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Faulty Votes: The Hidden Cost of PR Election Complexity

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Abstract

We seek to assess how informational challenges in open-list proportional representation (OLPR) systems contribute to higher incidence of “faulty” votes compared to majoritarian systems. We define three types of faulty votes: spoiled votes and votes attributable to ballot primacy or list primacy effects. Using data from simultaneously held Polish OLPR and SMD local elections, we find significantly higher rates of faulty votes in OLPR systems than in SMD systems—an estimated 12.87% more eligible voters cast a faulty vote under OLPR. The difference is even more stark when calculated as a percentage of actual voters, with over 25% more faulty votes under OLPR. Our findings suggest that the increased complexity of OLPR systems leads to lower-quality votes. This “PR blow” is similar in magnitude but opposite in direction to the well-documented “PR boost” in turnout. We offer policy recommendations to mitigate faulty votes in OLPR systems, including simplifying ballots, using smaller districts, and randomizing candidate order.

Keywords

proportional representation, single-member districts, turnout, primacy effects, ballot positional bonus, local elections

Introduction

We examine the extent to which informational challenges in open-list proportional representation (OLPR) systems lead to a higher frequency of “faulty” votes compared to majoritarian systems. We define “faulty” votes as encompassing “spoiled” ballots, where votes are not counted due to labeling or marking errors, including intentionally blank ballots, and two types of “position-based” effects, where “lazy” or “uninformed” voters select the party or candidate listed at the top of the ballot only because of their prominent positions. These phenomena are typically examined independently. However, they share a common trait: they represent votes that deviate from the expectations of the election system’s designers. We suggest analyzing them within a unified framework for two reasons. First, they may stem from similar causes. Second, this approach allows for a comparison of their scale, enabling an assessment of their collective impact on the quality of democracy. We argue that fair elections are those where the electoral system does not steer voter behavior in ways that alter the final election results.

Following the early work of Duverger (1959), and at least since Rae’s (1967) and Lijphart’s (1984) seminal books, the political consequences of electoral systems based on proportional representation (PR) have been

systematically compared against single-member district (SMD) systems. One such consequence is turnout. Most scholars agree that PR systems involve noticeably higher participation. We focus our attention on a matter closely related to participation, that is, the quality of votes. According to the participation argument, PR systems encourage voters to participate by offering more choices. Typically, under PR, more parties compete than in SMD systems and, in open-list PR systems¹, the candidates’ cafeteria will be much longer. Of course, a richer menu of options involves a cost, that is, the price is paid in the greater complexity of choice. Even voters who know their minds in advance must spend more time with the ballot cards to identify their picks. But are such problems meaningful? Do they cause measurable consequences?

Our hypothesis about faulty votes states that the greater complexity of choices typical of OLPR versus SMD elections causes voters to experience “cognitive fatigue”

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and results in more meaningless or at least problematic votes.² The common-sense explanation of the idea of “faulty” votes is as follows: a cognitively overload voter, is more likely to make the vote (intentionally or not) invalid, or spoilt, or the voter may cast such a vote mechanically for the first option on the ballot. The first effect is straightforward while the other effect was established to come principally in the form of “primacy” effects of mechanical voting for the first candidate or party listed on the ballot or party list of candidates.

We believe that there are three principal categories of “faulty” votes. The voters may cast an invalid vote, or they may vote for the first candidate (in SMD systems) or party (in OLPR systems) on the ballot only because it occupies the most prominent position. In addition, in a phenomenon only present in OLPR systems, voters who already chose their favorite party may vote for the first candidate of this party’s list due to their prominence on the list.

Our goal is to estimate the effects of these categories. We denote and define them in the following way:

S—*spoilt* (invalid) votes.

B—*ballot positional bonus*: the percentage of all votes that were cast on the first party (in the case of OLPR) or candidate (in the case of SMD) exclusively because such a competitor was listed first on the ballot.

L—*list positional bonus*: the percentage of all votes that were cast for the first candidate on a party’s list in OLPR exclusively for being listed as #1 within this party’s list.

There are two types of spoilt votes. Blank votes are typically interpreted as intended protests or disinterested votes, while mistaken votes are usually interpreted as unintentional (Kouba and Lysek 2016). Invalid votes, if an expression of protest, can be considered the equivalent of the NOTA (“none of the above”) option, but this is only one component of the phenomenon (Plescia, Kritzingner and Singh 2023). Analysis of results in elections where such an option is on the ballot also shows that such a vote can be an expression of lack of interest and competence (Damore, Waters, and Bowler 2012; Galatas 2008).

Research on the phenomenon of invalid votes, going beyond the protest trend, refers to two explanations—institutional and social (McAllister and Makkai 1993). The problem becomes more complicated if the parameters describing institutional and social variation are correlated (Lundell and Högström 2021). However, while social determinants are relatively fixed, the institutional voting framework is already a factor whose configurations are subject to significant change. The importance of such configurations has been pointed out by numerous studies. The complexity of elections and their concurrency increase the number of invalid votes regardless of the fact

that some of them are protest votes (Lysek, Lebeda, and Kouba 2020). Transferring voting patterns between simultaneous, differently organized elections increases the number of invalid votes (Lee and Song 2023). While concurrent elections increase turnout, they also increase the share of invalid votes, as indicated by election results in Italy (Cantoni, Gazzè and Schafer 2021), Czechia (Lysek and Kouba 2022), and Slovakia (Spáč and Zagraban 2025). Slovak studies also show that in addition to concurrency, list length, and district size also have an independent effect on the number of invalid votes. Similar conclusions are drawn from analyses of the results of a separate election—the parliamentary elections in Chile held after the electoral reform (Cox and Le Foulon 2025). The surfeit of candidates is discouraging; it is hard for voters to get their bearings even with a small number of candidates (Cunow et al., 2024). On the other hand, also the lack of competition and disproportionality increases the number of invalid votes (Silva and Crisp 2022), although this already seems closer to the problem of protest votes. These different perspectives are tried to combine by Cohen (2018), pointing out the different factors affecting the number of invalid votes—static (too many candidates) and dynamic (new candidates attracting votes that might otherwise have been protest votes). However, all these studies indicate that the size of the electoral “menu” is a factor of intrinsic importance, even if it does not explain the entire phenomenon.

