of the respondents would vote for anyone else and 39 % would choose Miloš Zeman. Further in the poll respondents were asked to vote in a pairwise comparison between Miloš Zeman and all of his opponents. Jiří Drahoš would have won in this case and Michal Horáček, Pavel Fischer and Marek Hilšer would still have stood a reasonable chance (STEM/MARK 2018; NEWTON Media n.d.).

In addition, the support of political parties was not concentrated towards a few candidates. For example, the Prime Minister, the leader of ANO – the biggest party in the Czech Republic – openly supported Miloš Zeman. However, his Party did not agree upon a candidate (Bohuslavová 2018). ODS, KDU-ČSL, STAN supported Jiří Drahoš (ČTK 2017; Vaverková 2018); Piráti supported Marek Hilšer, Jiří Drahoš and Michal Horáček (Pirátská strana 2018); the TOP 09 Party proclaimed Miloš Zeman as the worst candidate, however found several viable options. They did not specifically name anyone (Pospíšil 2018). Only the SPD openly supported Miloš Zeman (Okamura 2018).

The incumbent President Miloš Zeman, although a clear winner in the first round, was thus not seen as an obvious winner in the second round. Polls were actually showing that he could have trouble defeating some of his opponents (STEM/MARK 2018; Median 2018). His closest rivals were the following candidates: Jiří Drahoš, Pavel Fischer and Michal Horáček – and, to a lesser extent, the former Prime Minister Mirek Topolánek, and Marek Hilšer. Jiří Hynek, Petr Hannig and Vratislav Kulhánek were not seen as having a real chance to decide the election.

2.3 Election results

In the first round of the election, the results did not follow pre-election surveys closely: Pavel Fischer and Marek Hilšer got substantially more votes and Miloš Zeman and Michal Horáček substantially fewer votes than expected. Although, as predicted, Miloš Zeman clearly won the first round, receiving more than 38 % of the votes, followed by Jiří Drahoš with more than 26 %, Pavel Fischer with 10 %, with Michal Horáček and Marek Hilšer both supported by approx. 9 % of the electorate. At the lower end of the rankings were Mirek Topolánek with above 4 %, Jiří Hynek with just over 1 % and Petr Hannig and Vratislav Kulhánek with approx. 0.5 % of the votes (Czech Statistical Office 2018).

In the second round of the election, Miloš Zeman defeated Jiří Drahoš by 51.36 % against 48.63 % of votes and thus won the presidential elections (Czech Statistical Office 2018). He is currently serving his second term in office.

Candidate	**1st round**	**2nd round**
Zeman	38.6 %	51.4 %
Drahoš	26.6 %	48.6 %
Fischer	10.2 %	
Horáček	9.2 %	
Hilšer	8.8 %	
Topolánek	4.3 %	
Hynek	1.2 %	
Hannig	0.6 %	
Kulhánek	0.5 %	

Table 2: Results of the official election. Source: Czech Statistical Office (2018).

3. Methodology of the empirical study

During the first-round election days on 12 and 13 January 2018, the data collection was conducted by two opinion polling agencies, Median and STEM/MARK, two of the most renowned Czech agencies in this field. To attain representativity of the Czech voting population, computer-assisted face interviews (CAPI) were realised in all 14 Czech regions, while participants were chosen by quota sampling. To correct for a participation bias and therefore to make a direct comparison with the official results possible, the data were then weighted by basic sociodemographic variables (region, age, gender, education, residency size and working status) and also by participation and the chosen party in the 2017 Parliament election

and in the first round of the 2018 presidential election. Table 3 shows a comparison of unweighted and weighted results.

Candidate	Unweighted	Weighted
Zeman	40.1 %	38.6 %
Drahoš	23.9 %	26.4 %
Fischer	10.9 %	10.3 %
Horáček	9.7 %	9.2 %
Hilšer	7.3 %	8.8 %
Topolánek	4.7 %	4.3 %
Hynek	1.2 %	1.2 %
Hannig	1.3 %	0.7 %
Kulhánek	0.8 %	0.5 %

Table 3: Comparison of unweighted and weighted results. Source: own analysis.

