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# Doubly effective one round election model: Improving efficiency and fiscal savings

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**Abstract.** Electoral processes are usual in most countries around the world. The most dominant electoral system is the standard Two-Round System (TRS). Despite the variety of models for electing public representatives, all result in public expenditure. In democratic societies, we cannot avoid such an expense, but we can minimize it. Minimizing expenses in line with simplicity and justice of the electoral processes is the primary goal of this paper. We propose an entirely new one-round election model that can replace and successfully simulate the existing two-round model. Our proposed solution is unique, and we have named it the Doubly Effective One Round election model (DEOR election model). The literature contains many similar approaches, such as Ranked Choice Voting (RCV)/Instant-Runoff Voting (IRV), Single Transferable Vote (STV), Approval Voting, or Majority Judgment, but this proposed model is entirely new. As the new model is based on a ranking method, it offers additional advantages and possibilities, which are explained and illustrated through several examples in the paper. In addition to its efficiency, the application of this model can bring significant fiscal savings.

**Keywords**: ballot, election round, fiscal savings, public good

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## 1. Introduction

The motivation for this paper is to improve the efficiency of the election process and reduce public expenses, thereby creating fiscal space for other public investments and enhancing the availability of public goods. Because most election processes consist of two rounds, the primary goal is to have only one round. There are various options for single-round election models, but this solution is unique. Therefore, the main objective of the paper is to develop an electoral model that successfully simulates the classic two-round system in only one round. In this way, the model will theoretically address a gap in the existing literature and practice. Its implementation will increase efficiency and yield significant financial savings.

Election models or electoral systems are the foundation of parliamentary democracy. Douglas Rae [26], in his 1967 work "The Political Consequences of Electoral Laws" underlines this point and it has become one of the most renowned papers in the field of election models. A comprehensive overview of election systems is also given in Arend Lijphart [23] significant paper from 1994 in which the author offers a detailed analysis of 70 election systems from 27 states during the period from 1945 to 1990. Such a large sample allowed for more precise conclusions. One of the most significant findings is that election models in general are not as different from

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each other, nor as complex from the voters' perspective, as they may appear initially. The success of specific election models lies in the design of a combination of characteristics that provide a fair and justified compromise for all stakeholders [4].

Generally, there are many dimensions of election models that are the basis for differentiation between them. One of the simplest is the way voters' preferences are expressed. According to this, we may select a single candidate, use ranked choice, score voting/range voting, or approval voting; very rarely, there is negative voting or the closure of candidates. The Doubly Effective One Round (DEOR) model uses augmented rankings with multiple choice.

Election models can be distinguished by the number of election rounds. There is a one-round election model (as in our DEOR model) and a two-round election model. The third and fourth options involve iterative elections, which eliminate candidates in each round, and elections with multiple rounds. Election models can also be differentiated by the method of decision making after voting. We have a majoritarian system, requiring more than 50% of the votes; the second is pluralistic (first-past-the-post-elections); the third is proportional which allows votes to be distributed according to contribution (e.g. the d'Hondt method which is very well represented in Croatia); and the last is compromise decision-making. Our model combines a majoritarian model in the first round with compromise decision-making in a hypothetical second round. The type of election result is another criterion for differentiating election models. The goal may be to elect a single winner (as in presidential elections), multiple winners (as in parliamentary elections), or to produce a ranked list (as in internal party processes). Our suggestion is to elect a single winner or multiple winners. Election models can also be judged in terms of their resistance to manipulation, such as false rankings, changes in decision, or disloyalty.

Our DEOR model increases resistance with more possibilities of voter preferences. Electin models can also be distinguished by their transparency or the complexity of vote evaluation. They may be simple, complex or computer verifiable. The DEOR model uses simple mechanism that can be verified by both humans and computers. One of the criteria is the impression of fairness of election models. Our proposed model provides very precise voter positions by ranking politicians according to their preferences and simulates the second round of the two-round system (TRS) in the second evaluation step, without the need to re-express preferences, which enhances security.