Invalid votes are reported directly, and there is no need for any estimation. The following two categories of faulty votes, due to the so-called primacy effect, must be estimated. The ballot bonus comes from parties or candidates receiving additional votes simply because they have been placed in the prominent first position on the ballot. This effect may arise when voters vote “randomly” for the first candidate, perhaps associating upper positions with “good” and lower with “bad” traits (Kim, Krosnick, and Casasanto 2015) or maybe due to a more extensive media coverage that the top listed candidate receive (van Erkel and Thijssen 2016). We are interested in estimating the total bonus without examining its specific causes. Our second type of bonus, the list bonus, appears only in electoral systems using party lists and allowing for the choice of candidates within lists since there are no such lists in SMD elections. Voters responsible for a list bonus would mechanically choose the candidate listed first on the party list. In order to eliminate double counting of our estimates, we introduce some corrections. The three components of faulty votes will be represented as percentages of all eligible voters.

Favoring top candidates is a fairly common and strong effect in electoral systems that use lists of candidates (see Lutz 2010 in the Swiss elections; Faas and Schoen 2006 in Bavaria; Raciborski 1997; Marcinkiewicz 2014 in Poland;

van Erkel and Thijssen 2016 in Belgium; Blom-Hansen et al., 2016 in Denmark). However, the estimates are more difficult to make since, with the exception of Finland, such lists are not alphabetical, and the ordering of candidates cannot be considered random (Ministry of Justice 2018). The interparty positional bonuses, that is, the bonuses for the first position of a party list among all parties are even most difficult to estimate but research suggests that they may be strong (Flis and Kaminski 2022).

Since our goal is to assess the differences in faulty votes, we will analyze paired estimates of such votes in OLPR and SMD elections held simultaneously among the exact sets of voters. Due to the complexity of estimates and the scarcity of space, we had to minimize the analysis of factors affecting our final numbers and, for instance, omit the analysis of positional bonuses for second, third, last, and lower positions, which are usually estimated as positive and much smaller than first-position bonuses versus middle positions or small and negative (Lutz 2010). For comprehensive overviews of positional bonuses, see Krosnick, Miller, and Tichy (2004), Chen et al. (2014), Blom-Hansen et al. (2016), Däubler and Rudolph (2020).

We begin with a description of faulty votes, our sources of data, and our main hypotheses. Section 3 contains a comparative analysis of spoiled votes in all pairs of SMD and PR elections that were conducted simultaneously. Section 4 compares the estimated ballot positional bonus in SMD borough mayor and council elections with the estimated ballot positional bonus in OLPR elections to the county councils, using data from the provincial elections. Section 5 discusses the list positional bonus in a system with party lists. We explain the methodology and how we controlled for potentially relevant variables in each case. The final sections conclude with a discussion of the estimates and policy recommendations.

Testable Hypotheses and Data

We broadly conjecture that faulty votes appear more often when the total number of viable candidates on a ballot is large (in PR systems) versus small (in SMD systems). The reasoning behind our conjecture is simple: The complexity of election choices confuses some voters who become more likely to vote for the first named candidate or party on the ballot paper or the first candidate on the party list. They are also more likely to make a mistake on a ballot or cast blank vote in protest. Asking for choices in PR on two levels—interparty and intraparty—can also lead to confusion regarding the number of possible indications. As more candidates usually compete in OLPR elections than in SMD elections, we expect that there will be more faulty votes in OLPR elections.

Testable Hypotheses

Our hypotheses are formulated for the SMD and OLPR elections and claim that both spoiled votes and randomly cast votes for the first position on the ballot are more frequent in the OLPR system and that the list bonus for competing as No. 1 is positive.

Spoiled (invalid) votes include blank ballots, usually interpreted as protest or disinterested votes, and incorrectly filled out ballots, interpreted as voter errors. Breux and Couture (2014) demonstrate, using Canadian local elections, that institutional complexity, jointly with the borough's social structure, influences spoiled votes. Pachón, Carroll, and Barragán (2017) also indicate the importance of voting complexity in the OLPR system for the number of spoiled votes. A recount of spoiled votes after the 2014 Polish local elections showed that the main reason for their large number was voter confusion about the voting procedure (Gendźwił et al., 2016, 55–62). However, this effect was not studied comparatively for different electoral systems.

Similarly, the positional effects generating the first-position bonus were studied by several authors but never comparatively. Out of the three effects that we are interested in, the candidate positional bonuses were studied most intensively. While some researchers call the existence of first-position bonuses in such elections “common wisdom” and claim that they are usually not very strong or universal (Alvarez, Sinclair, and Hasen, 2006), in some down-ballot cases, the bonus is estimated as substantial (Grant 2017).

Formally, we write (superscripts represent the corresponding election types):

H1 (More spoiled votes in OLPR): *Ceteris paribus*, $S^{\text{OLPR}} > S^{\text{SMD}}$;

H2 (Greater ballot positional bonus in OLPR): *Ceteris paribus*, $B^{\text{OLPR}} > B^{\text{SMD}}$;

H3 (Positive list positional bonus in OLPR): $L^{\text{OLPR}} > 0$.

Our final testable hypothesis is obviously related to H1-H3, that is, for $F^{\text{OLPR}} = S^{\text{OLPR}} + B^{\text{OLPR}} + L^{\text{OLPR}}$ and $F^{\text{SMD}} = S^{\text{SMD}} + B^{\text{SMD}}$:

H4 (More faulty votes in PR): $F^{\text{OLPR}} > F^{\text{SMD}}$.

Components of Faulty Votes and Corrections Against Double Counting of Primacy Effects

To estimate the spoiled votes S and positional bonuses B and L and compare them with the turnout, we must express them as a percentage of all those entitled to vote, that is, including voters and eligible non-voters. For example, if 10% of voters returned spoiled votes ($S = 10\%$) and the

turnout was 0.4, then the spoilt votes constitute $10\% \times 0.4 = 4\%$ of all eligible voters. In general, in the case of the first two types of votes, the transformation is straightforward (lowercase letters represent “effective” categories of faulty votes after they are made comparable with the turnout T , which is represented as a proportion of all eligible voters).

$$s = TS; b = TB \quad (1)$$

In the case of list bonus L , the correction is more complicated. The votes constituting the bonus are estimated as a percentage of all valid votes; we receive the proportion of valid votes when we subtract the proportion of spoilt votes from the turnout. In addition, some voters who vote for the first party listed on the ballot solely because of its position may similarly vote for the first place on this party’s list. We want to count such voters only once, and we also subtract them from the turnout. Assuming that the interaction between the ballot and list bonuses is negligible (as we argue in Section 5.3), we receive the following conversion formula:

$$l = L \times (T - s/100 - b/100) \quad (2)$$

In formula (2), l represents part of the list bonus from voters not included in the ballot bonus. Both $s/100$ and $b/100$ are much smaller than T , and the result of the subtraction is positive. By combining formulas (1) and (2), we obtain the following equation defining the faulty votes f as a percentage of all those entitled to vote:

$$f = s + b + l = TS + TB + L \times (T - TS/100 - TB/100) \quad (3)$$

Formula (3) represents the components of faulty votes f^{OLPR} in the OLPR system. In the SMD system, without party lists, f^{SMD} is the sum of only the first two components.