Interviewers approached people in the streets, and not directly at the polling stations, so we cannot call this design experimental as we cannot be sure whether the respondents who claimed that they were going to vote or had already voted actually participated in the election. Another possible issue concerning the comparison of results under the two tested voting methods is the order of questions: there was a section with plurality voting, followed by the description of the Janeček method. Thereafter, respondents were asked whether they would use the additional two plus votes and one minus vote, if those votes were available, and to whom they would give those votes. The shortcoming of this procedure is that the candidate picked under plurality voting was always an element of the chosen candidate(s) under the Janeček method. The scenario when the single-choice candidate would not be among the first three candidates would probably happen only rather sporadically, as this would mean that

they gave their first vote to a fourth or lower ranked candidate. This case of strategic voting would remain unrevealed under the design of this study. Nevertheless, we argue it does not substantially change the results.

In total, 2 568 people took part in our study. Out of these respondents, only 1 754 (68.3 %) reported their participation in the official election. The analytical part of this study includes only 1 608 who actually revealed their "official choice," allowing us to compare their voting behaviour under the two examined voting methods. The remaining analyses are based on the weighted data of these 1 608 participants.

4. Results

Table 4 presents the results of plurality voting and the Janeček method. It should be read as follows: the first two columns depict the plurality voting results; the third and fourth columns give the Janeček method without the minus vote results, and the last three columns correspond to the Janeček method including the minus vote results. All numbers should be interpreted as a percentage of voters who gave a candidate one of their plus or minus vote (thus, while using multiple votes, percentage points of all candidates add up to more than 100 %). This allows us to see much more clearly the shift of each candidate's support when additional votes are included, than it would be with normalised results (as used by Baujard et al. 2014: 134).

According to Table 4, Miloš Zeman is the clear winner under plurality voting, with almost 39 % of votes. Jiří Drahoš received the second highest vote share with 26.4 %. All other candidates received less than 15 % of the votes. When analysing the results of the Janeček method without the minus vote, we can see two inversions in the rankings. The first inversion is between Miloš Zeman, the official winner of the election, and Jiří Drahoš, his major opponent. The second inversion is between Michal Horáček and Marek Hilšer.

Empirical study results	1. Plurality voting results	2. Plurality voting rankings	3. Janeček method (3+) results	4. Janeček method (3+) rankings	5. Janeček method (only minus votes)	6. Janeček method (3+1-) results	7. Janeček method (3+1-) rankings
Miloš Zeman	38.6 %	1.	46.5 %	2.	33.5 %	13 %	5.
Jiří Drahoš	26.4 %	2.	54.4 %	1.	3 %	51.4 %	1.
Pavel Fischer	10.3 %	3.	36.3 %	3.	1 %	35.3 %	2.
Michal Horáček	9.2 %	4.	29.9 %	5.	7.7 %	22.2 %	4.
Marek Hilšer	8.8 %	5.	33.8 %	4.	0.8 %	33 %	3.
Mirek Topolánek	4.3 %	6.	11.4 %	6.	27 %	-15.5 %	9.
Jiří Hynek	1.2 %	7.	7.9 %	7.	0.4 %	7.5 %	6.
Petr Hannig	0.7 %	8.	6.5 %	8.	4 %	2.5 %	8.
Vratislav Kulhánek	0.5 %	9.	6.5 %	9.	0.9 %	5.6 %	7.

Table 4: Plurality voting and Janeček method results. Source: own analysis.

Under the Janeček method, Jiří Drahoš was able to get additional plus votes from 28 % of voters. Furthermore, he was the only candidate to get plus votes from a majority of voters. This fosters his strong position, as he was the runner-up in the 2018 presidential election, losing in the second round with 48.6 % of votes. Besides Jiří Drahoš, also Pavel Fischer, Michal Horáček and Marek Hilšer received substantially higher scores under the Janeček method, all receiving additional support from more than 20 % of the electorate. In contrast, Miloš Zeman increased his score by only 8 %. The Janeček method, similarly to other multi-vote methods (e.g., approval voting or ranked preferential voting methods, such as the Borda count or instant-runoff voting), allows voters to express their support beyond one preference. They do not have to cast their vote strategically (to prevent wasted vote effect), as is often the case in first-past-the-post and proportional elections (Abramson 2010: 82). This broader expressiveness favoured Jiří Drahoš, Pavel Fischer, Michal Horáček and Marek Hilšer, who proved to be candidates with a wider appeal. This attribute would not be revealed under single-choice voting. Mirek Topolánek, Jiří Hynek, Petr

Hannig and Vratislav Kulhánek did not receive much attention from voters in either of the examined voting methods.

