Comparing strategic voting incentives in plurality and instant-runoff elections

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4 Results

4.1 Expected Benefit, Magnitude, and Prevalence

We now proceed to present and discuss the results of applying the above method to the CSES data. We show that the expected benefit of strategic voting is higher in Plurality, regardless of how precise beliefs about the expected outcome are, or how strategic voters anticipate others to be. The larger expected benefit is due to both a higher magnitude and a higher prevalence of strategic incentives in Plurality. Decomposing these results further, we find that the probability of a strategic vote being beneficial is (on average) lower in IRV, whereas costs and benefits of strategic voting are more positively correlated in IRV.

For all quantities of interest, we present the average *within* each CSES cases (weighted by individuals' survey weights) as a thin line across all iterations as discussed in Section 3.3.1. We also compute the average *across* all CSES cases (weighted by case's population and number of surveys) and plot it as a thick line.

Figure 1 shows the expected benefit, magnitude, and prevalence of strategic voting in both Plurality and IRV. We discuss the expected benefit first, before decomposing the result into magnitude (how much one benefits from the strategic vote) and prevalence (whether one has an incentive to vote strategically at all). Overall, our finding supports the conjecture noted in at the beginning that IRV offers fewer incentives to vote strategically than Plurality.

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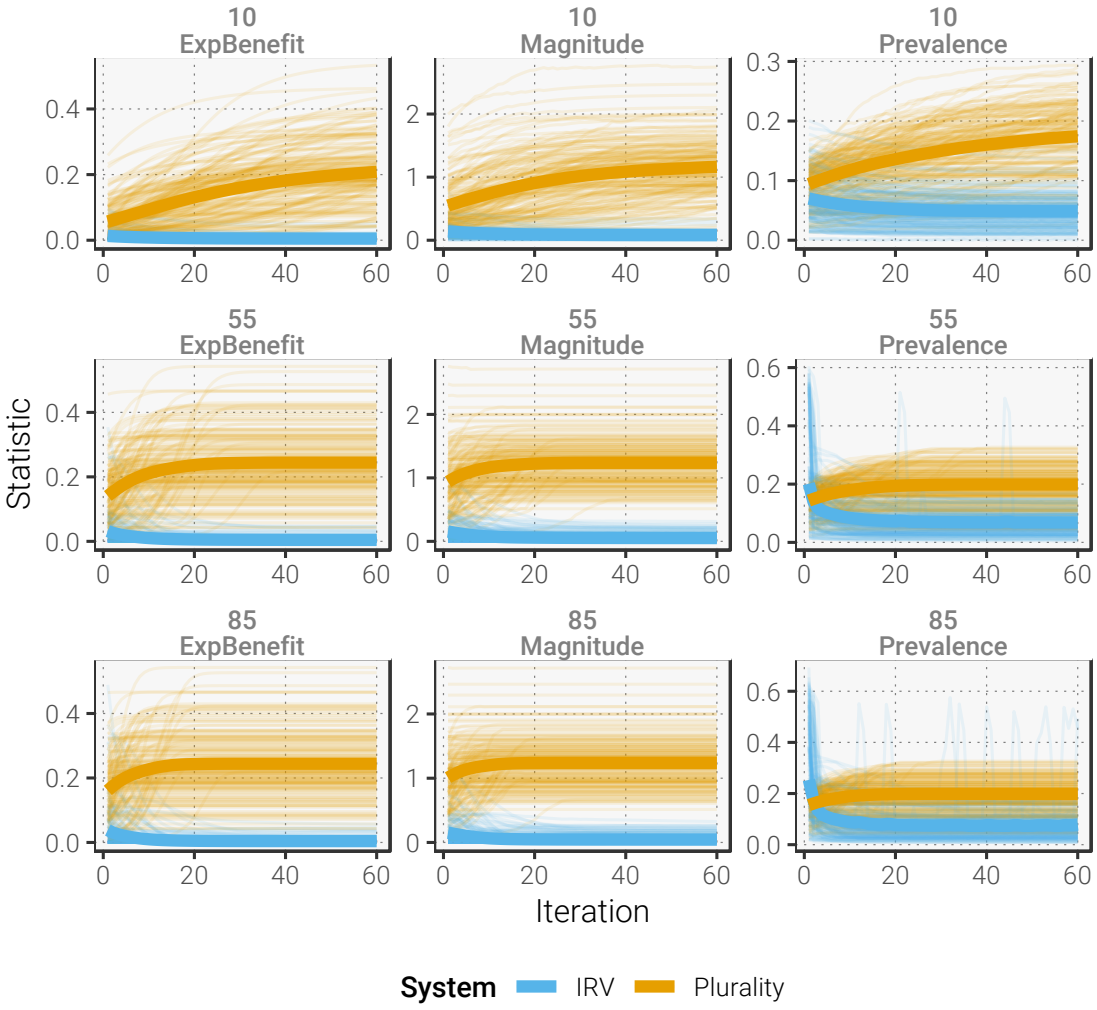