This model does not concern institutional design or construction. This paper focuses on the most efficient solution for the materialization of voters' rights. The fundamental goal in the process of translating voters' preferences into election outcomes must be justice and fairness. Despite all varies and different variations between countries – such as political system, geographical dispersion, voter concentration, history, heritage, number of parties [24], level of democracy, election structure, rule of law, level of decentralisation, social structure, economic development, and other determinants – there are a significant number of solutions in election process policy. Literature from this perspective has become increasingly popular [12, 14]. According to the complexity of the problem with collective choice and social welfare, we can say that the main problem in a broad perspective with preferences and aspirations of voters is interdisciplinary [30].

After the introduction in the paper, we present existing similar election models. The third part elaborates an extended explanation of our proposal, a one-round model. The last part presents the results and discussion of the proposed model with concluding remarks.

## 2. Existing election models

In an average country in the world, elections are a democratic standard. The decisions voters make under political circumstances are preconditions for conducting election policies. While intentions may be positive, the outcome can be devastating. Therefore, it is important to be aware of both the positive and negative aspects, considering all their pros and cons, as well as the differences between the various models [28]. The most well-known model is Ranked Choice Voting (RCV), also known as Instant-Runoff Voting (IRV). The main presumption is that voters rank according to their preferences. If no candidate has a majority, the candidate with the fewest votes is eliminated, and their votes are redistributed to the remaining candidates until someone reaches a majority. Examples of such elections can be found in Australia, where they are used for elections of the House of Representatives, as well as in some cities in the USA, such as New York, San Francisco, and Minneapolis, and in Ireland for presidential elections. This election model increases voter participation and reduces the intensity of negative campaigns. Another important benefit is lower fiscal pressure on the budget [27].

The next model is the Single Transferable Vote (STV), which is a proportional system in which voters rank politicians. The elementary concept of a proportional system is that the distribution of politicians is the same as the distribution of views in the electorate. This model is predominantly used in countries with strong English influence [32]. The most well-known usage of STV is in Australia, Ireland, and Malta. This election model allows countries with large pluralities to offer the most appropriate candidates from a wide range of political options. Consequently, this differentiation of voters' preferences allows smaller political parties a more significant role in the political process and more chances for success [6]. Another consequence is lower wastage of votes, but on the other hand, it is harder to understand how it works in practice for an average voter. Minus is also a complicated system of vote counting. This model is extensively elaborated in Farell and McAllister [11] on Australia's example. Another explanation also gives the work of Farell and Katz from 2014 [10]. According to practice, STV can be manipulated despite the theoretical perspective, which says that STV is difficult to manipulate [35]. The most debatable fact is the complexity of the model, and it can be mistaken in vote counting, where analysis of mistakes has shown that those mistakes can have a significant influence on election results [5].

Approval voting is a simple model that allows voters to approve of politicians as many times as they want. Among all models, approval voting is the most genuine of all similar voting systems, and it is the only model that secures the politicians with a Condorcet majority if the preferences are dichotomous. The consequences could be strengthened for centrist politicians in the most dominant two-party system [7]. Voters can choose more candidates from a ballot where every chosen candidate gets one vote. There is no ranking. The candidate with the highest number of approvals is the winner. This model is appropriate for elections with more candidates. It eliminates vote splitting. An explanation of the model's mathematical perspective is given in the paper by Van der Straeten et al. [34]. Because there are significant differences between voters in honesty [36], some authors give a comparison of election results that use approval voting from the perspective of honest strategic voters. Approval voting advocates for more candidates with the same treatment. Results give a better voice to voters with lower costs at the end of the process [16]. The negative side of this model is the uncertainty of voters' candidates' selection because they are unsure whether to choose only one candidate or all candidates that are acceptable to them [33]. Analysis has shown that this model gives the best results in situations when there are not too many and not too few candidates who compete [25].

