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ORIGINAL ARTICLE

The best at the top? Candidate ranking strategies under closed list proportional representation

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Abstract
Under closed-list proportional representation, a party's electoral list determines the order in which legislative seats are allocated to candidates. When candidates differ in their ability, parties face a trade-off between competence and incentives. Ranking candidates in decreasing order of competence ensures that elected politicians are most competent. Yet, party lists create incentives for candidates that may lead parties not to place their best candidates at the top of the list. We examine this trade-off in a game-theoretical model in which parties rank their candidates on a list, candidates choose their campaign effort, and the election is a team contest for multiple prizes. We analyze how the candidates' objectives, voters' attention and media coverage, incumbency, the number of parties competing in the election, and the electoral environment influence how parties rank candidates.

Keywords: competence; game theory; formal theory; incentives; party lists; proportional representation

1. Introduction

Effective politicians play a crucial role in ensuring the smooth functioning of government. In most democratic systems, political parties are responsible for selecting candidates to participate in elections, spearheading media campaigns and securing key positions after elections. The process of candidate selection holds paramount significance. Our focus lies on electoral systems that use closed-list proportional representation (PR), in which parties assign legislative seats to their candidates based on the predetermined order of their electoral list.[1]

In this context, parties determine strategically the order of candidates on the list to achieve their electoral objectives. These may not always align with the objective of maximizing the competence of elected officials. Crucially, when political parties select candidates, they are not solely concerned with their competence but also with their motivation to actively engage with voters and work diligently to ensure the party's electoral success. In a recent newspaper interview (see Chardon, 2022), a member of the elite of one of the mainstream parties in Belgium remarked that potential candidates expect their *competence, their hard work, and their electoral appeal* to matter for their party's nomination and promotion strategy. Notably, this party elite member explicitly voiced agreement with these expectations. However, candidates at the top of the list have little incentive to exert effort to improve their chances of getting elected as these are electorally very safe positions (Persson and Tabellini, 2000; Crutzen *et al*., 2020; Cox *et al*., 2021). The low-powered incentives of top list positions create a conflict between party nomination based on

[1]Beck *et al.* (2020) report that a large majority of countries rely on PR for their election.

competence and that based on effort. With this conflict as a premise, we uncover conditions that drive parties to arrange candidates in descending order of competence. Questions explored include the impact of candidate exposure in the electoral contest, the role of incumbency, the influence of ideology, other goals candidates may harbor and the effect of the number of competing parties.

In this paper, we develop a full fledged game-theoretical model. We build upon the model of closed-list PR as a contest between teams of Crutzen *et al.* (2020). Our model accommodates for variations in candidates' competencies and incorporates multiple sources of incentives for campaign effort. Prior to the election, candidates are assigned specific positions on the list. Armed with this information, they invest in costly campaigning effort. The term "effort" encompasses the time and energy candidates expend on various activities aimed at enhancing their party's electoral success. Thus, effort is to be broadly understood as any resource-intensive action to mobilize undecided voters or to persuade them to vote for a specific party.

The collective efforts of candidates listed by a party contribute to that party's electoral output. Such output may or may not be biased toward some candidates on the party list. The likelihood of a party securing a specific seat is determined through a Tullock contest, based on those electoral outputs. The party's probability of winning a particular number of seats follows a binomial distribution. The crucial parameters for this distribution are the total number of seats in the legislative body and the Tullock probability derived from the parties' electoral outputs.

In a scenario where all candidates influence equally their party's electoral performance and their sole concern is winning a legislative seat, the distribution of incentives across list ranks takes on a bell-shaped form centered around the list position corresponding to the anticipated number of seats the party is expected to win in the election. Given that effort is increasing in competence, other factors being constant, parties strategically position their most competent candidate at the list position associated with the expected seat count. Subsequently, candidates are ranked around this position in descending order of competence. Consequently, this process endogenously determines which spots on the list are considered safe, hot, or hopeless. In a context where candidates' incentives solely stem from the prospect of winning a seat, parties opt to place their most skilled candidates in hot spots. These spots are typically located around the position corresponding to the expected number of seats the party anticipates winning and, contrary to intuition, they often do not occupy the top positions on the list.

This result is consistent with the marginal rank hypothesis derived by Buisseret *et al.* (2022). However, this result is at odds with the empirical evidence. Both Cox *et al.* (2021) and Buisseret *et al.* (2022) document empirically that parties tend to allocate list positions to their candidates in decreasing order of competence. To make headway on our understanding of the conditions that push parties to rank candidates in decreasing order of competence, we extend our theoretical model in several directions.

We first endow candidates with an electoral benefit unrelated to their own election or list position. For instance, candidates may be concerned about their party's overall performance in the election due to the public funds parties receive post-election and the subsequent use of these funds (e.g., societal activities sponsored by the party). Candidates may also simply wish to not see the opposition gain access to the executive office on pure ideological grounds. Importantly, we establish that such motivations do not significantly alter the incentives of candidates.

We then consider candidate exposure effects. A candidate's effort can influence his party's success in varied ways contingent upon his position on the list. This variation stems from the fact that voters incur costs when gathering and processing information. Rational behavior dictates that individuals will only seek information about what matters most to them. This idea is supported by works such as Ledyard (1984), Martinelli (2006), and Matejka and Tabellini (2021), among others. Arguably, this suggests that the electorate naturally concentrates on the efforts and information related to the leading candidates of each party. This focus on the prominent candidates is driven by the understanding that they constitute the pool from which the politicians who ultimately shape post-election governance emerge.[2] Furthermore, the media directs attention toward prominent candidates as an optimal strategy in the context of rationally inattentive voters (Prat and Strömberg, 2013, Section 5). This strategic approach is supported by empirical evidence; see Tullock (1980), van Aelst *et al.* (2008), van Aelst *et al.* (2010), and Vos and Van Aelst (2018). These studies document a consistent pattern of media focus on prominent candidates, revealing that candidate exposure diminishes rapidly with one's rank in the party list.[3] We demonstrate that if candidate exposure experiences a rapid decline with rank, it becomes optimal for the party to arrange their candidates in decreasing order of competence.

We then delve into benefits directly tied to list positions, specifically those associated with post-electoral higher offices, building on Cox *et al.* (2021). The prospect of attaining a higher office motivates candidates positioned at the top of the list. Cox *et al.* show that, if parties commit to awarding better executive positions to candidates in higher ranks (this is their Monotonicity Assumption), then parties are incentivized to allocate list positions based on candidate competence. To validate their claims, they focus on empirical data from Norwegian parliamentary elections spanning the period from 1997 to 2017. We build on their work to show that, under a regularity condition that guarantees that the problem all candidates face is well behaved, if (1) candidates positioned higher on the list are entitled to more valuable higher offices when their party wins a majority of votes, and (2) the increase in the value of these distinct offices is substantial enough the party optimally organizes its candidates in descending order of competence. Furthermore, we demonstrate that the larger the expected number of seats for a party, the more pronounced must be the growth in the value of higher offices for the party to prefer ranking candidates in descending order of competence.

Turning to the effect of incumbency, we conceptualize it as a reservoir of political capital that influences the party's electoral success akin to effort. However, since this capital doesn't directly affect candidate incentives, the nomination strategy of the party remains unchanged in the absence of candidate exposure effects. If candidate exposure favors incumbents, the party has an incentive to place incumbents in top list positions, to capitalize on the advantages offered by their accumulated political capital.

We close our analysis by considering the effects of the number and popularity of parties. It is well known that elections under closed-list proportional representation typically involve more than two parties. We establish that with an increased number of parties, the incentives derived from benefits other than the desire to enter the legislature become less pronounced. However, parties not only vary in number but also in terms of popularity, reflecting their expected electoral success. As the probability of having access to these other benefits is positively correlated with a party's popularity, popular parties anticipating electoral victory are more inclined to organize their candidates in descending order of competence, a prediction put forward also by Buisseret *et al.* (2022) albeit in a different, incentive-free environment.

2. Related literature

Candidate ranking strategies are not well understood in closed-list proportional representation systems, especially when both incentive and competence considerations play a role. Our paper adds to a growing literature, both empirical and theoretical, that focuses on the effects of closed party lists and their composition on electoral outcomes.

Our theory builds on Crutzen *et al.* (2020). Compared to that paper, we extend the model along several dimensions. We introduce candidate heterogeneity in the cost of effort. This allows

[2]The prediction of Cox *et al.* (2021) about the geographic focus of the campaigning effort of different candidates could also be rationalized via the fact that voters are rationally inattentive.

[3]Of course, this evidence cannot rule out reverse causality as the media could focus on the most competent candidates that the parties have placed at the top of their list. On this issue, see for example Stromback and Nord (2006).

for a meaningful analysis of the impact of list order on incentives. We also enrich the payoffs of candidates: we add an ideological payoff that is independent of the position on the list and an individual payoff—linked to the party's result in the election—that varies according to the position on the list.[4]

Buisseret *et al.* (2022) propose an alternative formal model of list composition and then test their predictions on Swedish municipal election data. Their model focuses on competence and leaves aside incentive effects.[5] Candidates differ in competence and are passive participants in the electoral contest. The outcome of the election is determined by a complex calculus of voting. As in our model, parties that want to maximize their electoral success place their best candidates on marginal ranks. Yet, this is not due to incentive reasons—as these are absent in their pure competence-based theory—but to the fact that a voter recognizes that their vote impacts only the election prospects of candidates located at (and, possibly, around) their party's marginal seat rank. One extra vote can be decisive to get party A another seat at the expense of party B. If the quality of the two marginal candidates differ, a voter, conditional on being decisive, would rather vote for the party that would send to parliament the more competent candidate. If parties also care about electing their best candidates then a ranking strategy that is decreasing in candidate competence may be optimal. Our work complements theirs as we have both selection and incentives in our model and offer an alternative theory of what drives party candidate ranking strategies. We also allow candidates to have multiple motivations and study how candidate exposure, incumbency, and the number of parties impact party incentives, deriving explicit sufficient conditions for parties to want to rank candidates in decreasing order of competence.