Data

We will use data from Polish local elections in 2014, and in one case 2010, for estimating faulty votes in OLPR systems using the Jefferson-D’Hondt algorithm, SMD elections employing MR and FPTP, and Bloc Vote (BV)³ elections as a proxy for list bonus under OLPR. Local elections provide an excellent opportunity for comparative analysis, as they often include both proportional representation elections for councils and majoritarian elections for executive positions (Ladner and Milner 1999). We identified two sets of natural experiments within these elections that facilitate our comparisons. To provide context for our analysis, we’ll briefly overview

the Polish local government structure and its electoral processes.

The Polish local government structure consists of three tiers. At the top are 16 provinces (województwo), followed by 380 counties (powiat) at the second level, and 2,477 boroughs (gmina)⁴ at the lowest level. Council sizes vary from 15 to 60 members. 66 special large city county-boroughs function as both counties and boroughs. Larger boroughs may establish additional smaller administrative units. The public directly elects borough chief executives, while county (starosta) and province (marszałek) executives are elected by their respective councils.

The local elections occurred every 4 years (after 2018: every 5 years) for all three councils and borough leaders (see Table 1). In the 2014 elections, SMD (MR or FPTP) and OLPR systems were used. Voters coming to a voting booth in 2014 simultaneously received three or four ballots. Most voters voted twice under OLPR, once under FPTP, and once under MR systems (elections #1, #2, #3ab, and #4 in Table 1). In 66 county-boroughs, there was one MR and two OLPR elections (#1, #2 – in this case, the same as #3c and #4 in Table 1). In the 2010 elections that provide us with auxiliary data, BV was also used.

Using Natural Experiments and Other Methods

Firstly, pairing the OLPR and SMD elections has created a comfortable *ceteris paribus* situation for variables that are usually difficult to control in comparisons of electoral laws. Not only the turnout but also the identities of voters were the same. Consequently, we controlled for all socio-cultural characteristics of voters in the OLPR and SMD comparisons. We used this opportunity to compare spoilt votes for both systems using all five OLPR and SMD election pairs where identical sets of voters voted both in OLPR and SMD elections (see Section 3 for the details). The spoilt-votes data were obtained from the election results, and there was no need to make estimates.

Due to its dual registration as a political party and a citizens’ committee, the *Polish People’s Party* (PSL) inadvertently created a natural experiment in ballot positioning during elections. PSL-party received the coveted first position on some ballots through a lottery, while its citizens’ committee counterpart was placed lower on others. Consequently, the major party, *Law and Justice* (PiS), found itself in varying positions across districts, sometimes at the top and in second or third place. This unintended variation allowed us to estimate the first-position ballot bonus for PiS in proportional representation elections. In contrast, estimating the ballot bonus in single-member district (SMD) elections was simpler due to the alphabetical arrangement of candidates on those ballots. We used elections #4 and #3a for estimates.

Table 1. The Structure of Local Government and the Main Parameters of the Elections in 2010 and 2014 (on the Day of Elections, November 11, 2014).

Type of Office	Number	Seats (Total)	Dis mag 2010	Electoral Law 2010	Electoral Law 2014
1. Province council	16	30–51 (555)	5–15	OLPR	OLPR
2. County council	314 ^a	15–29 (6276)	3–10	OLPR	OLPR
3. Borough council (all types)	2,477	15–60 (37842)	1–8	OLPR or BV	OLPR or FPTP
(a) <20,000	2139	15 (32085)	1–5	BV	FPTP
(b) ≥20,000	272	18–24 (4063)	5–8	OLPR	FPTP
(c) County-boroughs	66	18–60 (1694)	5–8	OLPR	OLPR
4. Borough mayor	2477	1 (2477)	1	MR	MR

Note: “Number” = the total number of councils of this type; “Seats” = seat interval for the council’s size (in parenthesis: total seats in all councils); “Dis mag” = seat interval for district magnitude in 2010; MR = majority top-two runoff; BV – bloc voting; FPTP – first-past-the-post; OLPR = open-list proportional representation with Jefferson-D’Hondt; “<20,000” = boroughs with population lower than 20,000; “≥20,000” = boroughs with population at least 20,000 excluding county-boroughs; “county-boroughs” – large boroughs that also have the status of county. We will refer to particular elections using their year and “Type of office” characteristics (e.g., 2010.3c = county-boroughs elections of 2010).

^aExcluding 66 county-boroughs that were included in the 3c category.

Source: Flis and Kaminski (2022), Główny Urząd Statystyczny (2018), Kodeks Wyborczy (2018).

The third estimation required the use of indirect methods. The candidates’ positions in all OLPR elections were not alphabetical, meaning separating their popularity from the bonus generated solely by the position on the list was impossible. To overcome this difficulty, we assessed the bonus in the BV elections, which took place in some boroughs in 2010 and used alphabetical lists. We treated our estimates as proxies for the list positional bonus in OLPR elections.

Spoilt Votes

The amplifying effect of the complexity of votes under PR and other factors associated with PR on spoilt votes was documented by a few studies (Breux and Couture 2014; Gendźwiłł et al., 2016; Pachón, Carroll, and Barragán, 2017). In our work, we used all five election pairs from Table 1 where exactly the same set of voters voted in both PR and SMD 2014 elections for the estimates. This allows for a more reliable comparison of the effects caused by PR and SMD systems.

Elections carried out simultaneously under various electoral laws, as is often the case with local elections, allow a comparative analysis of spoilt votes. The main factors that hold constant are turnout and the identities of voters who cast their votes simultaneously using different ballot cards under different electoral systems. Nevertheless, the resulting natural experiments are not free from imperfections. First, external variables can intervene and asymmetrically affect the level of spoilt votes. Moreover, it is virtually impossible to control individual variables such as gender, age, or education because of the secrecy of voting.

In order to estimate the difference in the spoilt votes between the OLPR and SMD elections, we compared such votes for all five SMD and OLPR election pairs in 2014,

where exactly the same voters cast their votes (see Table 2). The comparisons are related to the intersections of voters who voted in the specific pair of election. Thus, such subsets may be different, and the percentages of spoilt votes may differ on such different subsets. As an example, spoilt votes corresponding to elections 1 (row 1) refer to the set of voters who also voted in elections 3ab while the spoilt votes for elections 1 (row 3) correspond to the set of voters who voted in elections 4.

