La Cordata: Loyalty in Political Tournaments[*]

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Abstract

We study the allocation of talent in tournaments between (political) teams. The winner-take-all nature of these contests implies that talented members may quit if the odds of winning diminish. A leader must choose between competent individuals who increase the chances of winning but may bolt at the first hint of bad news, and loyalists who have fewer outside options. The value of loyalty increases when outside options are more valuable, pre-election information (polls, primaries) is more predictive, or elections are more competitive. Monetary incentives do not negate the value of loyalty. We discuss organizational responses, such as ideological platforms and shorter campaigns, and show how leader loyalty can improve the talent-loyalty trade-off by enabling long-term relationships.

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The aim of every political constitution is, or ought to be, first to obtain for rulers men who possess most wisdom to discern, and most virtue to pursue, the common good of the society; and in the next place, to take the most effectual precautions for keeping them virtuous whilst they continue to hold their public trust. James Madison, Federalist 57

1. Introduction

Various languages use the same term for mountaineers roped together for safety and for politicians forming alliances for power: a "*cordata*" in Italian,[1] or a "seilschaft" in German.[2] The analogy between mountaineers and politicians is quite apt. Like climbing parties, political groups bind themselves to a leader who guides their ascent to power. Success brings rewards for all - loyal followers gain influential positions. But the loss of a member can destabilize the ascent.

History offers many examples of these political rope teams. In the late 19th and early 20th centuries, US politicians from "Tammany Hall" in New York established vast networks of loyalists, offering jobs and favors in return for electoral support. In more recent times, close-knit, long lasting cordatas can be observed across the political spectrum. Italian mogul Silvio Berlusconi drafted business associates and friends for his political adventure and then rewarded them with powerful jobs. Trump appointed loyalists to all key administration roles in 2025, while Biden's inner circle included advisors who had worked with him for decades. We examine these and other cases in Section 2.

This preference for loyalty over talent carries efficiency costs. Government positions may end up filled by those lacking proper skills. This is contrary to the interests of voters. As Besley (2005) has argued "if competence differs, then an important role of elections is to pick competent politicians."

Why does loyalty play such a crucial role in politics? Under what conditions does it come at the cost of merit? And what can societies do about it? In this paper, we aim to answer these questions.

[1] "Cordata (feminine noun): (Mountaineering) roped party (figurative); (Politics) network, alliance system in financial and business world." Collins English Dictionary. Or as Moran, Abramson, and Moran (2014) explain, cordata refers to "the practice of pulling along friends and family in the climb up the corporate ladder."

[2] "Seilschaft (Femininum): Roped party of mountain climbers, rope party; Clique." Langenscheidt German English Dictionary.

A key feature of political campaigns is that non-monetary goals associated with the attainment of power are paramount, and those typically only accrue to the winners. Thus, our starting point is the observation that political contests are generally brutal, winner-take-all contests. This demands a solid team. Talented individuals with good outside options may abandon their leader during turbulent times, as they will only receive a reward when the team is successful. This leaves leaders with a dilemma: to recruit skilled individuals who are potentially less loyal, or to rely on those with fewer external opportunities.

To study this type of political organizations and understand the incentives of both leaders and followers to participate, we set up a simple analytical model of a team that produces together. We start with a team consisting of a leader and one follower and we later extend the analysis to multiple followers.

Two teams face each other in a winner-take-all tournament (the election). The winning team takes the prize, the losing one gets nothing. Hence effort is valuable only if the tournament is won.[3] But winning is not just a matter of skill – luck plays a key role too. News during the campaign - from debates, polls, and scandals - reveals likely outcomes.

The winner-take-all tournament induces a threshold in the information received- when the news is sufficiently bad, more talented agents quit, leaving the leader in the lurch. As a result, the unique equilibrium of the tournament may have competing leaders choose less talented, but loyal followers.

Specifically, our analysis shows that loyalty prevails over merit when political talent has a high value outside of politics or, conversely, when skill is less valuable inside political campaigns. Interim information further plays a key role: when pre-election information is quite predictive of final results, loyal agents are preferred over talented agents.

We also show that strategic considerations matter. A meritocratic team may quit with bad interim news. On the other hand, it may also induce the rival team to give up when they face setbacks (whereas a loyal but low-skill team would not have had this effect). Because of this 'discouragement effect' on the rival team, talented followers may be optimally chosen even when they are known to quit when bad news arrives.

We then consider three extensions of the basic model. First, we consider how the value of loyalty changes as elections become more or less competitive. We start by considering the impact of asymmetries where one team has a natural, preexisting, advantage- because

[3] "Tournament" models were proposed by Lazear and Rosen (1981) and Green and Stokey (1983) See Lazear and Shaw (2007) for a survey.

its leader is better, because of an incumbency advantage or for any other reason. Such pre-existing asymmetries make elections less competitive. As we show, for a high enough asymmetry, merit trumps loyalty. Intuitively, the team that is ahead chooses a highly skilled agent, because there is a lower risk that followers will quit when victory is quite likely. The leader who is behind, in contrast, knows that the chances of winning in case of bad interim news are slim and therefore cares less about loyalty; by hiring a highly skilled agent, he gambles it all on the chance of winning when interim news is good. We subsequently study elections that are more competitive because more than two teams are competing. As competition intensifies, the value of loyalty increases, as those with more outside options are more likely to quit at the hint of any trouble.