4.1 How did the minus vote influence the results?

The possibility of casting one minus vote (see the 5th, 6th and 7th columns of Table 4) only influenced the ranking of Miloš Zeman and Mirek Topolánek. Miloš Zeman was strongly disliked by one-third of the electorate (33.5 %), moving him from second place to fifth place with 13 % of the net votes. The large number of minuses could have been caused by the pronounced anti-Zeman campaigns of Jiří Drahoš, Marek Hilšer, Pavel Fischer, Michal Horáček and Mirek Topolánek. The minus vote could potentially disadvantage the incumbent candidate, as anyone who does not want him in office again could tend to give him a minus vote. This hypothesis is up to further research.

The next notable recipient of negative votes was Mirek Topolánek, who obtained minus votes from 27 % of voters, making him the only candidate to receive a negative net total (receiving more minus votes than plus votes). This moved him to the last place under the Janeček method. A possible explanation could be his connection to a major corruption case during his governance. Michal Horáček was the last candidate to have been *minused* by a substantial portion of the electorate (7.7 %), but to a much more limited extent than the previous two candidates. Every other candidate received a minus vote from less than 5 % of the electorate.

4.2 The broader expression - do people use additional votes?

We know from the experiments on approval and disapproval voting that people most often approve one, two or three candidates when they have no limit on their plus votes (e.g., Baujard et al. 2011: 155, 2013: 349; Alós-Ferrer & Granić 2012: 180; Kabre et al. 2017: 17; Laruelle 2018: 9; Laslier & Van der Straeten 2008: 100). In the Janeček method the amount of plus votes is limited. Therefore, we can expect that the average number of votes used by voters would be lower. Furthermore, the percentage of voters using only one approval (analogy of one plus vote in the Janeček method) in those studies was usually under 30 % of voters. Unfortunately, there are only fragments in the literature mentioning factors influencing the number of cast votes in multi-vote voting methods. Notable exceptions are Baujard and her colleagues (2014: 138), who suggested that different

scales produce significantly different voter behaviour. The 2011 experiment in the Benin presidential election shows younger, more educated voters used more approvals (Kabre et al. 2017: 16).

Table 5 shows the distribution of votes.[5] Overall, the voters in our study used, on average, 2.33 plus votes and 0.78 minus votes under the Janeček method. Roughly 80 % of voters used the opportunity to vote for more than one candidate. A further 94.7 % of voters used the minus vote, once they had the possibility (those who cast at least two plus votes). This high frequency could be a sign that some voters cast two plus votes to be able to cast the minus vote.

Votes used	**1 plus**	**2 plus**	**2 plus and 1 minus**	**3 plus**	**3 plus and 1 minus**	**Total**
Number of respondents	280	43	471	27	787	1 608
Percent	17.4 %	2.7 %	29.3 %	1.7 %	48.9 %	100 %

Table 5: Structure of votes. Source: own analysis.

5. Typology of candidates

Is the structure of votes consistent with the supporters of candidates? Table 6 presents significant differences in voting behaviour, particularly of Miloš Zeman's voters. Baujard and her team (2014: 132) classify two types of candidates – exclusive and inclusive. They define exclusive candidates as those who are supported by voters who cast very few plus votes (approvals) and they are almost never supported by voters for other candidates, while inclusive candidates are those who are supported by voters who also cast plus votes (approvals) for other candidates and are supported by voters for other candidates.

[5] For example, you can see that 43 respondents (which equals 2.7 % of the total) specifically used two plus votes.

	A	B	C	D
M. Zeman	2.01	32.9 %	620	7.9 %
J. Drahoš	2.52	7.7 %	425	28 %
P. Fischer	2.53	6.7 %	165	26.1 %
M. Horáček	2.51	8.8 %	148	20.7 %
M. Hilšer	2.55	7.1 %	141	25.1 %
M. Topolánek	2.62	7.2 %	69	7.2 %
J. Hynek	2.55	5 %	20	6.7 %
P. Hannig	2.73	0 %	12	5.8 %
V. Kulhánek	2.38	25 %	8	6 %

Table 6: Comparison of voting behaviour. Source: own analysis.