Three other papers focus on aspects of the election we abstract from in our work: the geographic level at which candidates exert effort, the role of the intraparty value of candidates, and the presence of candidates that the party wishes to shield from electoral competition. Cox *et al.* (2021) focus on the first aspect. They offer a remarkable empirical analysis of Norwegian electoral data between 1997 and 2017. They document that (candidates' competence increases with their position on the list, and) the rank on the list influences effort provision on several dimensions. In particular, highly ranked candidates tend to spend relatively more effort on extra-district campaigning than on intra-district campaigning. To rationalize their findings, Cox *et al.* (2021) describe formally the main theoretical intuitions that underpin their empirical investigations. Importantly for our work, they show that, if parties commit to awarding better executive positions to candidates in higher ranks (this is their Monotonicity Assumption), then parties are incentivized to allocate list positions based on candidate competence. Building on their work, we analyze in detail the trade-off between incentives stemming from winning a legislative seat and those arising from securing a higher office post-election. Our analysis establishes that, under a regularity condition that ensures that the problem all candidates face is well behaved, the increase in the value of these distinct offices must be substantial enough for the party to optimally rank its candidates in descending order of competence. Furthermore, we demonstrate that the larger the expected number of seats for a party, the more pronounced must be the growth in the value of higher offices for the party to prefer ranking candidates in descending order of competence.

Svitáková and Ŝoltés (2020) focus on the second aspect we abstract from. They build a model on the idea that there is a market for candidates in which demand and supply determine outcomes. Candidates are characterized by a valence or competence level and an intraparty value, proxied for example by the amount of donations they bring to their party. As in Buisseret *et al.*,

[4]Crutzen and Sahuguet (2023) analyze the interaction between the competitiveness of parties' candidate selection procedures and electoral systems—contrasting British-style first past the post and Israeli-style proportional representation—and show that the way parties select candidates may impact candidate incentives more strongly than the electoral system itself. Yet, in that model, candidates also do not differ in competence.

[5]See also Galasso and Nannicini (2015, 2017).

incentives play no role in their model. They examine several thousands of observations about municipal elections in the Czech Republic. Interestingly perhaps, they find that candidates with higher intra-party value receive less votes than candidates with low intra-party value candidates. Yet, they show that parties rank candidates on their electoral list in decreasing order of both competence and intra-party value.[6]

Finally, Fiva *et al.* (2024) analyze how parties can resolve the trade off between giving candidates proper incentives to exert costly campaign effort and shielding their favorite candidates from electoral competition. They focus on Norway, which uses a flexible list PR system in which parties can allocate to their preferred candidates a pre-electoral bonus that makes it easier for such candidates to get elected. Using data from the 2019 Norwegian municipal elections, they find strong support for their theoretical predictions that ex-ante more popular parties face a lower electoral cost of facilitating the election of their preferred candidates. Interestingly, they also show that popular parties benefit from their larger freedom to support their preferred candidates at the post-electoral bargaining table.

3. The model

3.1 Candidates and parties

Two parties are competing for n (odd) legislative seats. Party j fields a list of n candidates who exert effort to contribute to their party electoral success. Candidate i in party j exerts effort $e_{ij} \geq 0$ at quadratic cost $K_{ij}(e_{ij}) = \frac{1}{2} c_{ij} e_{ij}^2$.[7] Candidates thus differ in their cost of effort $c_{ij} \geq 0$. We interpret this heterogeneity in costs as heterogeneity in the competence or experience of candidates. A list for party j is a mapping $\alpha_j : \{1, \ldots, n\} \rightarrow \{1, \ldots, n\}$ that assigns position m on the list to candidate i. Parties maximize their electoral success: the list is designed by the party leadership to maximize the number of legislative seats won in the election. Given a list α_j, it is convenient to call candidate i in position m on party j's list $(\alpha_j(m) = i)$ by his position m_j. When parties choose their list, we will be more precise with notation.

Party j's electoral output, the quality of its electoral platform *as perceived by voters*, is the weighted sum of its candidates' efforts:

$$E_j = \sum_{m=1}^{n} a_m e_{mj}.$$

where the vector of weights $\mathbf{a} = (a_1, a_2, \ldots, a_n)$ is due to media effects and voter rational inattention. Considering the inherent cost of information acquisition and processing, it is rational for voters to focus their attention on top candidates, given that these individuals typically play a more influential role in post-election decisions. Following the empirical evidence that indicates a biased media focus on highly ranking candidates, we set $a_1 = 1$ and all other $a_m \geq 0$ exhibit a weakly decreasing pattern in list position m.

Election. The number of legislative seats won by party j is modeled as a random variable and its distribution is assumed to follow a multinomial distribution. The parameters of the distribution are determined through a generalized Tullock contest among the parties, relying on the ratios of parties' electoral outputs. The probability of party j winning each individual seat follows a

[6]Other, less closely related contributions include Shugart *et al.* (2005), Hobolt and Høyland (2011), Esteve-Volart and Bagues (2012), Baltrunaite *et al.* (2014), Besley *et al.* (2017), Carroll and Monika (2020) and Buisseret and Prato (2021).

[7]We assume quadratic costs for simplicity. This allows for simple closed form solutions for candidates' effort.

binomial distribution denoted by the winning probability p_j:[8]

$$p_j = \frac{(E_j)^\gamma}{(E_j)^\gamma + (E_k)^\gamma},$$

where γ is a return to scale parameter.

Values of γ lower than 1 make the allocation of prizes among teams more noisy and less responsive to parties' outputs. Lower values of γ also make the objective functions of team members more concave; γ thus plays an important role to ensure that first order conditions are both necessary and sufficient to pin down the optimal effort choice of candidates. Throughout the paper, we rely on the following assumption to guarantee that the second order conditions are satisfied in the candidates' maximization problems. As we show in the Appendix, this assumption is a sufficient condition only, it is not necessary.[9]

ASSUMPTION 1: The return to scale parameter γ satisfies $\gamma < 1/n$.

We assume that the probabilities of winning seats are independent. Thus, using C_k^n to denote binomial coefficients, the probability of party j's winning k seats is given by:

$$P_j^k = C_k^n p_j^k (1 - p_j)^{n-k}.$$

Payoffs. On the cost side, we already mentioned that candidate i's individual effort cost is $K(e_{\mathrm{mj}}) = \frac{1}{2} c_{\mathrm{mj}} e_{\mathrm{mj}}^2$.

There is a benefit to be elected to the legislature, equal to V. Candidate in position m on the list gets elected if the party wins at least m seats, which happens with probability $\sum_{k=m}^{n} P_j^k$. Candidates also enjoy benefits when their party wins a majority of legislative seats.[10] Let these benefits be $W_m = W + w_m$. W captures the utility associated with the party of the candidate gaining control of the executive office, which allows it to implement its favored policies. It may also capture the expected benefits from a party controlling government that allows it to distribute rents and resources to party members and to activities sponsored by the party. W is thus a proxy for both the purely ideological and other electoral victory-related benefits accruing to candidates. Importantly, all candidates on the list enjoy W irrespective of their rank and whether or not they get elected to parliament.

Some candidates, thanks to their rank, may also gain access to additional benefits provided their party wins the election. Specifically, the top $k^C \leq (n+1)/2$ slots on the party list are associated to an additional rank-dependent private payoff w_m when their party wins a majority. We assume that $w_1 \geq w_2 \geq .. \geq w_{k^C} \geq w_{k^C+1} = \ldots = w_n = 0$. There are multiple, complementary interpretations for these payoffs. We give two hereafter. First, candidates ranked at the top of the list are often top brass candidates who receive perks that come with being in such a top position. These perks are monetary and non-monetary resources and are available conditional on the party doing well (enough) in the election. For example, top brass candidates may receive resources to carry out projects they care about. Or such candidates are in a position to influence the party manifesto more markedly than other candidates and party members. Also a typical

[8]Our modeling strategy allows for the inclusion of a weight $\rho > 1$ multiplying party j's output. These weights introduce a bias in the contest as one party is advantaged, possibly due to voters' ideology leaning toward that party. The probability p_j then becomes $p_j = (\rho E_j)^\gamma / (\rho E_j)^\gamma + (E_{-j})^\gamma$. For the sake of expositional clarity, we do not add these weights in what follows.

[9]Another way to guarantee enough concavity is to make the cost of effort more convex. We keep the quadratic cost assumptions as this allows for simple closed-form solutions for effort.

[10]In Section 5, we extend the model to more than 2 parties. In that case, instead of using the probability that the party is winning a majority of seats, we consider that the payoffs are proportional to the share of seats of the party.

consequence of electoral defeat is the replacement of such top candidates. Second, these candidates enjoy the benefits that come with their party gaining access to post-electoral executive and other high office benefits. Payoff w_m can thus be interpreted as the "expected share of the pie of higher offices" as mentioned in Cox *et al.* (2021). Cirone *et al.* (2021) show that, in Norway, higher offices are allocated to candidates as a function of seniority and that seniority maps into higher list rank. Interpreting seniority as being top brass, this evidence is consistent with our assumptions about w_m.

Given that the probability that a party wins a majority of seats is $\sum_{k=k^{\text{maj}}}^{n} P_j^k$, where $k^{\text{maj}} = (n+1)/2$, the candidate in position m on party j's list has thus the following benefit function:

$$B_{\text{mj}} = V \sum_{k=m}^{n} P_j^k + W_m \sum_{k=k^{\text{maj}}}^{n} P_j^k.$$

Timing

The timing of the game is as follows:

$t = 1$ – Nomination stage: Party leadership designs the list of candidates.
$t = 2$ – Campaign stage: Given party lists, candidates exert effort.
$t = 3$ – Election stage: Given perceived party outputs, seats are allocated to parties.