It is worthwhile taking a few notes. The percentage of spoilt votes in all OLPR-SMD pairs is higher in the OLPR elections, that is, $s^{\text{OLPR}} > s^{\text{SMD}}$. Consequently, our hypothesis H1 is corroborated in all five cases. Nevertheless, the differences within election pairs vary significantly, which suggests that there are more relevant variables that systematically affect spoilt votes. In addition, a comparative analysis of the 2010 elections (not shown here) revealed that while all differences in spoilt votes have the same sign, they are smaller than in the 2014 elections, and slightly over half of the 2014 numbers. This difference may be attributed to the ballot design in all 2014 OLPR elections, that is, “ballot booklet,” not a one-page ballot card. It was shown that the ballot booklet significantly increases the percentage of spoilt votes (Pierzgalski, Górecki, and Stępień, 2020).

As a single-number measure of the effect, we decided to take the unweighted mean of all five effects. While this decision may be subject for discussion, the effect in the first four election pairs is substantial and consistent, and only in the last pair, it is slightly lower. The median for the five election pairs is a very similar 6.24. Unfortunately, running regressions with dummies for election types turned out technically unfeasible due to difficulties in combining data sets for different elections.

Table 2. Spoilt Votes in Five Paired Elections in 2014 Using SMD and OLPR.

OLPR Elections	Spoilt Votes S^{OLPR}	SMD Elections	Spoilt Votes S^{SMD}	$S^{\text{OLPR}} - S^{\text{SMD}}$
1	10.40	3ab	2.16	8.24
2	8.40	3ab	2.16	6.24
1	8.25	4	1.04	7.21
2	6.68	4	1.04	5.64
3c	3.05	4	0.70	2.35
Unweighted average of votes for all five election pairs				5.94

Note: Spoilt votes are percentages of those entitled to vote. Election numbers represent elections described in Table 1: 1- province council; 2- county council; 3c- county borough councils; 3ab- borough councils, not county; 4- borough mayor.

The final caveat is that, in all cases, the paired elections fill different offices. The PR elections are used when a large number of seats needs to be filled out, such as in province, county, or large-borough councils; the SMD elections are used for single offices or smaller councils. Since the office type is fused to election type, separating a hypothetical effect of election type is impossible.

Ballot (Interparty or Candidate) Positional Bonus

In an ideal voting world, the position of the candidate or party on the ballot would not affect the result. We know, however, that sometimes competitors can receive a bonus for the most prominent first position from some “lazy,” “poorly informed,” “less educated,” or “ambivalent” voters (Kim, Krosnick, and Casasanto, 2015). The effects of SMD ballots are so well recognized that the courts refer to them as common knowledge in reversing election outcomes (Alvarez, Sinclair, and Hasen, 2006). Our empirical hypothesis, H2, that stipulates stronger first-position bonus for OLPR systems, is motivated by the following reasoning. With comparable numbers of options, voters looking at the PR ballot see the same number of parties as candidates in single-member districts. However, the cognitive task of especially less informed voters is more demanding since they need at least to skim the list of individual candidates. Due to resulting cognitive overload, relatively higher percentage of voters will vote for the first party on the PR ballot than the first candidate in SMD systems.

Intuitively, the positional ballot bonus B is the percentage of valid votes that the candidate or party listed first on the ballot card receives solely because of this position.

Alphabetical Positional Bonus with MR

The number of candidates in SMD elections varies from one to several strong candidates, and possibly some

additional “plankton,” unknown to most voters. For estimates, we used elections #4 and #3a in Table 1.

Candidates for borough leaders in MR elections (#4 in Table 1) were ordered alphabetically. We assumed that the alphabetic listing was generated in a quasi-random process and was not a priori correlated with electoral chances, that is, that there were no significant effects due to, for example, putting on ballot dummies with alphabet opening names such as *Abacki*. In contemporary SMD elections there are no real benefits to listing alphabetically privileged nobodies who would gain the support of a few confused voters.

After excluding 247 single-candidate races, we obtained data on 2229 ballots ranging in length from 2 to 11 candidates, with an average ballot length of 4.54. We used the following main variables describing candidates for borough leaders:

VOTE is the average percentage of votes for candidates listed as No. 1 on the ballot in the first round of elections.

LENGTH is the ballot length (number of candidates on the ballot).

EXPECTED (percent) is equal to $100/n$ where n is the corresponding ballot length.

Δ , the dependent variable equal to $VOTE - EXPECTED$, represents the difference between actual and expected votes.

Table 3 shows the values of variables and the number of cases for all ballot lengths.

Estimated bonuses for candidate No. 1 were small for all ballot lengths with 100+ cases. In the case of three ballot lengths, candidate No. 1 received slightly more votes than expected, while for seven lengths, their votes were slightly smaller. The average bonus for all ballot lengths was a tiny -0.51% . This number represents the average loss from being listed as No. 1. Because the p -value is a substantial 0.15, we do not reject the null hypothesis that the positional ballot bonus equals zero.

We examined several control variables for Δ , which included LENGTH; POPULATION—the population of the borough standardized with a medium-sized borough

Table 3. (Model MRI): Votes for No. 1 Listed Candidates and Related Data by Ballot Length in Elections of Mayors in 2014 Using MR (Percentage).

LENGTH	Number	VOTE	EXPECTED	Δ
2	666	49.06	50.00	−0.94
3	653	32.31	33.33	−1.02
4	439	25.28	25.00	0.28
5	253	20.70	20.00	0.70
6	123	17.11	16.67	0.44
7	53	12.45	14.29	−1.84
8	25	10.52	12.50	−1.98
9	13	7.97	11.10	−3.13
10	2	2.80	10.00	−7.20
11	2	6.24	9.10	−2.86
Total:	$n = 2229$		BONUS:	−0.51

Note: Own calculations based on official election data from Państwowa Komisja Wyborcza (2019). “Number” is the number of ballots with the corresponding length; VOTE is the mean vote for candidates listed as #1 by different ballot lengths; EXPECTED is the expected percentage of votes for a given ballot length; $\Delta = \text{VOTE} - \text{EXPECTED}$; BONUS is the estimated bonus for being listed as a #1 candidate across all ballot lengths.

For H_0 : BONUS = 0 & H_a : BONUS $\neq$ 0, $t = -1.4385$; two-sided p -value = $\Pr(|T| > |t|) = 0.1504$.

Jedlicze, which was normalized at 1; and BOROUGH—a binary variable that assumes 0 for towns and 1 for other boroughs. All seven regressions using our control variables turned out insignificant slopes, with p -values for double-sided t -test ranging from 0.343 to 0.9. The amount of the explained variation in Δ was negligible.

The most interesting control variable was LENGTH, which can be interpreted as a proxy for the complexity of the voter’s decision problem. Δ slightly increased with LENGTH but the increase was insignificant. This suggested that voters were not computationally overloaded and were not more likely to vote for the first-named candidate when the candidate list lengthened. The culprit may be relatively short ballots, all of which cover 2–11 candidates, and over 98% only cover 2–7 candidates.