The crux of the Majority Judgment model is an entirely new theory of social choice where voters judge the politicians [2], and it avoids and differs from the well-known Condorcet and Arrow paradoxes [21]. Majority Judgment is an electoral reform that satisfies all the preconditions for a successful election model [21]. The Condorcet rule is based on repeated voting and

elimination of one candidate in every round, which is the basis of consistency [1], but on the other hand it could be possible Condorcetov paradox which means that the winner candidate wins all other in the game of pairs based on majority rule [20]. The Majority Judgment model is more realistic and lifelike. Balinski and Laraki [2] believe that the question is not how to convert many individual rankings into one decision, but rather, after defining a common language of grades to measure merit, how to convert voters' wishes into one collective evaluation of all competitors. The basic presumption is to evaluate, not to compare [12]. Some disadvantages and weaknesses of this model are shown in [19]. In the literature, there are some recommendations to use multiwinner voting as the process in electing politicians [9], which can be a solution.

For future research, we explore some specifics for a similar RCV model. We chose RCV because it is the most popular among researchers, and has the most usable data, which could be a good path for the implementing our model in practice. Some research showed that Ranked Choice Voting (RCV)/Instant-Runoff Voting (IRV) could increase voters' participation in elections and voters' curiosity. In contrast, others stated in favour that just younger voters are attracted [8], but not the overall population [18]. The paper [30] shows that RCV increases the chances for women in the election process, especially minorities. [15] showed that RCV has a good impact on a better perception of voters on the legacy of elections and election justice in comparison with traditional election models. From the negative perspectives of RCV, [13] concluded the importance of ballot construction as one of the significant reasons for RCV imperfections. However, some researchers have found a solution to the challenge mentioned. The work of [31] investigates appropriate ways of ballot construction to avoid one of the main complaints about this method. They suggested the System Usability Scale (SUS). Such a solution could also be easily implemented in the DEOR method, and it is detailed explained in [22]. Current literature from this field and all comparable models, with their pros and cons, is a precondition for a practical approach to implementing our DEOR model based on normative and practical goals. The detailed explanation is given below.

## 3. Methodology

Considering elections where only one candidate from the election list needs to be selected, a very common option is a classical model with two election rounds. This is the case with all elections in the Republic of Croatia since its independence. Since the very first time, Croatia has held eight presidential elections, 13 parliamentary elections, and nine local elections. One of our main motivations is to reduce the fiscal costs associated with the election process, so we propose an entirely new election model here. That model includes just one election round and can effectively replace and simulate the existing two-round model, with additional advantages and possibilities. In elections where only one candidate from the list needs to be selected, we use a classical two-round model. This is the case with all elections in the Republic of Croatia since its independence. Since the very first time, Croatia has held eight presidential elections, 13 parliamentary elections, and nine local elections. One of our main motivations is to reduce the fiscal costs associated with the election process, so we propose an entirely new election model here. That model includes just one election round and can effectively replace and simulate the existing two-round model, with additional advantages and possibilities.

### 3.1. Classical two-round election model

This is a standard model for selecting a single candidate from the list, with the following rules. In the first round, each voter must pick only one candidate from the ballot. If he chooses more than one candidate or none, his ballot is invalid. If a particular candidate gets more than 50% of the total number of valid votes, the election process is completed. Otherwise, two candidates

with the most votes enter the second round after a few days (or weeks), where the election process is repeated just for them.

Obviously, organizing and implementing this model requires significant financial resources. The considerable financial savings could be achieved with just one round instead of two. However, can the overall process efficiency be retained in that case? With appropriate modification of the voting method, the answer is positive.

## 3.2. New doubly effective one-round election model

The main idea behind the one-round election model is that voters rank the candidates offered rather than choosing one. This approach is quite natural and practical. Namely, choosing only one candidate means that all the others are discarded as worthless. But in reality, that is never the case; everyone has their pros and cons. Each voter, according to his own perception, creates his own mental ranking of the candidates. This model enables the voter to copy it to the ballot. In this way, the ballot represents his real perception of all the candidates and not only one of them.