4. Solving the model

We solve the model using backward induction.

4.1 Campaign stage: equilibrium efforts

Taking party lists as given, a Nash equilibrium of the campaign stage is described by the effort profile of candidates in the two parties. The effort profile within party j generates its aggregate output, E_j. The party outputs determine the party winning probabilities p_j. We characterize the equilibrium by taking the first-order conditions of the candidate's maximization problem for given winning probabilities p_j. We then prove that for a given set of party lists, there exists a unique profile of candidates' efforts and unique party winning probabilities p_j, such that each candidate maximizes his expected utility given the winning probabilities and the winning probabilities are consistent with the effort profile. In the Appendix, we also check the second-order conditions and show that Assumption 1 is a sufficient condition under which the solution of the system of first-order conditions indeed maximizes the candidates' expected payoff.

Denoting $M_j^m = mC_m^n p_j^m (1-p_j)^{n-m+1}$ and $M_j^{\text{maj}} = k^{\text{maj}} C_{k^{\text{maj}}}^n p_j^{k^{\text{maj}}} (1-p_j)^{n-k^{\text{maj}}+1}$, we have:

PROPOSITION 1: There exists a unique Nash equilibrium (e_{mj}^*) of the campaign stage. The equilibrium is characterized by the following system of equations:

$$e_{\text{mj}}^* = \frac{\gamma a_m}{c_{\text{mj}} E_j^*} \left(M_j^m V + M_j^{\text{maj}} W_m \right), \tag{1}$$

$$E_j^* = \sqrt{\sum_{m=1}^{n} \gamma \frac{a_m^2}{c_{\text{mj}}} \left(M_j^m V + M_j^{\text{maj}} W_m \right)}, \tag{2}$$

$$p_j^* = \frac{\left(E_j^*\right)^\gamma}{\left(E_j^*\right)^\gamma + \left(E_{-j}^*\right)^\gamma}. \tag{3}$$

Proof. See Appendix □

Optimal efforts e_{mj} depend on the probability of winning p_j that is endogenously derived in equilibrium. In the general case, parties can be asymmetric in their initial pool of candidates or in the way they allocate candidates on their list. In the asymmetric case, efforts cannot in general be derived in closed form solution as equilibrium probabilities of winning and efforts correspond to the fixed point of the system of three equations stated in Proposition 1.

If all candidates were of equal competence, equilibrium efforts would be proportional to $a_m^2(M_j^m V + M_j^{maj} W_m)$. As the distribution of binomial coefficients is bell-shaped, the distribution of effort inherits similar features (see Crutzen *et al.*, 2020 for more details on the case with no media effect and $W_m = 0$). When candidates are heterogeneous in competence, equilibrium efforts also depend on how competence maps into parties' candidate ranking strategy.

When each party pool of candidates is identical and parties use the same candidate nomination strategy, the equilibrium is symmetric and the winning probabilities are easily computed: $p_1 = p_2 = 1/2$. In that special case, the closed form solutions for equilibrium efforts and party outputs are as follows:

$$E^* = \sqrt{\sum_{m=1}^{n} \gamma \frac{a_m^2}{c_m} (1/2)^{n+1} \left(mC_m^n V + k_{maj} C_{k_{maj}}^n W_m\right)} \tag{4}$$

$$e_m^* = \frac{\gamma a_m}{c_m} \sqrt{(1/2)^{n+1}} \frac{\left(mC_m^n V + k_{maj} C_{k_{maj}}^n W_m\right)}{\sqrt{\sum_{m=1}^{n} \gamma \frac{a_m^2}{c_m} (1/2)^{n+1} \left(mC_m^n V + k_{maj} C_{k_{maj}}^n W_m\right)}}. \tag{5}$$

In the rest of the paper, we work with the efforts expressed as a function of the (endogenous) winning probabilities as this formulation allows us to derive easily the optimal list order given any winning probabilities. We also illustrate the optimal list in the symmetric equilibrium case, for which $p_1 = p_2 = 1/2$.

4.2 Nomination stage

Taking into account equilibrium effort choices, parties order candidates on their list to maximize electoral success. In doing so, parties take into account the equilibrium efforts defined in Proposition 1 as well as the associated probabilities of winning seats. Party *j*'s equilibrium electoral output $E_j^* = \sqrt{\sum_{m=1}^{n} \gamma a_m^2 / c_{mj} (M_j^m V + M_j^{maj} W_m)}$ depends on the weights M_j^m and M_j^{maj}, which are themselves a function of p_j.

Taking the winning probability of winning p_j as exogenous for now, the party would assign candidates with marginal costs of effort c_{mj} to a position in which the incentive to exert effort is proportional to $\Lambda_j^m(p_j) = a_m^2(M_j^m V + M_j^{maj} W_m)$. $\Lambda_j^m(p_j)$ corresponds to the implicit incentive given to the candidate on position m on the list. The optimal list assigns positions on the list so that candidates with high competence get the highest incentives to exert effort. Thus, to maximize

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the party output, the list should assign the most competent candidates to the position with the highest value of Λ_m, the second most competent candidate to the position with the second highest value of Λ_j^m, and so on and so forth. The incentives are divided between the marginal impact of effort on the chance to get elected to the legislature and the marginal impact of effort on the party winning a majority. The first source of incentives $M_j^m V$ is bell-shaped. The highest incentives at the top of the bell are given to the candidate who is in the position that corresponds to expected seat share of the party. This is the marginal position on the list. Positions higher on the list are safer, positions lower on the list are less safe. Incentives decrease with how safer and more hopeless positions are with respect to the marginal seat. The second source of incentives comes from $M_j^{\text{maj}} W_m$ and is increasing in rank, with the candidate at the top of the list having the largest W_m.

The previous argument takes p_j as exogenously given. However, a change in the order in the list leads to a subgame with different efforts and a different equilibrium probability p_j. The effects of such a change do not guarantee in general that the list that gives the most competent candidates the highest incentives to exert effort automatically maximizes the party's electoral output and winning probability. To ensure this, we need to ensure that $p_j - (E_j(p_j))^\gamma / (E_j(p_j))^\gamma + (E_{-j}(1-p_j))^\gamma$ is strictly increasing in p_j, which essentially guarantees that our model is well behaved. Then, the direction of the change of E_j and p_j following a change in the list order is always the same. This means that changes in the list order that lead to an increase in aggregate effort also leads to an increase in the electoral success of the party. This is why we impose a regularity condition that we derive in the Appendix (at the end of the proof of Proposition 1, where we also show that Assumption 1 guarantees that the regularity condition is satisfied).

To rank candidates, parties need to consider carefully the M_j^m function, as Λ_j^m is increasing in M_j^m, given that $\Lambda_j^m = a_m^2(M_j^m V + M_j^{\text{maj}} W_m)$ and M_j^{maj} is constant across slots on the list. Remember that $M_j^m = mC_m^n p_j^m (1-p_j)^{n-m+1}$. Then, M_j^m is always strictly positive and it is straightforward to show that $M_j^m \gtreqless M_j^{m+1}$ if and only if $(n+1)p_j \gtreqless m$. Finally, the distribution of M_j^m is single-peaked at $m = \lfloor (n+1)p_j \rfloor$, where $\lfloor (n+1)p_j \rfloor$ is the smallest integer greater than $(n+1)p_j - 1$ in case $(n+1)p_j$ is not an integer itself.

We relabel the identity of candidates in increasing order of their cost of effort, so that $c_{1j} \leq \ldots \leq c_{\text{kj}} \leq \ldots \leq c_{\text{nj}}$. Now, define a one-to-one mapping $\alpha_j^\star : \{1, \ldots, i \ldots, n\} \rightarrow \{1, \ldots, k \ldots, n\}$ such that $\Lambda_{\alpha^\star(1)}(p_j^\star) \geq \ldots \geq \Lambda_{\alpha(k)}(p_j^\star) \geq \ldots \geq \Lambda_{\alpha^\star(n)}(p_j^\star)$. This mapping allocates candidates on the list such that a candidate with a lower cost of effort gets higher implicit incentives of effort Λ_j^m than a candidate with a higher cost of effort.

PROPOSITION 2: The mapping $\alpha_j^\star$ that assigns candidates to positions following the implicit incentive function Λ_j^m is the optimal list.

Proof. See Appendix. □

The next section turns to the positive analysis part of our article. We analyze how the different aspects of the electoral environment impact the equilibrium candidate nomination strategy of parties.

5. Optimal list

5.1 Candidates only care about winning a seat

We start with the simplest case: candidates only care about the benefit V of being elected to the legislature (thus $W = w_m = 0$) and candidate exposure is uniform across candidates, that is, $a_i = 1$ for all i. These assumptions imply that $\Lambda_j^m = M_j^m V$.

To maximize electoral success, the leadership assigns the most competent candidate to the position with the highest value of M_j^m. As the distribution of weights M_j^m is hump-shaped and single-peaked, the distribution of competence across ranks needs to replicate this hump-shape, with the most competent candidate in position $np_j + 1$, if we ignore integer constraints. Indeed, if the party expects to win np_j seats, then the marginal benefit of exerting effort is highest for the candidate who is exactly at $np_j + 1$. More generally, other candidates are allocated in positions around the peak in decreasing order of competence following the values of M_j^m. We thus have:

PROPOSITION 3: **Expected seat share hypothesis.** Assume $W = w_m = 0$, and $\alpha_i = 1$, $\forall i$. The implicit incentives function Λ_j^m is hump-shaped. The most competent candidate is allocated to position $\lfloor np_j + 1 \rfloor$, party j's equilibrium expected seat share.