Interestingly, in the open-race (no-incumbent) elections of borough mayors, which account for around 11% of all elections, a small positional bonus was found. Bartnicki (2018) analyzed the winners in the open-race elections in 2006, 2010, and 2014. His four regressions with additional controls identify an average bonus of 2.6%.

Analysis of borough council elections in 2014 under FPTP returned similar conclusions to the elections of the mayors in 2014 (election #3a in Table 1). The main results were as follows: the number of electoral races was 131799; 1733 election cases with only one candidate on the ballot were excluded. The positional ballot bonus was slightly positive at the level of 0.07% (p -value for two-sided mean comparison t -test equal to 0.375).

We conclude that the null hypothesis that the estimated positional ballot bonus in the SMD elections for borough mayors and councilors is zero ($B^{\text{SMD}} = 0$) was corroborated.

Lottery-Generated Positional Bonus under OLPR

When the electoral law is PR, the election menu is extended by an order of magnitude.⁵ In the OLPR system, voters choose the party and the name from its list. Suppose the district magnitude is low $M = 5$ (the minimum number of candidates for the list in the PR borough elections), and the number of competing parties is also equal to the low five. In that case, the total number of candidates on the ballot is 25. In provincial elections, with over 16 candidates for one seat, the average number of candidates on the ballot was about 120. In addition, with OLPR, voters may choose a local candidate on each list. Even if they choose the first party without paying attention to its identity, the second choice of a local candidate may provide them with a psychological alibi that they voted conscientiously.

Identifying the positional bonus in PR elections is more challenging than in SMD elections due to the lack of alphabetically organized ballots that vary across districts. In PR elections, a consistent set of parties competes in virtually all districts. Party positions on ballots are determined by a single lottery after registration and remain uniform across all districts. Consequently, the party fortunate enough to draw the first position retains this placement throughout all districts. This uniformity makes it difficult to differentiate between votes attributable to the first-position bonus and those that would have been cast for the party regardless of its ballot position.

The estimation of the ballot bonus in the county election in 2014 (Election #2 in Table 1) was possible due to the exceptional coincidence producing a suitable natural experiment. The PSL drew the coveted first position on ballots in all districts where it competed as a party. However, in about one-third of districts, PSL registered as a freestanding committee rather than a party, resulting in a lower ballot position. This discrepancy created varying ballot positions for other parties. The second position was assigned to a tiny citizens’ committee called Direct Democracy, which only competed in one county. More importantly, the major party PiS, which initially drew the third position, benefited from this situation. PiS competed in different positions across districts: third, in one district where Direct Democracy was listed second, second against PSL-party in all other districts, and first against PSL-freestanding. In eight counties, PiS did not compete at all (see Figure 1). This incidental variation in ballot positions allowed us to estimate the first-position ballot bonus.

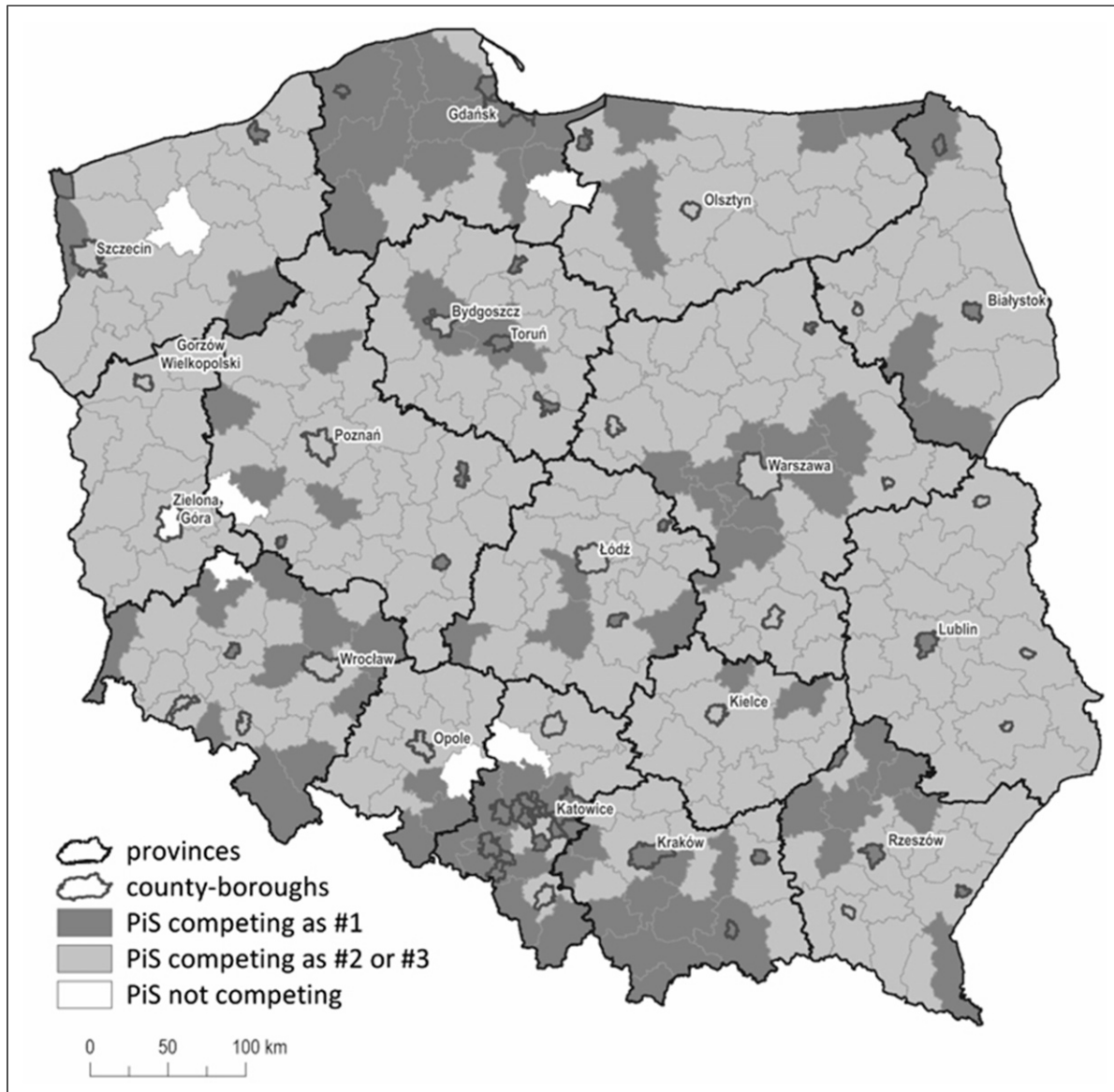


Figure 1. The territorial distribution of the positions of PiS on the ballot. Note: The position of PiS on the ballot, or the lack of a registered list of candidates, remains the same in all boroughs within a particular county. There are 16 provinces, with boundaries marked in black; 66 county-boroughs are small units within provinces with boundaries marked in medium grey. Source: Flis and Kaminski (2022).