A = Average number of pluses cast by the candidate's official voters under Janeček method

B = Percentage of candidate's official voters who cast only one vote under Janeček method

C = Total number of candidate's official voters

D = Percentage of candidate's non-official voters who cast a plus vote for him under Janeček method

Miloš Zeman's voters are attached to him to a much greater extent (as 32.9 % used only one vote) than other voters are to their first preferred candidate (assuming non-strategic voting). On average, his supporters cast 2.01 plus votes, which is significantly lower[6] than the number of votes cast by voters of all other candidates – with the exception of those who voted for Vratislav Kulhánek. In connection with 33.5 % of the minus votes for Miloš Zeman, we can label him as an exclusive candidate, as he inflames strong negative feelings and attracts only a few voters of other candidates (7.9 %). In other words, he mainly appeals only to his own electorate.

In complete contrast, Jiří Drahoš, Pavel Fischer, Michal Horáček and Marek Hilšer can be considered inclusive candidates, as more than 90 % of their voters used multiple votes. Furthermore, they were all able to receive more additional votes than their plurality score, which demonstrates that their support is possibly not as strong as Miloš Zeman's. Nevertheless, they had a much broader appeal than the plurality voting demonstrated. This aspect of the Janeček method and other multi-vote methods could motivate "smaller" candidates to participate in political activities, while the small support under plurality voting could discourage them.

This typology was further elaborated on by Darmann, Grundner & Klamler (2017: 210) in comparing the voting systems in the 2015 parliamentary election in the Austrian federal state of Styria. They categorised four types of candidates: popular, unpopular, medium and polarising. Populars have a strong support and are perceived positively by a large segment of society. Unpopulars have only limited support and the rest of society either do not like them or do not know them. Medium candidates are acceptable to a lot of people, but induce strong views only in a small segment of society. Lastly, polarising candidates induce strong positive and negative views. They are either beloved or detested by significant parts of society.

Using these categories, we can classify all the candidates in the Czech presidential election. Jiří Drahoš was certainly a popular candidate, as he had a lot of strong support (26.4 % of plurality votes) and was also able to improve his score by 28 % from additional votes in the Janeček method.

[6] Significant at 0.05 level in the Games-Howell post-hoc test in analysis of variance (ANOVA).

Moreover, he received minus votes from only a very small part of the electorate (3 % of voters).

Mirek Topolánek, Jiří Hynek, Petr Hannig and Vratislav Kulhánek would be classified as Unpopulars. They received really limited plurality support (below 10 %) and were not able to gain much from additional votes. The lower number of plus votes for Jiří Hynek, Petr Hannig and Vratislav Kulhánek could have been caused by their relative unfamiliarity to the public, in comparison with other candidates. Moreover, Mirek Topolánek received the second highest share of minus votes.

Marek Hilšer, Pavel Fischer and Michal Horáček can be labelled as medium candidates, as their single-vote support was approx. 10 %. However, the introduction of additional plus votes showed that their support was much broader (30-36 %). Generally, they are also very rarely detested, with the exception of Michal Horáček, who was *minused* by 7.7 % of the electorate. For this reason, it can be argued that Michal Horáček can be ranked between a medium and a polarising candidate.

Lastly, Miloš Zeman is the only example of a purely polarising candidate. He had very strong support (almost 39 %), but did not get many additional votes. He was the clear favourite of his electorate, but also strongly rejected by one-third of the electorate.

6. Who is favoured by the D21-Janeček method?

Darmann, Grundner, & Klamler (2017: 211) claim that Populars will be successful under any reasonable voting rule, irrespective of whether it counts first places, full rankings or cardinal marks. In contrast, Unpopulars will always fail, because they do not have any strong support and receive a lot of low marks. Medium candidates profit from systems which look at more than just the first ranks, while polarising candidates profit from those which focus only on the top preferences.

Those hypotheses are corroborated by our dataset. Figure 1 shows that Jiří Drahoš as a popular candidate is strong under plurality voting. He gains even more votes by applying the Janeček method, taking into account the first three preferences. Medium candidates are those who benefit the most from the Janeček method. Unpopulars did not change their ranking, as they were not able to obtain reasonable support from the first preference nor from additional votes. Unpopulars (Mirek Topolánek, Jiří Hynek, Petr Hannig, Vratislav Kulhánek), Populars (Jiří Drahoš) as well as Medium candidates (Marek Hilšer, Pavel Fischer, Michal Horáček)

were not affected by the minus votes, but probably for different reasons. Jiří Drahoš was completely new to politics, therefore it is likely that not having any political past may be the reason why almost nobody had negative feelings towards him, not strong enough to give him a minus vote. Medium candidates would probably get some negative ranking under evaluative voting or some 5th, 6th or 7th places under preferential voting, which is still not enough to get a minus vote in the Janeček method. Unpopulars are probably "not worth" a minus vote, as nobody considers them important enough or, alternatively, they are unknown. We can assume that, under the Janeček method, people are more likely to cast a minus vote for a candidate whom they dislike and who, at the same time, has a reasonable chance of winning, rather than for some of the generally unpopular candidates, although they could be lower in their rankings. This attribute could lead to the strategic use of the minus vote.