Proof. See Appendix. □

The intuition behind Proposition 3 is simple. Candidates at the bottom and at the top of the party's list are respectively in hopeless and safe spots and face weak incentives to exert effort. Indeed their effort has a tiny impact on their chance to win a seat. To the contrary, candidates at a position close to the expected number of seats that the party will win face powerful incentives to exert effort. Indeed, in equilibrium, the party is expected to win np_j seats. Candidates with a rank around this number have the most to gain from an increase in the party's output. So, a small change in effort can be decisive in getting the candidate a seat in parliament. The party's optimal strategy is then to allocate its best candidates at and around the list position corresponding to the number of seats it expects to win. Parties thus distribute candidates around position $\lfloor np_j + 1 \rfloor$ in decreasing order of competence. Competence corresponds to a smaller effort cost and thus more competent candidates exert more effort than less competent ones for any given incentive. The important implication of the "expected seat share hypothesis" is that candidates placed at the top of the list are not the most competent ones. The above findings on the incentive effects of party list in our baseline scenario complement those of Buisseret *et al.* (2022, Proposition 2). Even though their model does not involve effort, they find that parties would not rank candidates in decreasing order of competence when these care exclusively about electoral success. The logic is however different. In Buisseret *et al.*, voters cast their ballot considering their impact on the marginal candidate that their vote can send to parliament. In equilibrium, they consider the expected seats that each party wins, and compare the marginal candidates of each party. Everything else equal, they would rather vote for a candidate with higher competence. This leads the party to place high competence candidates in marginal positions. In our model, the candidates consider the impact of their effort on their chance of getting elected. Candidates, who are in a position in the list close to the number of seats their party is expected to win, have the stronger incentives to exert effort. The party will place high competence candidates in these positions.

In the symmetric case, for which $p_1 = p_2 = 1/2$, we can write $\Lambda_j^m = M_j^m V = mC_m^n (1/2)^{n+1} V$. The expected number of seats is $(n+1)/2$ and corresponds to the maximum value of Λ_j^m. The distribution of incentives is symmetric and follows the distribution of mC_m^n.

Figure 1 illustrates incentives at the various positions on the list for the symmetric equilibrium for an election with 21 seats and $V = 1$.

We now turn on the impact of the payoff W on the list composition. We have:

PROPOSITION 4: Parameter W does not impact the relative values of Λ_j^m and has no effect on parties' optimal list strategies.

Proof. See Appendix. □

W represents a candidate's rank- and own election-independent benefits from the party winning a majority. The interpretation of W as the party candidates' desire not to see the other party win the election generates an interesting prediction. Consider an increase in the polarization of

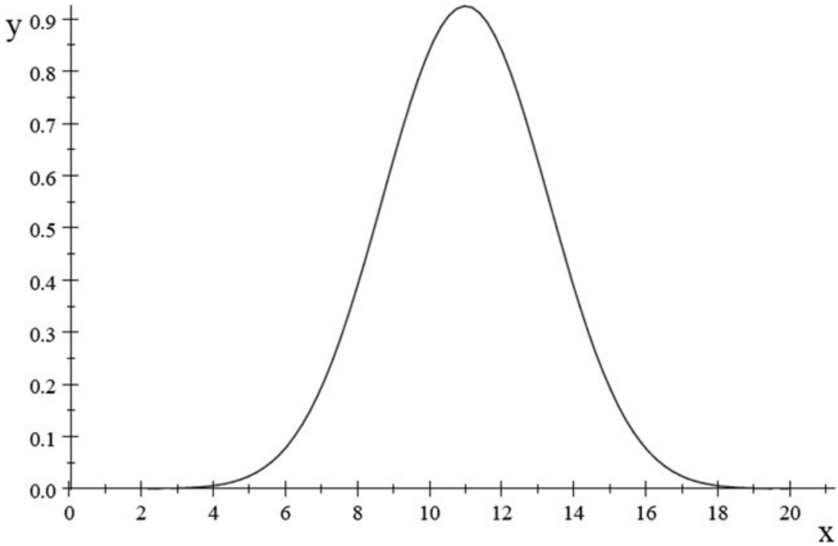

Figure 1. Effort incentives and list rank.

party platforms, which increases the cost to candidates of seing the other party win. Intuition suggests that this increase in the stakes of the election increases party incentives to put their best candidates at the top of the list. Yet, this intuition turns out to be incorrect. The benefit W impacts party output through $M_j^{\mathrm{maj}} W$. Therefore, as the probability that the party wins a majority, M_j^{maj}, is the same for all candidates, a change in W does not affect the ranking of the $M_j^m V + M_j^{\mathrm{maj}} W$, and thus the optimal list order does not depend on W. The recent increases in polarization witnessed in many if not most democracies have several effects on elections and politics. Provided polarization impacts the pure ideological motivation of candidates, our model predicts that the way parties rank their candidates should not be one of them.

To wrap up our findings so far, parties are predicted not to rank candidates in decreasing order of competence if candidates' main motivation is either to get elected to parliament or to see their party win the election for reasons that are rank- and own election-independent.

5.2 The role of candidate exposure

Candidates' efforts encompass all their campaign activities aimed at enhancing the electoral success of their party. However, candidates vary in the extent of the electoral exposure they receive, leading to differences in the significance of their efforts for their party's electoral success. This variation stems from the fact that each member of the electorate incur costs when gathering and processing information. Rational behavior dictates that individuals will only seek information that is most payoff relevant to them. This idea is supported by works such as Ledyard (1984), Martinelli (2006), and Matejka and Tabellini (2021), among others. Arguably, this suggests that the electorate naturally concentrates on the efforts and information related to the leading candidates of each party. This focus on prominent candidates is driven by the understanding that they constitute the pool from which the politicians who ultimately shape post-election governance emerge.

Furthermore, the influence of candidates' efforts is amplified by their media appearances and mentions. Media coverage, however, is not uniform, with prominent and senior candidates receiving substantially more attention than others. The media directs attention toward such candidates because it is an optimal strategy in the context of rationally inattentive voters as it allows the media to maximize their profits (Prat and Strömberg, 2013, Section 5). Such a strategic approach is consistent with the empirical evidence on elections under list PR; see for example van Aelst *et al.* (2008), Tresch (2009), van Aelst *et al.* (2010), and Vos and Van Aelst (2018). These studies document a consistent pattern of media focus on prominent candidates, revealing that candidate exposure diminishes rapidly with one's rank in the party list.[11] We demonstrate that if candidate exposure experiences a rapid decline with rank, it becomes optimal for the party to arrange their candidates in decreasing order of competence.

In line with the above, we let candidate exposure weights decrease weakly in list rank: $a_1 \geq a_2 \geq \ldots \geq a_n$. Then, such weights are a countervailing force to the non-monotonic incentives generated by the prospect of getting elected. Indeed, when candidate exposure is biased toward top candidates, voters' perception of the parties' electoral outputs becomes much more dependent on the choices of these top candidates. In that case, parties may find it in their interest to rank candidates in decreasing order of competence. This happens if the exposure weights decrease sufficiently fast with rank, that is, if exposure is biased toward top candidates severely enough. Our theory thus suggests a positive side effect of candidate exposure biases toward top candidates: it leads parties to position their most competent candidates at the top of their list. The next proposition formalizes this finding.

PROPOSITION 5: **Candidate exposure effects on party strategy.** Suppose candidates only care about getting a seat in parliament ($W_m = 0$) and candidate exposure weights decrease weakly in rank. If exposure weights are such that, for any p_j, $a_m \geq \sqrt{\frac{(n-m)}{m}\frac{p_j}{1-p_j}}a_{m+1}$, then parties rank candidates in decreasing order of competence.

The condition is always satisfied for ranks below np_j, as in this case $\sqrt{\frac{(n-m)}{m}\frac{p_j}{1-p_j}} \leq 1$. The condition is thus most important for top ranked candidates. Figure 2 illustrates this condition for the case of a symmetric equilibrium and 21 seats. In the figure, we plot the condition a_m/a_{m+1} must satisfy for parties to want to rank candidates in decreasing order of competence when $p_j = 1/2$; that is, we plot $\sqrt{(n-m)/m}$. Then, the exposure of the party list leader must be more than 4.5 times that of the second-ranked candidate. Thus given that a_1 is equal to 1 in our model, a_2 cannot be greater than 0.22, a_3 cannot be greater than 0.073 and so on. Our model thus predicts that, for parties to want to rank their candidates in decreasing order of competence (when these only care about getting elected to the legislature), the lion's share of the exposure should go to the candidate pulling the list, which is arguably in line with the available evidence we referred to above.

5.3 Effect of rank-dependent benefit of own party winning

We now focus on the effects of rank-dependent benefits associated with top candidates getting elected and their party winning the election—w_m in our model. When a party secures a majority of seats, it typically gains control of the executive branch enabling it to allocate high offices or ministerial positions, usually to the candidates positioned at the top of the list. This aligns with evidence provided in Fujiwara and Carlos (2020) or Cox *et al.* (2021) for example. A significant rationale behind this party strategy is to provide effort provision incentives to candidates. A notable example illustrates this point. It involves the resignation—for purely personal and work-independent reasons—of the Belgian Foreign Affairs Minister Sophie Wilmes on July 14 2022. In response, her party leader, George Louis Bouchez, rather than following customary party procedures, appointed well-known public television journalist Hadja Lahbib to the position, emphasizing the impact of party success on high-profile appointments. The appointment of the non-party

[11] Of course, this evidence cannot rule out reverse causality as the media could focus on the most competent candidates that the parties have placed at the top of their list.