If a party received extra votes for being No. 1 in some counties, then its electoral result in such counties should be higher. We have estimated such a hypothetical bonus for PiS. Since our alternative choice, PSL competed partially as the PSL-party and partially as PSL-freestanding, we could not separate the bonus from the disturbing effect of having two slightly different PSLs. The potential impact of different PSLs on other parties' scores, such as PiS, should be diluted and negligible.⁶

All variables listed below record the percentage of votes among all votes cast, including spoilt votes. The dependent variable is.

- (1) County/PiS_14: support at the borough level for PiS in county elections in 2014.

The explanatory variables are.

- (2) Province/PiS_14: support at the borough level for PiS in provincial elections in 2014.
- (3) NO-PSL: No PSL-party on county ballots in 2014.

In all provincial elections (Election #1 in Table 1), PiS received the number 3 because PSL competed in this

election in all districts as a party. Our key explanatory variable, the dummy variable NO-PSL, took the value 1 when PSL competed as freestanding (and PiS was assigned No. 1) and 0 when PSL competed as a party. Out of all 314 Polish counties, we excluded eight cases in which PiS did not compete in counties and 66 counties-boroughs with a different government structure than ordinary counties. In other counties, both PiS and PSL competed. We analyzed data at the borough level with 2338 boroughs.

The first regression estimates the positional bonus with provincial elections as a control. The fourth column shows a non-standardized impact of NO-PSL. In 2014, moving PiS up to No. 1 resulted in 8.52% more votes in a borough, which is highly significant.

The effect may be because NO-PSL is somehow connected to boroughs with more support for PiS, regardless of whether PSL ranks first. We ran three more regressions with similarly defined sets of dependent and explanatory variables and similarly defined sets of boroughs to test the reliability of our findings (see Table 4). In the previous election of 2010, we were looking for the impact of NO-PSL on the PiS result; PiS was listed fifth and PSL second. We also examined the impact of NO-PSL on the medium-sized party SLD (*Sojusz Lewicy Demokratycznej – Alliance of Democratic Left*), which was listed as No. 1 in 2010 and No. 6 in 2014. Since PSL never occupied the top position in all three cases, we didn't expect any impact of NO-PSL on PiS or SLD results.

Our second regression confirms that NO-PSL had no impact on the PiS result when PSL was not listed first in the previous election in 2010. Note that the 2010 and 2014 constants and the betas for provincial results in the two regressions involving PiS are very close.

The regressions involving SLD generate analogous conclusions to the second PiS regression. The removal of PSL from No. 1 did not move SLD to the top spot, and the impact of NO-PSL on SLD in 2014 was small and statistically insignificant. Similarly, in the 2010 elections, when SLD occupied the top spot, moving PSL from a non-top to another non-top position had no statistically

significant impact on the SLD results. Like the previous models, both SLD models have similar betas and constants.⁷

We will use the average of our two numbers, $B^{\text{OLPR}} = 8.45$, to estimate the positional ballot bonus. As the turnout in the 2014 #2 county election was 47.4%, applying the formula (1) returns $b^{\text{OLPR}} = 4.00$ effective ballot bonus. Because $b^{\text{OLPR}} - b^{\text{SMD}} = 4 - 0 = 4$, our H2 is corroborated.

List (Intraparty) Positional Bonus

A voter in OLPR elections faces two choices. After selecting a party, s/he must choose a specific candidate from the party list. Some voters choose their party and then select the first candidate on the list, whoever they are. What is more, some voters are increasingly less willing to vote for candidates from lower positions, although the last position may record a slight increase (Marcinkiewicz 2014) or decline (Lutz 2010). The effect is absent from SMD elections (no lists of candidates) or from closed list PR elections (no choice of candidate within lists allowed).

Positional effects with party lists are well recognized but difficult to estimate because positions on OLPR lists are rarely randomly or alphabetically ordered. The rare exception is Finland, where the candidates' order is arranged by lottery (Ministry of Justice 2018). Typically, party leadership, or party primary, arranges lists of candidates with stronger and/or senior “electoral locomotives” occupying higher positions. Therefore, voting on the list created by the leadership conflates positional effects with the strength of the candidate (see van Erkel and Thijssen 2016 for a creative attempt to “distill” such effects; see also Blom-Hansen et al. (2016) for ingenious use of columns on the ballot, which generated partial as-if-random allocation of candidates.). Similar problems appear in the Polish local 2014 elections. Therefore, our estimate of list positional bonus in PR elections should be considered with a grain of salt.

Despite methodological problems with identifying the bonus, there are strong indications that Polish voters handsomely reward the first candidates regardless of their

Table 4. (Model PR1): Estimates of Ballot Bonus B for PiS and SLD When There is No PSL-Party (Percent of all Votes Cast).

County results	Constant	Province results	NO-PSL		R^2
		β_1	B	β_2	
PiS_14	4.38	0.59 (0.00)	8.52	0.36 (0.00)	0.52
PiS_10	4.31	0.68 (0.00)	−0.20	−0.01 (0.57)	0.44
SLD_14	5.15	0.38 (0.00)	−0.23	−0.01 (0.55)	0.15
SLD_10	7.11	0.39 (0.00)	0.24	0.01 (0.64)	0.15

Source: Own calculations based on the official election data from Państwowa Komisja Wyborcza (2019).

identity. In an opinion poll of 2011, 77% of voters did not pay attention to the order of candidates on the list; 10% usually voted for a highly positioned candidate, but not necessarily No. 1; 6% usually voted for candidate No. 1; 7% were undecided (CBOS 2011, 5-6). We have used a proxy for estimating list positional bonuses under OLPR using a different list-based system that was applied in Poland in 2010.

List Positional Bonus under BV

The only electoral system used in Poland with district magnitudes greater than one and an alphabetical list of candidates was bloc voting (BV). It was used in all Senate elections from 1989 to 2007 and in some borough council elections in 2006 and 2010, but not in 2014.

We used the 2010 borough council elections with BV as a proxy for list positional effects under OLPR. BV filled a total of 18887 seats. The district magnitudes ranged from two to five seats (two: 3931; three: 1689; four: 872; five: 494). On average, 10.5 candidates competed for one seat. Most of the candidates came from one-candidate lists, and we excluded them from the analysis. The average length of the list with 2+ candidates was 2.67. In addition, some of the lists we analyzed contained fewer candidates than the district magnitude (Table 5).