Technically, the situation is straightforward. If we have $n$ candidates, then each candidate on the ballot is associated with $n$ numbers 1, 2, 3,..., $n$ that the voters can choose. For each candidate, the voter has three possible choices:

- to choose only one number (number 1 if this candidate is his first option, two if he is the second option, etc.),
- to choose two or more numbers if this candidate is one of his multiple options (e.g. 1,2 and 4 if he is the first, the second, and the fourth option),
- not to choose any number if this candidate is by no means his option.

We can see how these choices enable the voter to express their opinion of each candidate in relation to the others. In this way, the ballot represents his complete perception of the election list. Note that this way of filling out the ballot is very natural and familiar to the voter.

In this way, the election process is completed in one round. In order to simulate the usual two rounds, the ballots are evaluated in two rounds.

In the first round of evaluation, valid ballots are those in which only one 1 is selected. If more than one or no number 1 is selected, then such a ballot is invalid in this round. This fully corresponds to the case in the classical model when more than one or no candidate is picked out. Thus, number 1 selected for a particular candidate makes a valid vote for this candidate in the first round, if number 1 is not selected for any other candidate on this ballot. Similarly, as above, if someone receives more than 50% of the total valid votes, the election process is completed, and the second evaluation round is held for the two candidates with the most votes. Such validation makes the first round identical in both models.

In the second round of evaluation, the valid ballots from the first round that support the two candidates who advanced to the second round are transferred to the second round. The other ballots are evaluated so that only the selected numbers for these two candidates are considered. The vote goes to the candidate with a smaller selected number. Valid ballots in this round are those with different selected numbers for these two candidates, or with a selected number for only one of them. Invalid ballots are now those with exactly the selected numbers and no selected number for both candidates. Let us remember that a voter can select more than one number for the same candidate. In such a case, the smallest one is considered. Now, the votes for these two candidates, from valid ballots in the first and second rounds, are counted to determine the election winner.

## 4. Results and discussion

The method of two evaluation rounds in a one-round election model, which we have just explained, will be illustrated through several examples. Suppose we have six candidates, A, B, C, D, E, and F, in the election. The ballot can be structured as follows.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| B | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| C | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| D | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| E | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| F | ... | 1 | 2 | 3 | 4 | 5 | 6 |

Figure 1: *Six candidates ballot.*

Let us suppose that some voters make the following selections.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| B | ... | ① | 2 | 3 | 4 | 5 | 6 |
| C | ... | ① | 2 | 3 | 4 | 5 | 6 |
| D | ... | ① | 2 | 3 | 4 | 5 | 6 |
| E | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| F | ... | 1 | 2 | 3 | 4 | 5 | 6 |

(a) Ballot 2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | ... | 1 | ② | 3 | 4 | 5 | 6 |
| B | ... | 1 | 2 | ③ | 4 | 5 | 6 |
| C | ... | 1 | 2 | ③ | 4 | 5 | 6 |
| D | ... | 1 | 2 | ③ | 4 | 5 | 6 |
| E | ... | 1 | 2 | 3 | ④ | 5 | 6 |
| F | ... | 1 | 2 | 3 | 4 | 5 | 6 |

(b) Ballot 3

Figure 2: *Ballots 2 and 3 selections.*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | ... | 1 | 2 | 3 | 4 | ⑤ | 6 |
| B | ... | 1 | 2 | ③ | 4 | 5 | 6 |
| C | ... | ① | 2 | 3 | 4 | 5 | 6 |
| D | ... | 1 | ② | 3 | 4 | 5 | 6 |
| E | ... | 1 | 2 | 3 | 4 | 5 | ⑥ |
| F | ... | 1 | 2 | 3 | ④ | 5 | 6 |

(a) Ballot 4

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | ... | ① | 2 | 3 | 4 | 5 | 6 |
| B | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| C | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| D | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| E | ... | 1 | 2 | 3 | 3 | 5 | 6 |
| F | ... | 1 | ② | 3 | 4 | 5 | 6 |