Figure 1: Expected benefit, magnitude, and prevalence of strategic voting

The expected benefit is higher in Plurality than IRV for all levels of belief precision. Notably, the variance across different CSES cases is also higher in Plurality than in IRV. When beliefs are imprecise ($s = 10$), the expected benefit in Plurality is comparatively lower when voters are expected to vote sincerely (low number of iterations); as voters are expected to become more strategic (high number of iterations), the expected benefit in Plurality reaches approximately the same levels for all levels of precision. Overall, the expected benefit in Plurality is (weakly) increasing in the number of iterations in all three precision settings.

In IRV, the expected benefit is significantly lower in all circumstances, and there is far less variance across CSES cases. The average expected benefit in IRV does not vary much by level of precision; it remains at very low levels regardless of how precise beliefs are. Note, however, that it is (weakly) decreasing in the number of iterations.

The difference between Plurality and IRV is driven by both the magnitude and the prevalence of strategic incentives in either system. For magnitude (how much does a strategic vote benefit me?), the patterns look very similar to those of the overall expected benefit. The magnitude in Plurality is, on average, higher; it increases in the number of iterations and does so more strongly if beliefs are imprecise. In IRV, the magnitude is unconditionally low for all levels of belief precision, and weakly decreases in the number of iterations.

Finally, the prevalence of strategic voting incentives is somewhat different. We observe similar patterns in Plurality as we did for expected benefit and magnitude: the prevalence is, on average, higher than in IRV, and increases in the number of iterations. However, the difference between the two electoral systems is smaller. In fact, in the case of reasonably precise beliefs and an expectation that everyone else votes sincerely, strategic incentives in IRV are more prevalent. In further difference to the previous two quantities, the average prevalence of strategic incentives in IRV increases notably as precision improves. However, despite the increase in average levels, the prevalence *conditional on the same level of precision* still decreases in IRV as voters are expected to behave more strategically.

In sum, we find that strategic incentives have a higher average expected benefit in Plurality under all circumstances. For the most part, a greater proportion of voters has an incentive to vote strategically in Plurality (prevalence), and if they do, the benefit from doing so (magnitude) is also larger than in IRV. Only when beliefs are precise and everyone else votes sincerely is the prevalence

of strategic voting higher in IRV; however, even in these circumstances, the magnitude remains low, still yielding a higher composite expected benefit in Plurality (fewer people having an incentive to vote strategically, but those who do gain more from it).

4.2 Explaining the Results

We discuss and explain these findings further.

4.2.1 Probability of Benefitting from an Insincere Vote

Not quite sure if this point predominantly speaks to the magnitude or the prevalence of strategic incentives.

One of the reasons for the higher magnitude of strategic incentives in Plurality is that the pivotal events that render an insincere vote beneficial have a higher probability of occuring in this electoral system. Recall that in Plurality, an *abc* voter benefits from casting a B vote if they can resolve a tie for first between B and C (*bc* pivotal event). In contrast, in IRV, there are multiple pivotal events that can render one's insincere vote beneficial, but they are more complex, impose additional conditions and are therefore (even cumulatively) less likely: for example, an *abc* voter benefits from voting BAC (putting one's second preference first), if A and B are tied in the first round, and C must beat A in the hypothetical second round, but not must not beat B. This event is of a more conditional nature than the tie for first in Plurality. Although there are multiple pivotal events in IRV where a non-sincere vote can be beneficial (the former is just one example for an ABC voter), even their joint probability is, on average, lower than that of the relevant pivotal event in Plurality.

Figure 2 plots the average probability of a pivotal event under which a non-sincere vote would be beneficial, conditional on precise beliefs ($s = 85$).[1] Each of the categories (IRV second, IRV third, Plurality) refers to the joint average probability that the respective non-sincere vote is beneficial.[2] Unlike in the main results (expected benefit), there is a lot more noise between cases here: in some CSES cases, the pivotal probabilities relevant to putting one's third preference first in IRV are higher than those relevant to non-sincere voting in Plurality in other cases. However, the average

[1] These averages are computed from the likelihood of a pivotal event occuring multiplied with the fraction of voters who would benefit from it — after all, *abc* and *cba* voters' nonsincere votes will be rewarded in different situations.