Candidates ranked first on the list received an average of 7.3% more votes than the average for the remaining positions. This bonus decreases slightly in absolute terms with the list's length. In relative terms, No. 1 candidates received 17%, 21%, 26%, and 30% more votes than the average for other positions for list lengths 2, 3, 4, and 5, respectively.

Using equation (2), we can calibrate the list bonus as a percentage of all eligible voters. The parameters are as follows: turnout (46.6%), total actual spoilt votes ($5.4\% \times 0.466 \approx 2.5\%$), and the estimated ballot bonus ($8.45\% \times 0.466 \approx 3.94\%$). The calibrated list bonus is estimated as $7.3\% \times (0.466 - 0.025 - 0.0394) = 7.3\% \times 0.4016 \approx 2.93\%$. Remembering that we used list-based BV as a proxy for list-based OLPR, a low p-value for this result corroborates our hypothesis H3 that $I^{OLPR} > 0$. Again, we want to emphasize that our estimate of this list intraparty positional bonus is less reliable than the other two bonuses.

Summary of Results

We identified three types of "faulty" votes: spoilt votes that were blank or incorrect, votes related only to the most prominent first position of a party or candidate on the ballot, and votes cast for the first candidate on the party list in the OLPR elections solely because of this position. The third effect should be considered as a very rough estimate

Table 5. (Model BV1): Support for Candidates for Various Positions on Party Lists and Related Data in Elections to Borough Councils in 2010 Using BV (Percentage of Votes for the List).

Length	Number	#1	#2	#3	#4	#5	Bonus
2	11797	54.0	46.0	-	-	-	8.0
3	5033	37.8	32.2	30.0	-	-	6.7
4	2391	29.5	24.8	23.3	22.4	-	6
5	1295	24.5	20.4	19.0	18.0	18.0	5.7
Total:	$n = 20516$					Estimated list bonus:	7.3

Note: Own calculations based on official election data from Państwowa Komisja Wyborcza (2019). "Number" is the number of party lists with the corresponding length; #1-#5 is the candidate position on the list; "Bonus" is equal to the difference between the mean vote for the first position and the mean for the remaining positions; "Estimated list bonus" is the average "Bonus" weighted by numbers of lists. For H_0 : BONUS = 0 & H_a : BONUS $\neq$ 0, for means-comparison t-test, two-sided p-value = $\Pr(|T| > |t|) = 0.0000$ (for four tests for data from all four list lengths).

because of methodological issues that are impossible to overcome. Moreover, it is potentially present only in OLPR systems since in CLPR (closed list PR) systems, voters do not pick individual candidates. We estimated these effects thanks to the natural experiments we identified in Poland's local elections in 2010 and 2014 (see Table 6).

Our estimates of faulty votes return a surprisingly large number: 12.87% more eligible voters cast a faulty vote under OLPR than SMD systems or 9.34% if the list positional effect were excluded. When faulty votes are calculated as the percentage of all who voted, the difference between both types of elections is staggering: a full one-quarter, or one-fifth in a more conservative estimate, of voters more cast a faulty vote under OLPR! The turnouts were identical since we used data from simultaneous SMD and PR elections to estimate the effects. Both spoilt votes and the ballot bonus are much larger in the case of PR than in SMD systems; the list positional bonus appears only in OLPR systems.

Of course, we do not claim that ours are universal estimates. Various institutional and socio-cultural factors or ballot format may affect the effect's size and direction. Below, we will briefly discuss factors that cannot be controlled statistically with our data.

If we had to guess the spoilt-votes gap between typical "standalone" PR and SMD elections, it would probably be smaller than our estimates. In our case, four simultaneous elections imposed significant computational burdens on voters. Moreover, the lists of candidates were so long that some ballots were printed as "ballot booklets," which made the selection even more complex and troublesome.

The effect of the "ballot booklet" may also be partially or even primarily responsible for increasing the size of the ballot positional bonus. The first party was printed on the

Table 6. Percentages of Faulty Votes in Local Elections in Poland in 2010 and 2014 by Electoral System.

Faulty Votes	OLPR	OLPR (Effective)	SMD (Effective)	Δ
Spoilt blank or mistaken	7.68–26.2 ^s	3.05–10.40 ^t	0.56–2.16 ^u	5.94 ^w
Ballot positional bonus	8.45 ^v	4.00	0 ^x	4.00
List positional bonus	7.3 ^y	2.93	0 ^z	2.93
			Total difference:	12.87
			Only spoilt and ballot positional total:	9.94

Note: Δ = effective OLPR– effective SMD; ^{s, t, u}Ranges for five paired elections; ^wMean for five paired elections; ^vMean from Models PR1 and PR2; ^xModel MRI; ^yModel BVI; ^zEffect not present in SMD elections.

booklet's first page, making its location even more prominent. We do not know how strong the positional ballot bonus would be with a regular ballot. We know only that, combined with the booklet ballot format, the effect became very strong (Pierzgalski, Górecki, and Stępień, 2020). This part of our research is difficult to replicate because exchanging first-position parties in some districts created a rare natural experiment. At the very least, this part of our results adds another warning about bad ballot design, which is more likely in the PR than SMD because of the greater complexity of choices (Geys and Heyndels 2003).

The list positional bonus equals a relatively high 7.30 (2.93 effective). There is no reason to believe that this effect was affected by the ballot booklet format. However, one can argue that these votes are not completely faulty because they followed the conscious choice of the party leadership that possibly placed its “best” candidate at the top (van Erkel and Thijssen 2016). This is a valid point. However, those voters who follow their party blindly and generate such a bonus do not use the option OLPR offers to vote for a particular candidate. In this sense, their vote is flawed or incomplete because they could simply vote for their party. Moreover, awareness of such a bonus is important for the relationship between party authorities and individual candidates. It means that competition within the list, a key promise of the OLPR, is not fair (Flis 2014, 294–296).

Interactions Between Ballot Bonus and List Bonus Voters

We are interested in the specific type of interaction among the three subsets of faulty voters. Namely, we want to count such voters once if they belong to more than one subset. Since the first set of voters casting invalid votes is disjoint with the other two sets, the only potentially problematic interaction can take place between the two types of “bonus” voters, that is, those who vote for the first party on the ballot or the first candidate on the party list.

If there were a significant interaction between the ballot and list bonus voters, our formula (2) representing the

correction for list bonus would have to be modified. In the worst-case scenario, the same voters would vote for the first party on the ballot and then for the first candidate on this party's list, resulting in double counting such voters.