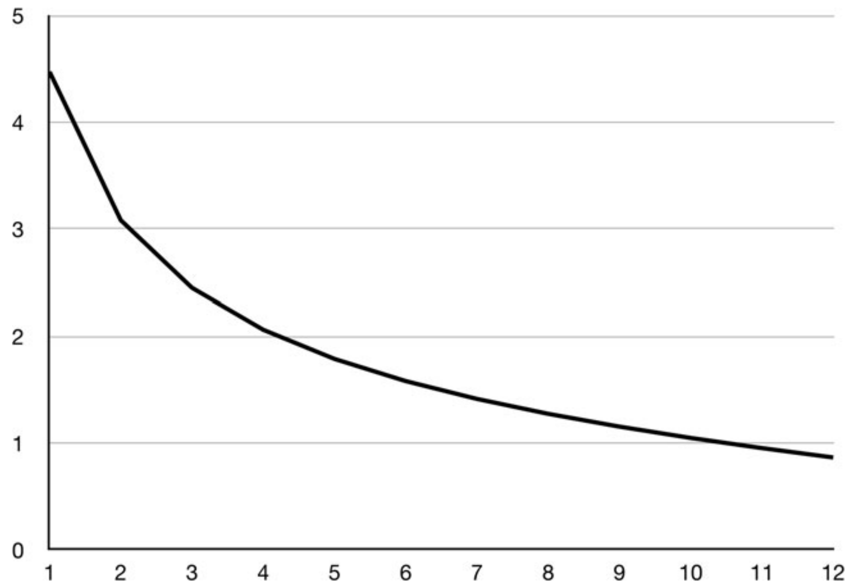

Figure 2. Exposure weight ratio condition and list rank.

member journalist stirred considerable commentary both within and outside the party, with many expressing the view that such a party strategy undermined the incentives for candidates' efforts. Particularly, Alexia Bertrand, the then leader in the lower legislative chamber and the most frequently cited candidate for the vacant job, did not receive the ministerial position. This apparent oversight played a pivotal role in her decision to defect to another party.[12] Interestingly enough, a second such case followed one year later (this time in a Dutch-speaking Belgian party; cf., RTBF, 2023). Once again, the reaction of politicians and commentators was that unless parties follow up on their pledge that hard work by their top political troops is rewarded by benefits such as ministerial positions, parties should not expect such troops to help their party maximize electoral success.

It is notable that, to mitigate potential issues like the ones mentioned above (but not only, of course), some democracies have introduced laws or even Constitutional articles that stipulate that top executive offices must be held by members of the legislature. An illustrative case is Ireland, where the Constitution stipulates that the Prime Minister, Deputy Prime Minister, Minister of Finance, and many other ministers are mandated to be members of the lower legislative chamber. This structural requirement aims to ensure a direct connection between executive leadership and legislative representation.[13] And the Prime Minister is typically the leader of the party that performed best in the election.

It is also a common occurrence for party leaders and other high-ranking members to face the repercussions of their rank and file's dissatisfaction when their party falls short of expectations in an election. Changes in leadership and the top brass are particularly frequent following an electoral defeat or even when there is a perceived underperformance in the election results. The electoral outcome often serves as a crucial factor influencing internal party dynamics and decisions regarding leadership roles.[14] Parameter w_m captures the effect of such customs. For the sake of clarity, we eliminate the influence of candidate exposure effects in our analysis: $a_1 = a_2 = \ldots = a_n = 1$.

[12]See Chardon (2022) and de Lamotte (2022).

[13]See article 7 of the Irish Constitution, available for example at Electronic Irish Statute Book (2020).

[14]Without loss of generality, we normalize these payoffs to 0.

We focus on the top brass of the party, the top k^C candidates, the candidates who could potentially win a higher office, care about their party winning the election. We assume that this electoral motivation diminishes with the list position of each top brass member. If the additional incentives stemming from w_m are strong enough, the party then ranks its first k^C candidates in decreasing order of competence. The next proposition formalizes this argument.

PROPOSITION 6: **Effect of top candidates caring about party's electoral success** When $k^C \leq \lfloor np_j + 1 \rfloor$, if for all $m \leq k^C$, $(w_m - w_{m+1}) \geq V(M_j^{m+1} - M_j^m)/M^{\text{Maj}}$, then party j ranks in decreasing order of competence its first k^C candidates.

When $k^C \geq \lfloor np_j + 1 \rfloor$, another condition is needed:

$$w_{k^C} \geq V \frac{(M_j^{\lfloor np_j+1 \rfloor} - M_j^{k^C})}{M^{\text{Maj}}}.$$

Proof. See Appendix. □

We illustrate the logic of this proposition in the symmetric equilibrium in which $p_1 = p_2 = 1/2$ and there are 21 seats. We assume that the top 5 candidates get an extra benefit w_m when the party wins a majority. In Figure 3, the value of w_m is large in respect to the value of a seat in parliament and equal for all top 5 candidates. This leads to incentives that are higher at the top of the list than in the middle of the list. As the value of w_m is constant, the first part of the curve is increasing. The condition in Proposition 6 tells us how fast the value of these higher offices must decrease for that curve to be decreasing. In Figure 4, the value of w_m is not high enough for the top candidates and effort incentives are then larger in the middle of the list.

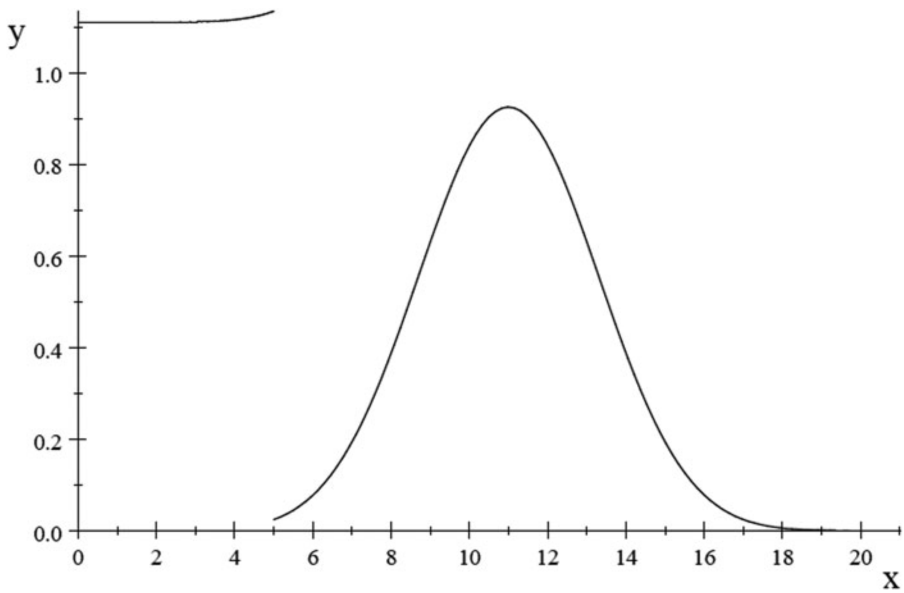

Figure 3. Incentive effect of large w_m.

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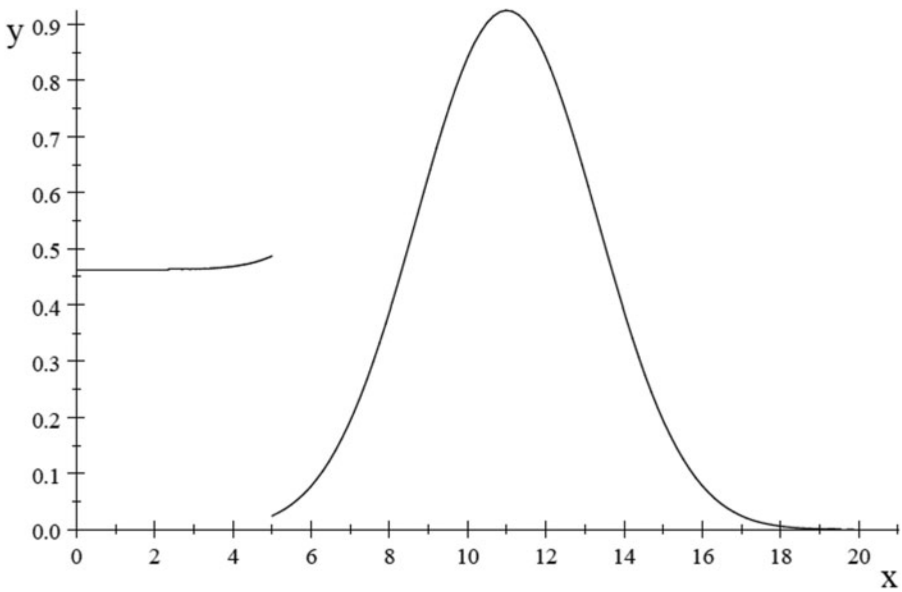

Figure 4. Incentive effect of small w_m.

5.4 Incumbents and popular candidates

Our model emphasizes competence as the primary source of heterogeneity among candidates. Our focus on competence aligns well with the most recent empirical papers on the matter, see Cox *et al.* (2021) and Buisseret *et al.* (2022). Nevertheless, it's crucial to acknowledge that there are other significant sources of heterogeneity. Two prominent examples include incumbency and popularity. Incumbents and popular candidates derive benefits from a reservoir of political capital, which proves valuable in attracting votes. These additional dimensions of heterogeneity play a crucial role in shaping real-world candidates' electoral dynamics.

A natural way to model these additional sources of incentives is to consider candidates who are characterized by an initial stock of political capital x_{mj} as well as their marginal cost of effort parameter c_{mj}. The party's output would then be:

$$E_j = \sum_{m=1}^{n} a_m \left(e_{\mathrm{mj}} + x_{\mathrm{mj}} \right).$$

The contribution of a candidate is the sum of his effort during the campaign and his initial stock of political capital.

If all candidates benefit from the same exposure, then the political stock of candidates does not factor into the allocation of positions on the list. Given that the stock of capital is additive, the contribution of a candidate's political capital remains the same regardless of their position on the list. In this scenario, the decisive factor in the allocation strategy is the candidates' effort, and the logic outlined in Proposition 3 remains applicable.