[2] For Plurality, the only relevant non-sincere strategic vote is to vote for one's second preference.

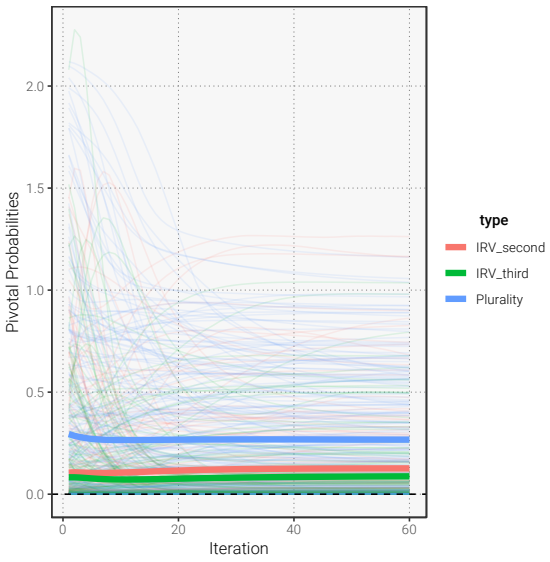

Figure 2: Pivotal probabilities relevant to each strategic vote

probability is higher for non-sincere voting in Plurality, followed (by some distance) by one's second preference first in IRV. The average probability of events that reward putting one's third preference first in IRV is the lowest. These averages do not change much as the number of iterations increases.

This result helps to explain why strategic incentives, for the most part, are more prevalent under Plurality: it is more likely that my non-sincere vote has a decisive effect and is rewarded; under IRV, on the other hand, the chance that my non-sincere vote actually affects the outcome in a positive way is much lower.

4.2.2 Correlation between Benefits and Costs of an Insincere Vote

The magnitude of strategic incentives is considerably greater in Plurality because the costs and the benefits of insincere voting are negatively correlated: the more I can expect to gain from an insincere vote (the benefit), the less do I have to lose in terms of a possible adverse effect of my nonsincere vote (the cost). Conditional on having any incentive to vote strategically, then, the magnitude is going to be large. In contrast, in IRV, the benefits and costs of insincere voting are positively correlated: the more I can potentially gain from voting insincerely, the greater are the potential adverse effects. Put differently, the risk of my strategic vote 'backfiring' is greater in IRV. As a result, the magnitude of strategic voting incentives is comparatively lower.

could decompose risk in prevalence of backfiring events and magnitude of them...

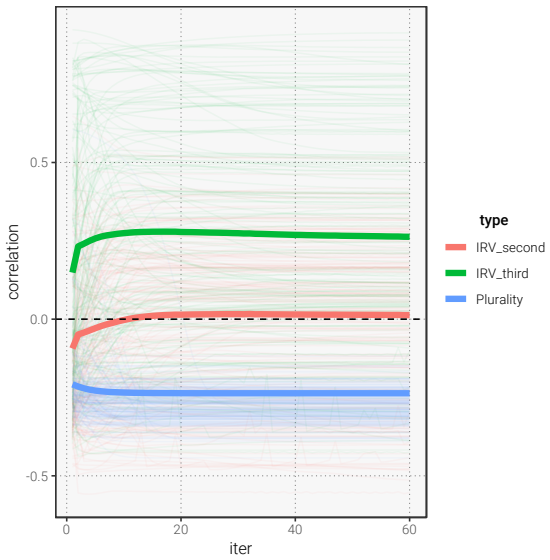

Figure 3: Correlations between benefits and costs for each type of non-sincere vote

Figure 3 plots the correlation between costs and benefits for each of the non-sincere choices. In Plurality, the two are negatively correlated. This is because what drives strategic incentives is the intention to avoid wasting one's vote. For an *abc* voter, the closer the expected result is to a pivotal event between B and C, the greater is the chance that her vote is wasted, and the more can she benefit from voting for B instead. At the same time, moving closer to this pivotal event also suggests that other pivotal events become less likely: if a tie between B and C becomes more likely, then one between A and B becomes *less* likely (for the most part)[3]. In sum, the risk of a non-sincere vote 'backfiring' with severe consequences is low in Plurality.