Last but not least, the only polarising candidate, Miloš Zeman did not gain much additional support. He induced very strong feelings, therefore voters either put him at the top of their rankings or at the bottom. We would expect Miloš Zeman almost not to receive any middle rankings under preferential voting. Under plurality voting, Miloš Zeman would be considered as a very popular candidate. Only the information provided by additional plus votes and a minus vote describe his profile more accurately. Thus, we argue that multi-vote methods prevent misjudging the candidate type, especially between popular and polarising candidates.

This facet could be very beneficial for elections where polarising candidates can camouflage themselves as popular candidates, like a wolf in sheep's clothing. That could be very harmful to the democratic systems.

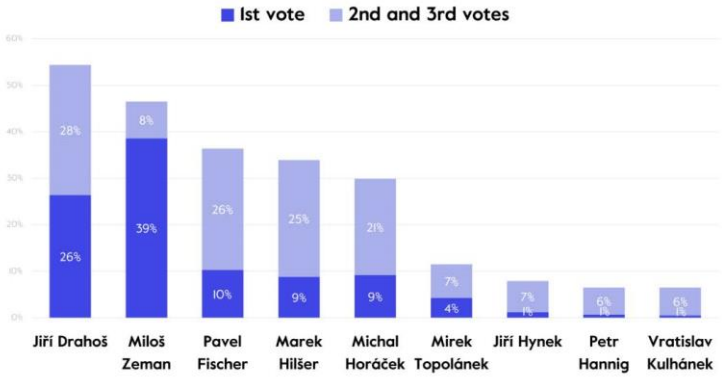

Figure 1 - Structure of positive votes in Janeček method. Source: own analysis.

Another aspect to consider is the representation of candidates based on their political views. Candidates who are the only ones to represent a particular political dimension will be better off in one-vote systems. On the other hand, those who are similar to other candidates will suffer from the vote-splitting phenomenon. Tables 7 and 8 reveal the overlap of plus and minus votes under the Janeček method. In the rows you can see how many plurality voters for a particular candidate cast one of their additional votes or minus vote for a candidate in a column. The most notable is the share of votes between the two frontrunners of the election, Jiří Drahoš and Miloš Zeman. 11 % of Jiří Drahoš's official voters cast a plus vote for Miloš Zeman and 28 % vice versa. In total, 247 voters (15.4 %) in our study gave one of their plus votes in the Janeček method to both Jiří Drahoš and Miloš Zeman. This relatively high figure[7] indicates that the polarisation of the electorate was not as substantial as presented in the media.

[7] This outcome is similar to the 2007 French presidential election, where the three main contenders were approved by 9-22 % of voters (calculated from Baujard et al. 2011: 162), and the 2011 Benin presidential election, where the two main contenders were approved by 19 % of voters (Kabre et al. 2017: 18).

	Zeman	Horáček	Drahoš	Topolánek	Hilšer	Kulhánek	Hannig	Hynek	Fischer
Zeman	X	10.2 %	27.9 %	7.7 %	16.6 %	7.4 %	8.1 %	7.1 %	16.3 %
Horáček	11.5 %	X	50.7 %	7.4 %	31.8 %	4.1 %	6.8 %	7.4 %	31.1 %
Drahoš	11.1 %	34.8 %	X	5.9 %	37.4 %	6.1 %	4.7 %	5.9 %	46.4 %
Topolánek	23.2 %	30.4 %	43.5 %	X	26.1 %	4.3 %	2.9 %	4.3 %	29 %
Hilšer	12.8 %	34.8 %	54.6 %	7.1 %	X	2.8 %	5.7 %	7.1 %	31.2 %
Kulhánek	25 %	12.5 %	25 %	12.5 %	25 %	X	12.5 %	12.5 %	25 %
Hannig	25 %	16.7 %	33.3 %	8.3 %	25 %	16.7 %	X	25 %	25 %
Hynek	20 %	25 %	30 %	15 %	30 %	5 %	0 %	X	35 %
Fischer	12.7 %	27.3 %	50.3 %	9.7 %	40 %	5.5 %	0.6 %	6.1 %	X