(b) Ballot 5

Figure 3: *Ballots 4 and 5 selections.*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | ... | ① | 2 | 3 | 4 | 5 | 6 |
| B | ... | ① | 2 | 3 | 4 | 5 | 6 |
| C | ... | 1 | ② | 3 | 4 | 5 | 6 |
| D | ... | 1 | 2 | ③ | 4 | 5 | 6 |
| E | ... | 1 | ② | 3 | 4 | 5 | 6 |
| F | ... | 1 | 2 | ③ | 4 | 5 | 6 |

(a) Ballot 6

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | ... | 1 | 2 | 3 | 4 | 5 | ⑥ |
| B | ... | 1 | ② | 3 | 4 | 5 | 6 |
| C | ... | 1 | 2 | 3 | 4 | 5 | 6 |
| D | ... | ① | 2 | 3 | 4 | 5 | 6 |
| E | ... | 1 | 2 | 3 | 4 | ⑤ | 6 |
| F | ... | 1 | 2 | 3 | ④ | 5 | 6 |

(b) Ballot 7

Figure 4: *Ballots 6 and 7 selections.*

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | ... | 1 | 2 | ③ | ④ | 5 | 6 |
| B | ... | ① | ② | ③ | ④ | ⑤ | ⑥ |
| C | ... | 1 | 2 | 3 | 4 | ⑤ | ⑥ |
| D | ... | 1 | 2 | ③ | 4 | ⑤ | 6 |
| E | ... | 1 | 2 | ③ | ④ | ⑤ | ⑥ |
| F | ... | 1 | 2 | 3 | 4 | 5 | 6 |

(a) Ballot 8

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | ... | ① | 2 | 3 | 4 | 5 | 6 |
| B | ... | ① | ② | 3 | 4 | 5 | 6 |
| C | ... | ① | 2 | ③ | 4 | 5 | 6 |
| D | ... | ① | 2 | 3 | ④ | 5 | 6 |
| E | ... | ① | 2 | 3 | 4 | ⑤ | 6 |
| F | ... | ① | 2 | 3 | 4 | 5 | ⑥ |

(b) Ballot 9

Figure 5: *Ballots 8 and 9 selections.*

Let us suppose that no candidate obtains more than 50% of the valid votes in the first evaluation round, and that candidates C and E receive the most, say 40% and 35% (note that all the ballots with exactly one selected make 100%). They bring their votes to the second evaluation round, where they get additional votes from the remaining ballots. C (E) gets an additional vote if its selected number is smaller than E (C) or with any selected number if no number for E (C) is selected. We will now evaluate the given ballots 1-9 and compare them with the corresponding cases in the classical election model.

Ballot 1 is invalid in both evaluation rounds because it is empty, and no number is selected. This is the same as in the classical model with an empty ballot.

Ballot 2 is invalid in the first round because multiple number 1 is selected. It is valid in the second round where C and E are considered, and it provides the vote for C because number 1 is selected for C and none for E. Equivalent situation in the classical model is that the voter picks out three candidates in the first round and thus makes his ballot invalid, while in the second round he votes for C.

Ballot 3 is invalid in the first round because no number 1 is selected, but it is valid in the second round, where it provides the vote for C (the smaller selected number between C and E). An equivalent situation in the classical model is that the voter does not vote in the first round, or he leaves an empty ballot, and in the second round he votes for C.

Ballot 4 is valid in the first round, where it provides the vote for C. Since C passes to the second round, this vote is just kept for C in the second round. Equivalently, in the classical model, the voter gives his vote to C in the first round and in the second round again.

Ballot 5 is valid in the first round, where it provides the vote for A. Since A does not pass to the second round, this ballot is invalid in the second round because no number for C or E is selected. Equivalently, in the classical model, the voter gives his vote to A in the first round and does not vote in the second one or leaves the ballot empty.

Ballot 6 is invalid in the first round because number 1 is selected twice. It is also invalid in second round where the same number 2 is selected for C and E. Equivalent situation in the classical model is that the voter makes multiple choice in the first and then in the second round again.