In IRV, the correlation is almost zero (for ballots putting one's second choice first) or distinctly positive (for ballots putting one's third choice first). The mechanism is somewhat more complicated (once again). The multitude of pivotal events means that moving closer to a 'rewarding' pivotal event often means that nearby, contradictory pivotal events also become more likely. Consequently, the greater the potential benefit from voting insincerely, the greater are also the costs of doing so. This is especially true if putting one's third preference first for strategic reasons: here, the cost is particularly high. If the non-sincere vote backfires, the voter ends up with one's least favourite choice as the winner, which amplifies the cost, even if such an event is not very likely. Overall, nonsincere voting in IRV is riskier: the greater the potential rewards are, the greater are the costs in

[3]If we move from one of the vertexes of the distribution, e.g., where B has all votes, towards the centre, then both events can become more likely

the adverse case if the vote backfires. This offers an explanation for why the magnitude of strategic incentives is so low in IRV.

4.2.3 Positive and Negative Feedback

One other key difference in strategic incentives between the two systems pertains to their behaviour as voters expect overall strategicness to increase (that is, the number of iterations in our algorithm goes up). Both magnitude and prevalence of strategic incentives increases with higher strategicness in Plurality but decreases in IRV. Strategic incentives are complements in Plurality but substitutes in IRV. This difference arises as a result of the nature of strategic voting in the two systems.

In plurality, the main driver to vote insincerely is to avoid wasting one's vote on a trailing candidate. But as a result of a non-sincere vote, the candidate in question ends up trailing even further, which increases the incentive of voters who also have this candidate as first preference to abandon her, too. Thus, we enter a positive feedback loop: abandoning the third-placed candidate triggers others to follow suit, which, in turn, incentivises even more voters to do the same, and so on. This explains why strategic incentives increase in the number of iterations: the more I expect others to behave strategically in Plurality, the more should I expect the trailing candidate to fall behind, and the greater is my incentive abandon her, too. This feedback loop only ends when there is no-one left to abandon the trailing candidate and we settle in a purely Duvergian, two-party equilibrium.

In contrast, negative feedback loops characterise strategic voting incentives in IRV. Recall from Section 3.1. that one of the incentives to vote insincerely in IRV is to abandon a leading candidate in order to avoid wasting one's vote. For example, an ABC voter will vote CAB in order to make sure that C advances to the second round, where their preferred choice, A can beat them. However, doing so decreases A's vote share in favour of C's. If everyone with the same preference ordering did the same, voters run the risk of having too few remaining A voters to beat C, and C winning the election.[4] Here, my incentive to engage in this type of strategic voting decreases the more I expect others to act in the same way, lest the insincere vote backfires. This explains why strategic incentives decrease in the number of iterations. It also means that the equilibrium ballot

[4]Graphically, related to Figure 1, this is the equivalent of 'overshooting' the target: the result moves towards C's vertex, but by such a magnitude that it passes through A's winset and settles in C's.

distribution (i.e., the fixed points of the iterative process) do not settle in a Duvergian equilibrum, but rather, all three candidates retain first-preference votes even if everyone votes strategically.

4.3 Summary

We show that the average expected benefit of strategic incentives is considerably higher in Plurality than in IRV, regardless of how strategic voters are expected to be or how precise beliefs about the election outcome are. Both prevalence and magnitude are higher in Plurality, with the exception of prevalence in IRV when beliefs are precise and everyone is expected to vote sincerely. We discuss this result with reference to the different nature of strategic voting in either system. In Plurality, pivotal events that benefit a non-sincere vote are more likely than their equivalent in IRV; furthermore, benefits and costs of a non-sincere vote in Plurality are negatively correlated on average. On the other hand, in IRV, we observe that pivotal events that benefit non-sincere voting are less likely, and that the costs and benefits of a non-sincere vote are either uncorrelated (when putting one's second preference first) or positively correlated (when putting one's third preference first). This indicates that opportunities to vote non-sincerely are not only less common in IRV (lower probability of pivotal events), but also that they are riskier and carry a greater cost if they backfire (more positive correlation). Together, these insights help us explain why IRV seems less vulnerable to incentives to vote non-sincerely. Finally, we also discuss the nature of feedback loops in the two systems: Plurality encourages positive feedback loops in strategic incentives, whereas IRV incentivises negative feedback loops. This difference explains why the average expected benefit increases in Plurality as voters become more strategic, but decreases in IRV.