Table 7: Overlap of plus votes. Source: own analysis

	Zeman	Horáček	Drahoš	Topolánek	Hilšer	Kulhánek	Hannig	Hynek	Fischer
Zeman	X	11.6 %	5.5 %	37.7 %	1.3 %	1.1 %	3.1 %	0.5 %	1.3 %
Horáček	49.3 %	X	2 %	27.7 %	0.7 %	0 %	4.1 %	0 %	1.4 %
Drahoš	56.7 %	4.2 %	X	20%	0.2 %	0.2 %	5.4 %	0.2 %	0.9 %
Topolánek	56.5 %	11.6 %	8.7 %	X	1.4 %	0 %	4.3 %	1.4 %	4.3 %
Hilšer	56 %	7.1 %	0 %	22.7 %	X	1.4 %	4.3 %	0 %	0 %
Kulhánek	37.5 %	0 %	0 %	37.5 %	0 %	X	0 %	0 %	0 %
Hannig	33.3 %	8.3 %	8.3 %	41.7 %	0 %	0 %	X	0 %	0 %
Hynek	30 %	10 %	5 %	40%	5 %	5 %	5 %	X	0 %
Fischer	56.4 %	7.3 %	1.8 %	16.4 %	0.6 %	1.2 %	4.8 %	1.2 %	X

Table 8: Overlap of minus votes. Source: own analysis

We extrapolated distances from overlaps of plus and minus votes and created Figure 2, where you can see how close/distant candidates are from each other in the eyes of voters. The figure was created in Gephi, "an open-source software for network visualisation and analysis" using the Force Atlas 2 algorithm.[8] The more plus votes candidates share, the closer they are to each other. The more minus votes they share, the more distant they are from each other. The bigger the candidate's circle is, the more plus votes he received under plurality voting. Moreover, the darker arrows between candidates mean that they share more voters. Lastly, to make it easier to read the graph, we included only stronger positive relationships

[8] For more information please visit https://gephi.org/about/.

between candidates, i.e., the figure shows only strong positive relationships (share of 20 % or more of net votes).[9]

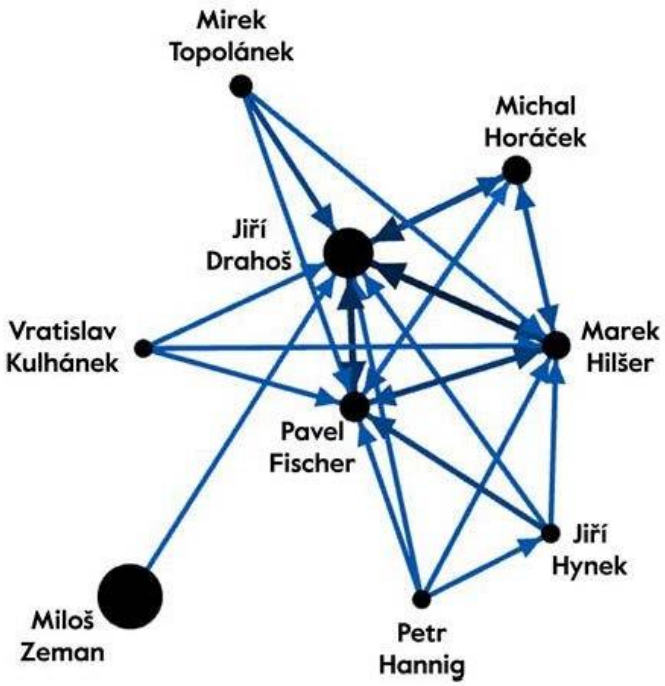

Figure 2: Distances of candidates. Source: own analysis

We can clearly see that Jiří Drahoš, Pavel Fischer, Marek Hilšer and Michal Horáček form the cluster of candidates who share a substantial part of the electorate. Many of their plurality voters would probably approve of them all under approval voting, have them in the top ranks under preferential voting, and give them high marks under range voting. However, under plurality voting, voters can support only one candidate. This makes "rivals" out of the candidates with similar positions and political views. Furthermore, the voters for unpopular candidates (Mirek Topolánek, Vratislav Kulhánek, Jiří Hynek and Petr Hannig) often also support the main cluster of candidates. However, usually this support is

[9] E.g., there were 165 voters for Pavel Fischer. They gave Horáček 45 plus votes and 12 minus votes which is 33 net votes (20 %).

not mutual. All unpopular candidates and also the actual winner, Miloš Zeman, have their own cluster, as they were not supported by other candidates' voters.