Ballot 7 is valid in the first round, where it provides the vote for D, but D does not pass to the second round. The ballot is also valid in the second round where it provides the vote for E because number 5 is selected for E and none for C. Equivalently in the classical model the voter gives his vote to D in the first round and to E in the second one.

Ballot 8 is valid in the first round, because of one selected number 1, where it provides the vote for B, but B does not pass to the second round. The ballot is also valid in the second round, where it provides the vote for E because the smallest selected number for C is 5, and for E is 3. Equivalently in the classical model the voter gives his vote to B in the first round and to E in the second one.

Ballot 9 is invalid in the first round because of multiple selections of number 1, and also in the second round because of the same smallest selected number (number 1) for C and E. Equivalent situation in the classical model is multiple choice in the first round, and then again in the second round.

The main idea was that DEOR simulates TRS as well as possible, and that is why the evaluation rules are like that. Such an approach also has certain disadvantages. For example, let us suppose that 90% of voters equally prefer candidates A, B, C, D with number 1 and they ignore candidates E, F. Then their ballots are not taken into account both in the first and in the second evaluation step and the remaining 10% of voters can choose winner E or F, although 90% of voters do not want that candidate E or F wins. An equivalent situation occurs in TRS when 90% of voters make multiple choices for A, B, C, and D. Of course, the probability of such a situation occurring in reality is practically zero.

Under different evaluation rules, e.g., a rule that in the first evaluation step each of candidates A, B, C, D gets $\frac{1}{4}$ vote from each ballot (in total each of them gets 22.5% of the votes), then neither E nor F can be a winner. Such changes can improve the model, but we lose equivalence with TRS. Modifying and optimizing the evaluation rules to improve the model can be an interesting topic for future research. We summarize here the properties and advantages of the proposed model in relation to the classical one.

As we have seen, the classical two-round election model could be replaced entirely with the proposed one-round model. It means that the same effects obtained from two rounds can be achieved just from one round. There are significant savings in time and money in the organization, administration, and conduct of the election due to a single round rather than two. There are also financial savings in the election campaign, as it is held only once. To improve efficiency in such circumstances, the campaign should be more serious and thorough, and its quality raised to a higher level. The election ranking method makes a ballot an image of the voter's detailed perception of all the candidates. It can be a background for valuable post-election analysis of public opinion. In the classical model, if a voter gives his vote to a candidate who advances to the second round, he can change his mind and cast his vote for another candidate in the second round. This is not possible in the one-round model. The candidates who pass to the second evaluation round bring their votes from the first round. This feature encourages voters to think carefully about their choice, and candidates to conduct their campaigns thoughtfully. If the voter chooses a particular candidate, then they should be consistent in their choice. However, the paper based on five presidential French elections shows that voters have different preferences between two rounds [3]. Finally, as we have seen in the presented examples, if a voter has any doubts and cannot make a firm decision (as the classical model forces him to do), he can express minor differences in his perception of the candidates through the ranking method in the proposed election model.

## 5. Conclusion

In the paper, we show that the classical two-round election model can be replaced by a one-round model. This can be achieved by introducing a ranking method rather than selecting a

single candidate. Instead of conducting two rounds, the ballots are evaluated twice. The first evaluation simulates the first round and yields the winner or two candidates for the second evaluation. In this way, two physical rounds are replaced with two evaluation rounds. This results in significant savings in time and money with the same output. Besides, the Doubly Effective One Round election model (DEOR election model) enables the voters to express their perception of each candidate instead of choosing just one and discarding all the others. This can be an additional motivation to vote, as many voters miss the election due to doubts about the candidates offered.

In conclusion, the presented model is much simpler and more efficient than the existing one. It encourages candidates and voters to approach the election process more seriously and consistently. For subsequent research on this matter, there is room to explore the practical and experimental aspects of this new method, and we encourage this approach, as this paper is based solely on a theoretical perspective.

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