We checked whether there is the interaction between the PiS list bonus voters and the PiS ballot bonus voters. If there were interaction, we would see different proportions of the list bonus votes voters in districts where PiS competed as No. 1 and non-No. 1. As a control variable, we used the number of votes for the first PiS candidate in the 2010 election. The differences were minor, with a two-sided p-value (*t*-test) 0.711. This finding corroborates the null hypothesis that the list bonus voters constitute the same proportion as the other voters among the ballot bonus voters.

Conclusion: Complexity as the Price for More Choices

Electoral systems were studied as independent variables and as consequences of social and political factors (see, among others, Benoit, 2007; Boix, 1999; Colomer, 2005; Kaminski, 2006). Treating electoral laws as independent—fixed—parameters of the political system created the field of “political consequences of electoral laws.” There is a broad consensus among scholars that one of the most important consequences is that PR usually facilitates greater turnout than SMD-based systems. Among the studies of this “PR boost” effect, Blais and Carty (1990, pp. 174–5) examined 509 elections in mostly European democracies and, after controlling for several institutional variables, found that PR increased turnout by 5% compared to majority-based systems and 7% compared to plurality systems. Ladner and Milner, in a natural experiment setting of different electoral laws applied in Swiss cantonal municipalities, estimated the PR boost between –1% and 13%, depending on the community size (Ladner and Milner 1999, 245). Kartal (2015) conducted laboratory experiments in two groups of subjects and found the PR boost between positive 4.2% (small minority group) and negative –8.6% (large minority group). Lijphart estimated the PR-boost at 9%–12%

(1997, p. 7). The average estimate of a PR boost based on the above numbers is about 5%. The existence of this PR-boost is often considered as the most important argument in favor of PR systems over SMD electoral systems.

PR elections come with their own price, however. More options come with complexity that lowers the quality of votes. When we compare the turnouts in PR versus SMD systems, although technically increasing turnout, faulty votes do not really form conscientious choices. All categories of faulty votes summed together for PR after recalibration and subtraction of faulty votes in SMDs constitute a “PR blow”—a negative PR effect versus SMD. Even if we halve our upper estimate of the total “PR blow” of 12.27%, it has a similar magnitude as the estimated PR boost but works in the opposite direction. Our findings are consistent with the results of such experimental studies as Kim, Krosnick, and Casasanto (2015), who report that the specific factors that increase the propensity to choose the first candidate among voters include poor information, ambivalence, weak cognitive skills, and unwillingness to put effort into their choice.

When the faulty votes are considered against all who voted and not all those entitled to vote, our percentage estimates will increase significantly to about twice the previous number, that is, around 25%, or 20% when list positional effects are excluded. Even if we consider this number extremely high and specific to the elections that we analyzed, corrections for many faulty votes coming with PR must seriously affect the comparisons of SMD and PR systems. For instance, in an influential book, Powell (2000) argues that PR systems have a clear advantage over SMD systems in translating electorate preferences into policy decisions. However, according to his proportionality measure of the representation, which estimates the percentage of voters represented, PR systems average 96.1 and SMD average 85 (Powell 2000, 96). Although it is not immediately clear how to adjust Powell’s results using estimates of faulty votes, it is clear that—considering the difference in proportionality is 11.1—a correction based on faulty votes would significantly reduce this difference or even reverse the relationship.

Our results offer a few simple policy recommendations that would make the OLPR elections more meaningful or that would dissipate the undesirable bonuses among parties.

First, the party ballot bonus is relatively easy to engineer down. Instead of one nationwide lottery to place a party on the ballot, separate lotteries or quasi-random procedures for districts or at least sub-national regions can be organized. The goal is to dissipate a likely inevitable bonus among various parties. In the United States, random rotation of candidate names is used in many states (e.g., Chen et al., 2014; Darcy 1986; Krosnick, Miller, and

Tichy, 2004). For example, since 1975, elections in California have used a two-step procedure that seriously limits the ballot bonus. Initially, a “randomized alphabet” is drawn and applied to the order of candidates on the ballot in one district. For the next district, the first letter falls to the last position, and so on (Padilla 2018). The procedure does not nullify the bonus but dissipates it significantly.

Second, one should choose the ballot format with the utmost caution, and the side effects of particularly exotic designs should be tested with the survey or focus data. The booklet format versus sheet format seems to be particularly vulnerable to positional effects.

Third, using smaller districts and limiting the length of candidate lists (no longer than the district magnitude) seem to be another obvious candidate for limiting faulty votes. In province council elections (#1 in Table 1), the average number of candidates per district was about 120. This large number makes it impossible for a voter to evaluate meaningfully even a small subset of candidates. Both smaller districts and shorter lists of candidates would restrict voter choices, but the result should be visible in fewer blank and erroneous votes.

Finally, limiting the number of simultaneous elections would reduce the complexity of voting, but such a change seems to be most difficult to implement.

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Notes

1. With a closed list PR (CLPR), voters choose only among party lists, and the seats are allocated according to pre-assigned positions of the candidates, while in the open list PR, voters cast “preferential” votes, that is, they select a specific candidate or candidates from the list. Both types of lists are popular in legislative, local, and other mass elections. In the OLPR variant used in Poland, sometimes called semi-open, voters cast one vote for one candidate, and those with the most votes receive the seats that were won by the list. CLPR

- and OLPR may differ in important respects such as the level of providing public goods (Kselman 2020), or programmatic cohesion (Carroll and Nalepa 2020), which are higher in OLPR.
- In Polish local elections, OLPR used the algorithm of Jefferson-D'Hondt divisors, in which party votes are divided by 1, 2, 3, ... (positive integers) and the seats are awarded to the parties with their highest resulting numbers. SMD methods included FPTP (first-past-the-post, plurality), and MR (majority top two runoff), where the candidate wins if s/he has the majority; otherwise, the two leading candidates compete in the plurality election 2 weeks later. In all cases, tie-breaking rules regulate rare draws.
 - In bloc voting (BV), also called plurality-at-large, the district magnitude is $M > 1$. Parties register lists with M candidates; voters cast up to M single votes for different candidates from the same or different lists; and the M candidates with the most votes win seats.
 - As of election day on November 11, 2014. Data from Główny Urząd Statystyczny (Main Statistical Office) (2017).
 - This section is based on a more comprehensive analysis of lottery-generated positional bonuses in Flis and Kaminski (2022).
 - A quick look at the data confirms the significant ballot bonus for PSL: it received a huge vote for this party, 21.42%, well above pre-election polls.
 - An additional, more detailed analysis confirmed that NO-PSL did not have a statistically significant impact on the results of all other parties in the 2014 and 2010 elections. In Flis and Kaminski (2022), a more detailed set of models estimated the primacy effects at slightly lower values of 6.02–8.06 for PSL and 8–8.52 for PiS in their respective districts where the parties were listed as first.
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