If candidate exposure decreases with rank, then the significance of political capital comes into play, particularly if it holds substantial importance relative to effort incentives. For example, if all candidates share the same marginal cost of effort, the optimal strategy would be to arrange candidates based on their political capital, prioritizing more experienced or popular candidates at the top of the list. In such a scenario, the interplay between political capital and effort incentives guides the optimal ranking strategy.

5.5 Number of parties, district magnitude and party popularity

Number of parties. In most countries relying on proportional representation, there are more than two parties competing for seats. How does the presence of more than two parties impact our results? With $J > 2$ parties, coalition governments are the norm and thus winning a majority is not the most relevant weight to use when we think about W_m. Following a large literature,[15] we assume that the expected share of rents enjoyed by each candidate is proportional to the expected seat share of their party. The expected seat share takes a simple form due to the multinomial distribution. We have that $\sum_{k=0}^{n} kP_j^k = np_j$. With J parties, the benefit function of a given candidate thus becomes:

$$B_{\text{mj}} = V \sum_{k=m}^{n} P_j^k + np_j W_m.$$

When we compare B_{mj} above to that when only two parties are present, the second part of the benefit of exerting effort differs. Yet, as in the main model, the probability of getting a benefit due to the party's electoral success np_j does not depend on the rank of the individual. Adapting the argument with two parties, we get the following party output:

$$E_j^* = \sqrt{\sum_{m=1}^{n} \gamma \frac{a_m^2}{c_{\text{mj}}} \left(M_j^m V + np_j (1 - p_j) W_m \right)}.$$

With the appropriate adaptations, all propositions about the optimal list are thus also valid with more than 2 parties. Further, in the symmetric case, all parties have the same expected seat share, $1/J$. Then, even when parties have an incentive to rank candidates as in Proposition 3, the most competent candidates are placed quite early in the list.

District magnitude. The influence of district magnitude is similar to that of the number of parties. With several districts, parties compete in each district with a distinct list of candidates. The larger is the set of such districts, the smaller is the expected seat share of each party in each district, all else equal. Once again, the most competent candidates are placed quite early in the list even when parties have an incentive not to rank candidates in decreasing order of competence, as in Proposition 3.

Party popularity. Parties often differ in their popularity and electoral prospects. Some of them are major parties looking to win control of or at least participate in government, while others are smaller parties trying to push their agenda and get a few seats without a real chance to control the executive. Proposition 3 argues that a party would place their most competent candidate around the position corresponding to the expected number of seats to be won. Thus, on average, small parties will place their best candidates earlier on their list than more popular parties. For instance, a party that expects to win one seat only will place its best candidate at the top of the list.

The biases in candidate exposure may also be a function of the popularity of parties. If voters are more interested in reading reports and news about the most popular parties, profit-maximizing media firms have an incentive to focus their attention more on these popular parties. How does this impact our findings? The condition from Proposition 5, $a_m \geq \sqrt{\frac{(n-m)}{m} \frac{p_j}{1-p_j}} a_{m+1}$, depends on the ratio $p_j/(1 - p_j)$ which is increasing in p_j. This condition is thus more stringent for more popular parties. This means that the media need to be biased even more toward the top candidates of popular parties for these parties to place their best candidates at the top of list.

[15] The idea of a probabilistic compromise has been introduced by Grossman and Helpman (1996) and has been used by Persico and Sahuguet (2006), Iaryczower and Mattozzi (2012) and Mattozzi and Merlo (2015) among others.

The effects of private incentives discussed above depend on the value of $M^{maj}(p_j)$. In contrast with the effect of popularity on media weights, we have that the condition in Proposition 6 is more easily satisfied for higher values of p_j, that is for strong parties that expect to win a large number of seats in parliament. Indeed, the incentive effects linked to high office are proportional to the probability that the party wins a majority. Thus, it is in large parties that these leadership rules impact incentives most forcefully. Strong parties are thus more likely than weak parties to rank candidates in decreasing order of competence. The empirical evidence in Buisseret *et al.* (2022) supports this interpretation, even though their theory abstracts from effort incentives.

5.6 Welfare considerations

The model highlights a fundamental trade-off for political parties between incentivizing candidates and promoting competence. Since electoral success hinges on candidates' efforts and securing a safe spot at the top of the list could potentially disincentivize candidates from exerting such effort, it becomes counterintuitive for parties to place their most competent candidates in these positions. This creates a conflict between the party leadership, aiming to maximize electoral success, and voters, who generally desire competence to be a driving factor in party nomination strategies, all else being equal.

The framework, however, doesn't readily lend itself to a straightforward welfare analysis. Voting behavior is encapsulated by a contest success function, intricately tied to party outputs. Moreover, candidates' efforts are akin to persuasive advertising, making welfare considerations challenging in such a context.

Nevertheless, the model underscores a tension between the goals of parties and voters, arising from moral hazard. Parties use their electoral list to incentivize candidates, but this might lead to suboptimal outcomes for voter welfare, especially when incentives from winning a seat necessitate placing candidates in hot spots. The model demonstrates that incentives linked to high offices and awarded to candidates higher on the list can alleviate this issue. Additionally, the analysis suggests that biased media or voter attention, by providing further incentives for vote-maximizing parties to base their nomination strategy on competence, may have a welfare-enhancing effect.

6. Conclusion

We develop a model of electoral competition between parties under closed list proportional representation. Parties care about competence and incentives and wish to maximize their electoral success. A party orders its candidates on their list to maximize the efforts of its candidates. We identify four main sources of incentives. The first source of incentive stems from the prospect of being elected to the legislature. These incentives exhibit a non-monotonic relationship with the position of the list. Incentives are most powerful for hot spots that correspond to the number of seats that the party expects to win in the election. Incentives are weak for safe and hopeless spots, that correspond to the top and the bottom of the list. The second source of incentives arises from rank-independent forces, such as pure ideology and the prospect of receiving party resources independently of one's ranking. As these incentives affect all candidates independently of their list position, we predict that they do not impact how parties rank their candidates.

We then show that candidate exposure biases—be them driven by rational voter inattention or media biases—may make parties rank candidates in decreasing order of competence. We also show that the presence of post electoral high offices or intraparty rules regarding leadership and top brass turnover may generate incentives that again lead parties to propose party lists in which rank and competence go hand in hand. We conclude by extending our model along several important dimensions, such as incumbency, the number of parties, district magnitude, and party popularity.

We assumed in this paper that parties wish to maximize their electoral success. Parties may also be interested in getting the best candidates elected. In that case, it is natural for the party to put their most competent candidates at the top of the list. Our results show that these two objectives need not be contradictory and that a list that orders candidates in decreasing order of competence can be consistent with both objectives, and thus with any alternative party objective that takes into account both the expected number of seats and the quality of elected candidates.

References

Baltrunaite A, Bello P, Casarico A and Profeta P (2014) Gender quotas and the quality of politicians. *Journal of Public Economics* **118**, 62–74.

Beck T, Clarke G, Groff A, Keefer P and Walsh P (2020) New tools and new tests in comparative political economy—the database of political institutions. Policy, Research Working Paper WPS 2283. Washington, D.C.: World Bank Group.

Besley T, Olle F, Torsten P and Johanna R (2017) Gender quotas and the crisis of the mediocre man: theory and evidence from Sweden. *American Economic Review* **107**, 2204–2242.

Buisseret P and Prato C (2021) Competing principals? Legislative representation in list proportional representation systems. *American Journal of Politicial Science* **66**, 156–170.

Buisseret P, Olle F, Carlo P and Johanna R (2022) Party nomination strategies in list proportional representation systems. *American Journal of Politicial Science* **66**, 714–729.

Carroll R and Monika N (2020) The personal vote and party cohesion: modeling the effects of electoral rules on intraparty politics. *Journal of Theoretical Politics* **32**, 36–69.

Chardon F (2022) *Ducarme: 'L'arrivée d'Hadja Lahbib est une Promesse Pour L'avenir Mais il Faut Mieux Considérer les Parlementaires MR. Belgian, La Libre Belgique*. Available at https://www.lalibre.be/belgique/politique-belge/2022/07/18/ducarme-larrivee-dhadja-lahbib-est-une-promesse-pour-lavenir-mais-il-faut-mieux-considerer-les-parlementaires-mr-BHLADLT2TNA43BWLSVU3RRFXKI/.

Cirone A, Cox GW, Fiva JH (2021) Seniority-based nominations and political careers. *American Political Science Review* **115**, 234–251.

Cox GW, Fiva JH, Smith DM and Sorensen RJ (2021) Moral hazard in electoral teams: list rank and campaign effort. *Journal of Public Economics* **200**, 104457. https://doi.org/10.1016/j.jpubeco.2019.104109.

Crutzen BSY and Sahuguet N (2023) Comparative politics with intraparty candidate selection. *European Journal of Political Economy* **79**, 102445. https://doi.org/10.1016/j.ejpoleco.2023.102445.

Crutzen BSY, Flamand S and Sahuguet N (2020) A model of a team contest, with an application to incentives under list proportional representation. *Journal of Public Economics* **182**, 104109. https://doi.org/10.1016/j.jpubeco.2019.104109.

de Lamotte A (2022) Nomination d'hadja lahbib: une nouvelle atteinte à la méritocratie?. *Belgian, La Libre Belgique*. Available at https://www.lalibre.be/debats/opinions/2022/07/19/nomination-dhadja-lahbib-une-nouvelle-atteinte-a-la-meritocratie-2C4X42ECPFGUBGBG23BK4ZV5KU/.

Electronic Irish Statute Book (2020) Constitution of Ireland. Available at https://www.irishstatutebook.ie/eli/cons/en.

Esteve-Volart B and Bagues M (2012) Are women pawns in the political game? Evidence from elections to the Spanish Senate. *Journal of Public Economics* **96**, 387–399.