In our second extension, we study monetary rewards. Political labor markets are special because of their winner-take-all nature. But similar dynamics may also play out in the private sector. Start-ups, for example, often use equity, stock options, and only modest salaries to attract talent. As in our model, talent may quit when the prospect of a successful exit becomes bleak, precipitating the demise of the venture. What is different from politics is that the 'prize' in case of success is now endogenously designed. As we show, as long as followers have limited liability, our results carry through qualitatively. The need for loyalty often results in the inefficient hiring of untalented workers (that is, if quitting was impossible, talented agents would have been hired). Intuitively, inducing loyalty from talented agents, while feasible, requires paying them rents on top of their outside option. As a result, a talented agent may either be endogenously disloyal or simply too expensive.

In our final extension, we introduce a team of followers, working together through an "O-Ring" production function on a set of tasks. In such a production function, complementarities are very strong: if any follower betrays the leader or quits, production is 0. We aim to capture the "team production" nature of the "cordata" where if one of the climbers (real or metaphorical) fails, she puts at risk the entire team.[4] We show that the resulting team is homogeneous (all followers are chosen either for their skill or their loyalty), and that the impact of information is as before. When production is sequential and later tasks are critical, Kremer (1993) argues that the most talented agents should be assigned to such critical "bottleneck" tasks. However, the task allocation in political tournaments may be the opposite: low skill "loyalists" will be more likely allocated to the bottleneck tasks, since these

[4] This type of production function was first proposed by Becker (1991) and most famously used by Kremer (1993), using the metaphor of the cheap "O-Ring" whose failure destroyed an entire Space Shuttle, to account for bottlenecks in economic development and the role of talent allocation for growth.

are the tasks where an agent quitting can ruin the entire team's prospects.

We finally turn our attention to the potential solutions to these problems. What can society do about it? We explore four possible ideas: (i) *Length of campaigns and electoral system.* Longer campaigns increase interim information and the opportunity costs for talented agents. Hence shorter campaigns are more likely to select for merit. Also, a move towards electoral systems that are less winner-take-all (i.e. proportional) may facilitate, all else equal, the entry and retention of talented politicians. (ii) *Career Politicians.* Career politicians have limited outside career options. This discourages them from quitting and softens the loyalty-merit trade-off we have studied. (iii) *Ideology.* More ideological movements and leaders have more dedicated, and hence loyal, followers. These followers may be less likely to jump ship when faced with bad news. Hence, the mechanism studied here means ideology will be correlated with loyalty and with the ability to attract talent. (iv) *Leader loyalty.* A final solution is the formation of a long-term relationship between leader and follower. Such a relationship may incentivize high-skill followers to stick around when facing bad interim information, in the expectation that the leader will run again after a loss.

Each of these institutional responses involves a trade-off: Leader loyalty requires leaders to remain loyal to followers even when they are no longer the right ones for the job; an ideological platform reduces the probability of winning; shorter campaigns yield less information to voters; and talented agents may not want to become career politicians.

Related Literature. We are not the first to model a trade-off between loyalty and competence in a principal-agent framework. But our focus on loyalty as reducing the risk that team members quit when the path gets tough, is novel. For us, a loyal follower sticks around even in rough times. In contrast, other papers have focused on the risk that disloyal followers may "backstab" or "betray a leader." This leads to different predictions, as we discuss below.

In Egorov and Sonin (2011), an outside enemy may threaten a dictator. High-competence viziers (followers) can recognize when a dictator is weak and are therefore more prone to betrayal. The different mechanism and definition of loyalty (backstabbing vs quitting) yields different implications. First, a less competent vizier is more likely to be chosen when the dictator is weak relative to the outside enemy (Proposition 2). In contrast, in our model, when there is a weak and a strong team, both have an incentive to hire for merit, while the same teams would have hired for loyalty when evenly matched (Proposition 3). Second, loyalty is more valuable in our model when pre-election information (polls, primaries) is more predictive of success/failure, and competence yields no informational advantage. In contrast, Egorov and Sonin (2011) develops no comparative statics regarding the quality of information, and competence is uniquely about having more informative signals. Related, Zakharov (2016) builds a dynamic model where less competent affiliates exert more effort to defend their dictator and tend to be more loyal, as they face higher opportunity costs in the event the leader is deposed. The main comparative statistics relate to the discount rates of the dictator and followers. Further, the focus in both papers on dictatorships abstracts from electoral competition with its strategic interdependences between the choices of two (symmetric) political teams. [5]

Our paper is also related to the literature on politician selection by their parties. Galasso and Nannicini (2011, 2015) find that more competent politicians (preferred by voters) are allocated to more competitive electoral districts and at the top of party lists in proportional elections. On the other hand, party leaders have an incentive to allocate loyalists (who provide more services to the party) to safe districts, where the result is less sensitive to a politician's valence. In contrast, in our model, political leaders are more likely to select party loyalists in elections that are more competitive. Mattozzi and Merlo (2015) provide a slightly different explanation for why political parties may deliberately choose to recruit only mediocre politicians, arguing that "super-stars" may discourage other party members in the internal competition within the party, inducing them to shirk. Internal competition plays also a central role in Besley, Folke, Persson, and Rickne (2017) who show, empirically and theoretically, that more competent politicians choose more competent followers since they are less likely to be (internally) challenged and replaced by those followers.