Duverger (1954: 240) and Cox (1997: 123) argue that the contest is between two or three candidates in a two-round system. The two front-runners in the Czech presidential elections were Miloš Zeman and Jiří Drahoš. However, their positions were completely different. Miloš Zeman did not have anyone close to his position, which is strategically disadvantageous under multi-vote systems, but favourable under plurality voting. Therefore, very possibly a change to the Janeček method (or another multi-vote system) would result in more "positive campaigns," as candidates would try to find what they have in common with their opponents, rather than what divides them. On the other hand, in the eyes of the voters, there were three candidates who were very close to Jiří Drahoš, which weakened each of them under plurality voting. Jiří Drahoš probably "stole" some votes from Pavel Fischer, Marek Hilšer and Michal Horáček,[10] as some voters whose first preference was one of these candidates, could see Jiří Drahoš as the only real contender to Miloš Zeman. For this cluster of candidates, it would be best if they joined forces and, under plurality voting, only one candidate ran to prevent vote splitting. Under the Janeček method, they can all freely participate in the race for office without being punished by strategic voting. Unlike in approval voting, the Janeček method would still require the voter to consider which of these four candidates is closest to them, as there is only a limited number of plus votes. However, the Janeček method still motivates candidates to participate in the election more than plurality voting, especially in the part of the political spectrum where fragmentation occurs most often.

7. Conclusion

We have analysed the possible impact of using the Janeček method in the 2018 Presidential election in the Czech Republic. Applying systematically capped multiple votes, the outcome of the Janeček method differed significantly compared to the single vote system and indeed to the actual election.

The Janeček method favours inclusive candidates, who are able to attract additional support from other candidates' voters. It disadvantages exclusive candidates. Medium candidates would gain the most under the Janeček method, as it allows them to get much broader support. Often they are not the first preference of voters, so they are not successful under plurality voting. Popular candidates, like Jiří Drahoš, would also profit from the alternative voting system, as they would also receive many additional second and third votes. The last but not least affected group of candidates would be polarising candidates, in our case represented by Miloš Zeman, who had a strong support but did not receive many additional votes when applying the Janeček method. Furthermore, he was rejected by a significant part of the electorate. In a nutshell, additional plus votes and one minus vote in the Janeček method would benefit popular and medium candidates and disadvantage polarising candidates. Unpopulars would be mostly unaffected.

Unsurprisingly, analysis of candidates' distances proved that candidates, who in the eyes of voters are close to other candidates, are most harmed by plurality voting because of vote splitting. In contrast, they gain much larger support under the multi-vote Janeček method.

Miloš Zeman, who was the winner in the election, was viewed as controversial and unacceptable by a large part of the population. Thus, under the Janeček method, Jiří Drahoš was identified as the winner instead. The study suggests that should the Janeček method (or other alternative multi-vote system) have been in place, then the process of the election (and possibly even the results) might have been quite different.

In this paper, we argue that the Janeček method would probably result in more positive campaigns, as candidates would try to discover what they have in common with their opponents instead of what divides them. Furthermore, the use of multiple votes could motivate "smaller" candidates to become politically active or to continue with their political careers, as multi-vote systems can reveal dimensions of support which remain hidden under plurality voting.

In addition, the overlap of plus and minus votes reveals candidates that are most hurt by vote splitting under plurality voting. Candidates around

[10] Frequency of this kind of strategic voting would need to be tested in another study.

Jiří Drahoš were seen as relatively similar, thus suffered the most under plurality voting.

We also show that the two main contenders shared support to a certain extent. This was contrary to the black and white picture presented by the media, which might also have been driven by the voting system in place that promotes such division.

Clearly, popular candidates should be successful under any reasonable voting system. Nevertheless, the reality of many elections is not as straightforward. The options are often contradictory and society is left divided. We argue that the voting system can significantly influence not just the results, but also the process and tone of election campaigning. Should alternative multi-vote systems, such as the Janeček method, be in place, candidates who tend to unite society would be better favoured. Thus, it is not beneficial to divide the electorate to gain the maximum possible single-vote support, as we can currently see around the globe.

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