Fiva JH, Izzo F and Tukiainen J (2024) The Gatekeeper's dilemma: political selection or team effort. Discussion paper No. 164, Turku: Aboa Centre for Economics. Available at SSRN: https://ssrn.com/abstract=4691338.

Fujiwara T and Carlos S (2020) Rank effects in bargaining: evidence from government formation. *Review of Economic Studies* **87**, 1261–1295.

Galasso V and Nannicini T (2015) So closed: political selection in proportional systems. *European Journal of Political Economy* **40**, 260–273.

Galasso V and Nannicini T (2017) Political selection under alternative electoral rules. *Public Choice* **171**, 257–281.

Grossman G and Helpman E (1996) Electoral competition and special interest politics. *Review of Economic Studies* **63**, 265–286.

Hobolt SB and Høyland B (2011) Selection and sanctioning in European parliamentary elections. *British Journal of Political Science* 477–498.

Iaryczower M and Mattozzi A (2012) The pro-competitive effect of campaign limits in non-majoritarian elections. *Economic Theory* **49**, 591–619.

Ledyard JO (1984) The pure theory of large two candidate elections. *Public Choice* **44**, 7–41.

Martinelli C (2006) Would rational voters acquire costly information?. *Journal of Economic Theory* **129**, 225–251.

Matejka F and Tabellini G (2021) Electoral competition with rationally inattentive voters. *Journal of the European Economic Association* **19**, 1899–1935.

Mattozzi A and Merlo A (2015) Mediocracy. *Journal of Public Economics* **130**, 32–44.

Persico N and Sahuguet N (2006) Campaign spending regulation in a model of redistributive politics. *Economic Theory* **28**, 95–124.
Persson T and Tabellini G (2000) *Political Economics: Explaining Government Policy*. Cambridge, Massachusetts: MIT Press.
Prat A and Strömberg D (2013) The political economy of mass media. *Advances in Economics and Econometrics* **2**, 135.
RTBF (2023) La tempête au sein de l'Open VLD. Available at https://www.rtbf.be/article/la-tempete-au-sein-de-lopen-vld-11276285.
Shugart MS, Valdini ME and Suominen K (2005) Looking for locals: voter information demands and personal vote-earning attributes of legislators under proportional representation. *American Journal of Political Science* **49**, 437–449.
Stromback J and Nord LW (2006) Do politicians lead the tango?. *European Journal of Communication* **21**, 147–164.
Svitáková K and Ŝoltés M (2020) Sorting of candidates: evidence from 20,000 electoral ballots. CERGE-EI Working Papers wp652. Prague: The Center for Economic Research and Graduate Education – Economics Institute.
Tresch A (2009) Politicians in the media: determinants of legislators' presence and prominence in Swiss newspapers. *The International Journal of Press/Politics* **14**, 67–90.
Tullock G (1980) Efficient rent-seeking. In Buchanan JM, Tollison RD, Tullock G (eds), *Toward a Theory of the Rent-Seeking Society*. College Station, Texas: A&M Press.
van Aelst P, Maddens B, Noppe J and Fiers S (2008) Politicians in the news: media or party logic?: media attention and electoral success in the Belgian election campaign of 2003. *European Journal of Communication* **23**, 193–210.
van Aelst P, Sehata A and Van Dalen A (2010) Members of parliament: equal competitors for media attention? An analysis of personal contacts between MPs and political journalists in five European countries. *Political Communication* **27**, 310–325.
Vos D and Van Aelst P (2018) Does the political system determine media visibility of politicians? A comparative analysis of political functions in the news in sixteen countries. *Political Communication* **35**, 371–392.

Appendix

Proof of Proposition 1. Candidate m_j exerts effort to increase the probability he gets elected through an increase in p_j.

The impact of an increase in that candidate m_j's effort on party j's aggregate effort is:

$$\frac{\partial E_j}{\partial e_{\mathrm{mj}}} = a_m.$$

thus, the impact of an increase in e_{mj} on p_j is:

$$\begin{aligned}\frac{\partial p_j}{\partial e_{\mathrm{mj}}} &= a_m \frac{(E_{-j})^{\gamma-1}}{\left((E_{-j})^{\gamma}+(E_j)^{\gamma}\right)^2} \\ &= \gamma \frac{a_m}{E_j} p_j(1-p_j).\end{aligned}$$

Differentiating $P^k(p_j)$, we obtain:

$$\begin{aligned}\frac{dP^k}{dp_j} &= C_k^n\left(kp_j^{k-1}(1-p_j)^{n-k}-(n-k)p_j^k(1-p_j)^{n-k-1}\right) \\ &= C_k^n p_j^{k-1}(1-p_j)^{n-k-1}(k-np_j).\end{aligned}$$

Notice that the sign of the above is not always positive. This can be seen by noting the special case of $k = 0$. If p_j increases, it is obvious that $P^0(p_j)$ is decreasing. As the above formula shows, $(dP^k/dp_j) \gtreqless 0$ if and only if $k \gtreqless np_j$.

So we get:

$$\frac{dP^k}{de_{\mathrm{mj}}} = \gamma \frac{a_m}{E_j} C_k^n p_j^k (1-p_j)^{n-k}(k-np_j)$$

Denoting $\mu_j^k = C_k^n p_j^k (1-p_j)^{n-k}(k-np_j)$, we have:

$$\frac{dP^k}{de_{\mathrm{mj}}} = \gamma \frac{a_m}{E_j} \mu_j^k.$$

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We obtain

$$\frac{\partial B_{\mathrm{mj}}}{\partial e_{\mathrm{mj}}}-\frac{\partial K\left(e_{\mathrm{mj}}\right)}{\partial e_{\mathrm{mj}}}=\gamma\frac{a_m}{E_j}\left(\sum_{k=m}^{n}\mu_j^k V+\sum_{k=k^{\mathrm{Maj}}}^{n}\mu_j^k W_m\right)-c_{\mathrm{mj}}e_{\mathrm{mj}}=0.$$

$$E_j=\sum_{m=1}^{n}a_m e_{\mathrm{mj}}=\sum_{m=1}^{n}a_m\frac{\gamma a_m}{c_{\mathrm{mj}}E_j}\left(V\sum_{k=m}^{n}\mu_j^k+W_m\sum_{k=k^{\mathrm{Maj}}}^{n}\mu_j^k\right).$$

Let $\sum_{k=m}^{n}\mu^k=M_j^m$. We have

$$M_j^m=mC_m^n p^m(1-p)^{n-m+1}.$$

Thus, the equilibrium sum of efforts is

$$E_j^*=\sqrt{\sum_{m=1}^{n}\gamma\frac{a_m^2}{c_{\mathrm{mj}}}\left(M_j^m V+M_j^{k^{\mathrm{Maj}}}W_m\right)},$$

and individual effort is given by:

$$e_{\mathrm{mj}}=\frac{\frac{\gamma a_m}{c_{\mathrm{mj}}}\left(VM_j^m+WM_j^{k^{\mathrm{Maj}}}\right)}{\sum_{h=1}^{n}\frac{\gamma a_h^2}{c_{\mathrm{hj}}}\left(VM_j^m+WM_j^{k^{\mathrm{Maj}}}\right).}$$

To check second order conditions, we take the second derivative and evaluate them at the FOC. We have:

$$\begin{aligned}
&\frac{\partial^2 B_{\mathrm{mj}}}{\partial e_{\mathrm{mj}}^2}-c''(e_{\mathrm{mj}})\\
&=-\frac{\gamma a_m^2}{E_j^2}\left(VM_j^m+W_mM_j^{k^{\mathrm{Maj}}}\right)+\frac{\gamma a_m}{E_j}\frac{d\left(VM_j^m+W_mM_j^{k^{\mathrm{Maj}}}\right)}{dp_j}\frac{dp_j}{de_{\mathrm{mj}}}-c_{\mathrm{mj}}\\
&=-\frac{\gamma a_m^2}{E_j^2}\left(VM_j^m+W_mM_j^{k^{\mathrm{Maj}}}\right)+\frac{\gamma^2 a_m^2}{E_j^2}\left(VM_j^m\left(m(1-p_j)-(n-m+1)p_j\right)\right.\\
&\quad\left.+W_mM_j^{k^{\mathrm{Maj}}}k^{\mathrm{Maj}}(1-p_j)+\left(n-k^{\mathrm{Maj}}+1\right)p_j\right)\Big)-\frac{\gamma a_m}{e_{\mathrm{mj}}E_j}\left(VM_j^m+WM_j^{k^{\mathrm{Maj}}}\right)\\
&=\frac{\gamma}{e_{\mathrm{mj}}}\frac{a_m}{E_j}VM^m(p_j)\left[\theta_{\mathrm{mj}}\left\{\gamma\left(m(1-p_j)-\left(n-m+1\right)p_j\right)-1\right\}-1\right]\\
&\quad+\frac{\gamma}{e_{\mathrm{mj}}}\frac{a_m}{E_j}W_mM^{k^{\mathrm{Maj}}}(p_j)\left[\theta_{mj}\left\{\gamma\left(k^{\mathrm{Maj}}(1-p_j)-\left(n-k^{\mathrm{Maj}}+1\right)p_j\right)-1\right\}-1\right]
\end{aligned}$$

where

$$\theta_{mj}=a_{\mathrm{mj}}\frac{e_{\mathrm{mj}}}{E_j}.$$

The sign of $\theta_{\mathrm{mj}}\ \{\gamma(m(1-p_j)-(n-m+1)p_j)-1\}-1$ needs to be determined.

We have:

$$\gamma\left(m(1-p_j)\right)-\left(n-m+1\right)p_j)-1=\gamma\left(m-(n+1)p_j\right)-1$$

As the expression is increasing in m and decreasing in p_j, a sufficient condition for the expression to be negative for all m is that $\gamma < 1/n$ (by having $m = n$ and $p_j = 0$). This condition is not necessary and second order conditions can be satisfied even for values of γ close to 1. We also see that if the expression is negative for $m = k^{\text{Maj}} = (n+1)/2$, then an increase in W_m increases the relative importance of the second term. So, in that case a large W_m leads to the SOC be satisfied even for larger values of the parameter γ.

We can interpret the sufficient condition in terms of the concavity of the generalized Tullock contest function used. Smaller values of the parameter γ make the objective function of candidates more concave and an increase in the party's aggregate effort does not increase the winning probability of the party by too much.

We now prove the existence of a Nash equilibrium for given arty lists. As E_j depends only on p_j ($E_j = E_j(p_j)$), we consider the following mapping $f(p)$, with $p = (p_1, \ldots, p_J)$ and

$$f_j(p) = \frac{E_j^\gamma(p_j)}{\sum_{\ell=1}^{J} E_\ell^\gamma(p_k)}$$

for all $j = 1, \ldots, J$. Then $f(p) = (f_1(p), \ldots, f_J(p))$ is a fixed point mapping from simplex $\Delta^J \equiv \left\{p \in \mathbb{R}_+^J : \sum_{k=1}^{J} p_k = 1\right\}$ to itself, which is a continuous function. Since Δ^J is nonempty, compact, and convex, and $f : \Delta^J \to \Delta^J$ is a continuous function, there exists a fixed point $p^* = f(p^*)$ by Brouwer's fixed point theorem.

The equilibrium condition is

$$p_j = \frac{(E_j(p_j))^\gamma}{(E_j(p_j))^\gamma + (E_{-j}(1-p_j))^\gamma}.$$

We now derive a condition that guarantees that the equilibrium is unique for given lists by parties. To show that, we consider the function $G(p_j) = p_j - (E_j(p_j))^\gamma / (E_j(p_j))^\gamma + (E_{-j}(1-p_j))^\gamma$. As $G(0) < 0$ and $G(1) > 0$, we need to show that $G'(p_j) > 0$, so as to guarantee that there is a unique solution to the equilibrium condition above.

Taking the derivative, we get:

$$G'(p_j) = 1 - \frac{\gamma\left(E_j^\gamma + E_{-j}^\gamma\right)E_j^{\gamma-1}\frac{\partial E_j}{\partial p_j} - \gamma E_j^\gamma\left(E_j^{\gamma-1}\frac{\partial E_j}{\partial p_j} - E_{-j}^{\gamma-1}\frac{\partial E_{-j}}{\partial p_{-j}}\right)}{\left(E_j^\gamma + E_{-j}^\gamma\right)^2}.$$

Rewriting the above, we obtain

$$\begin{aligned}
1 - \frac{\gamma E_j^{\gamma-1}E_{-j}^\gamma\frac{\partial E_j}{\partial p_j} + \gamma E_{-j}^{\gamma-1}E_j^\gamma\frac{\partial E_{-j}}{\partial p-_j}}{\left(E_j^\gamma + E_{-j}^\gamma\right)^2} &= 1 - \frac{\gamma E_j^\gamma E_{-j}^\gamma\left(\frac{\partial E_j}{E_j \partial p_j} + \frac{\partial E_{-j}}{E_{-j}\partial p_{-j}}\right)}{\left(E_j^\gamma + E_{-j}^\gamma\right)^2} \\
&= 1 - \frac{\gamma\left(E_{-j}^\gamma\frac{p_j}{E_j}\frac{\partial E_j}{\partial p_j} + E_j^\gamma\frac{p-j}{E_{-j}}\frac{\partial E_2}{\partial p_{-j}}\right)}{\left(E_j^\gamma + E_{-j}^\gamma\right)} \\
&= 1 - \gamma\left(p_{-j}\eta_j + p_j\eta_{-j}\right).
\end{aligned}$$

where $\eta_j = p_j \partial E_j / E_j \partial p_j$ is team j 's winning probability elasticity of aggregate effort.

From now on, we impose:

Regularity Condition: $\gamma(p_{-j}\eta_j + p_j\eta_{-j}) < 1$.

Thus, under the following regularity condition, $G'(p_j) > 0$.

A sufficient condition for this regularity condition to hold is that $\gamma < 2/n$. Note that the regularity condition holds under Assumption 1. To prove this we first derive the following lemma. □

LEMMA: $\eta_j < n/2$.

Proof. As $E_j^* = \sqrt{\sum_{m=1}^n \gamma a_m^2/c_{\mathrm{mj}}(M_j^m V + M_j^{\mathrm{maj}} W_m)}$, we have:

$$\begin{aligned}
\eta_j &= \frac{p_j \partial E_j}{E_j \partial p_j} \\
&= \frac{p_j}{E_j} \frac{\sum_{m=1}^n \gamma \frac{a_m^2}{c_{\mathrm{mj}}} \left(\frac{M_j^m (m-(n+1)p_j)}{p_j(1-p_j)} V + \frac{M_j^{\mathrm{maj}}(k^{\mathrm{Maj}} - (n+1)p_j)}{p_j(1-p_j)} W_m \right)}{2\sqrt{\sum_{m=1}^n \gamma \frac{a_m^2}{c_{\mathrm{mj}}} \left(M_j^m V + M_j^{\mathrm{maj}} W_m \right)}} \\
&= \frac{1}{2E_j(1-p_j)} \frac{\sum_{m=1}^n \gamma \frac{a_m^2}{c_{\mathrm{mj}}} \left(M_j^m (m - (n+1)p_j) V + M_j^{\mathrm{maj}} (k^{\mathrm{Maj}} - (n+1)p_j) W_m \right)}{\sqrt{\sum_{m=1}^n \gamma \frac{a_m^2}{c_{\mathrm{mj}}} \left(M_j^m V + M_j^{\mathrm{maj}} W_m \right)}} \\
&< \frac{1}{2E_j(1-p_j)} \frac{\sum_{m=1}^n \gamma \frac{a_m^2}{c_{\mathrm{mj}}} \left(M_j^m (n - (n+1)p_j) V + M_j^{\mathrm{maj}} (n - (n+1)p_j) W_m \right)}{\sqrt{\sum_{m=1}^n \gamma \frac{a_m^2}{c_{\mathrm{mj}}} \left(M_j^m V + M_j^{\mathrm{maj}} W_m \right)}} \\
&< \frac{n - (n+1)p_j}{2(1-p_j)} = \frac{n(1-p_j) - p_j}{2(1-p_j)} < n/2.
\end{aligned}$$

Thus, under the regularity condition, we have $\gamma(p_2\eta_1 + p_1\eta_2) < \gamma(p_2 + p_1)n/2 = \gamma n/2$. Thus $G'(p_1) > 0$, and the equilibrium of the game is unique for given party lists. □

Proof of Proposition 2. The proof of Proposition 2 is based on a comparative static exercise. We want to see what happens when we change the cost parameter of one candidate. The parameter Δ corresponds to the increase or decrease in the cost parameter of a candidate. The direct effect is to change E_1, but that also changes p_1, which leads to further changes in E_1 and E_2. We want to consider the general equilibrium effect.

Equilibrium is defined by:

$$p_1 - E_1(p_1, \Delta)/(E_1(p_1, \Delta) + E_2(p_1, \Delta)) = G(p_1, \Delta)$$

Using the implicit function theorem, we get:

$$\begin{aligned}
\frac{\partial p_1}{\partial \Delta} &= -\frac{\partial G/\partial \Delta}{\partial G/\partial p_1} = -\frac{E_2/(E_1+E_2)^2 \cdot \frac{\partial E_1}{\partial \Delta}}{\partial G/\partial p_1} \\
&= \frac{E_2}{(E_1+E_2)^2 \cdot \partial G/\partial p_1} \frac{\partial E_1}{\partial \Delta}
\end{aligned}$$

Under the regularity condition, $\partial G/\partial p_1 > 0$. So a change in the cost parameter that leads on an increase in the aggregate effort also leads to an increase in the probability of winning. This means that changes in the list order that lead to an increase in aggregate effort will also lead to an increase in the electoral success of the party. □

Proof of Proposition 3. As stated in Proposition 2, the party assigns ranks according to $M_j^m = mC_m^n p_j^m (1-p_j)^{n-m+1}$.

As $mC_m^n = nC_{m-1}^{n-1}$, we need to look at the distribution of $M_j^m = np_j(1-p_j)(C_{m-1}^{n-1} p_j^{m-1}(1-p_j)^{n-m})$. Using a standard argument about the mode of the binomial distribution shows that M_j^m is largest when $k = \lfloor np + 1 \rfloor$. □

Proof of Proposition 4. The benefit W impacts party's output through $M_j^{\mathrm{maj}} W$, which is the same for all candidates. □

Proof of Proposition 5. Applying Proposition 2, parties optimally rank candidates in decreasing order of competence if $\Lambda_j^m \geq \Lambda_j^{m+1}$ for all m. Recall that $\Lambda_j^m = (a_m)^2 M_j^m V = (a_m)^2 (mC_m^n (p_j)^m (1-p_j)^{n-m+1}) V$. Rearranging leads directly to the above condition. □

Proof of Proposition 6. If the first condition is satisfied, then $\Lambda_j^m \geq \Lambda_j^{m+1}$ and incentives are decreasing at the top of the list. If $k^c \geq \lfloor np_j + 1 \rfloor$, then Λ_j^m is decreasing for all $m \geq k^c$ as M_j^m is decreasing for $m \geq \lfloor np_j + 1 \rfloor$. If $k^c \leq \lfloor np_j + 1 \rfloor$, the second condition states that the incentives of the last candidate on the list who can win a high office who is in position k^c are larger than those of the candidate in position $\lfloor np_j + 1 \rfloor$ for which M_j^m is maximal. When these conditions are not satisfied, then $\Lambda_j^m < \Lambda_j^{m+1}$ and the party does not rank candidates in decreasing order of competence. □

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