Beyond politics, a number of papers show how an owner or manager, concerned with "backstabbing" or "expropriation" by a subordinate, may want to hire a less competent

[5] Empirical evidence for an anti-competence strategy by dictators can be found in Bai and Zhou (2019). They show that, during the Cultural Revolution, Mao Zedong actively replaced Central Committee competent members with mediocre ones and that education and military rank are shown to hurt the probability of remaining in the Committee. Indeed, a large recent literature has focused on the role of social ties and connections in the Chinese party hierarchy. Francois, Trebbi, and Xiao (2023) study factional arrangements within the CCP. They show that affiliation to some groups (eg. the Communist Young League of China) increases one's chance of promotion compared to unaffiliated politicians.Fisman, Shi, Wang, and Wu (2020), on the other hand, find evidence of a connection penalty for junior members when considering hometown and college connection. They argue that this penalty derives from the senior members' desire to maintain a dominant position within their network by blocking out in-group individuals that may threaten their dominant position. Jia, Kudamatsu, and Seim (2015) argue that in the Chinese context, the loyalty-competence trade-off is mitigated by a system of connections between junior and senior officials that fosters loyalty and thus increases the survival of top politicians.

agent to reduce this threat (Glazer, 2002; Friebel and Raith, 2004).[6]

Our novel focus on "quitting" differs significantly from the focus on "backstabbing". In the above literatures, a leader worried about backstabbing or internal rivalry will avoid any risks to her internal position unless external competition is strong. In contrast, a leader worried about quitting, like in this paper, will avoid hiring talented followers in highly competitive settings to reduce quitting risks. Less competition, in contrast, lowers the risk that talented individuals quit, making them more attractive (see e.g. Proposition 3). While we agree backstabbing is relevant, we believe the aspect of loyalty we discuss is crucial in uncertain political environments.

Finally, our work also falls within the economic literature on tournaments. The most closely related are a number of papers that study the (often negative) effect of interim performance evaluation on the incentives of workers (see, for example, Ederer (2010) and Lizzeri, Meyer, and Persico (2002)). None of those, however, study how interim feedback affects the optimal selection of workers and the value of loyalty. Our paper also differs from much of the tournament literature in studying agency problems within competing teams in a tournament (see, however, Sutter and Strassmair (2009)). Again, we are the first to study the value of loyalty within such teams.

2. Quitters and Loyalists: Some Cases

To motivate our analysis, we discuss a series of examples below of the role that merit, quitting and loyalty play in the politics of multiple countries– the US, UK, France, Italy, India. Unusually, we start from fiction: the movie "Ides of March," a political drama loosely based on Howard Dean's insurgent presidential campaign, which beautifully illustrates the trade-offs our model aims to capture. The aspect of (dis)loyalty we analyze is not about running against the leader or aiming to replace her, but is instead about leaving her behind for better pastures when her prospects deteriorate.[7] In a crucial scene, the political veteran played by Philip Seymour Hoffman scolds the political novice (Ryan Gosling) for his disloyalty:

[6] See also Prendergast (1993), who shows how an incentive to conform makes it hard to preserve honesty in the organization. Such 'loyalty', however, is a consequence of subjective performance evaluations and not a desirable trait.

[7] The script is based on a theatre play called "Farragut North" by Beau Willimon, a US writer who had served in the staff of Senators Chuck Schumer, Hillary Clinton and Bill Bradley and in the presidential campaign of Howard Dean and went on to be the showrunner for the hit Netflix series "House of Cards." The title, of course, evokes the betrayal of Julius Cesar by his supporters on March 15, 44 B.C.)

"The first campaign I ran was a tiny race for a Kentucky State Senate seat, working for an unknown candidate named Sam McGuffrey. (...). I told Sam about the offer, and he responded that if I believed the other candidate had a better chance and could pay me more, he wouldn't stand in my way. I refused to abandon Sam, saying he had taken a chance on me when I was a nobody, so I wouldn't jump ship just because things got tough. We lost that race, but three years later, when Sam ran for governor, he called me again, and we won. Twenty years later, I'm where I am now, valuing loyalty above all. In politics, loyalty is the only currency you can count on. That's why I'm letting you go now, not because you're not good enough or because I don't like you, but because I value trust over skill, and I no longer trust you."

2.1. Quitters

In a ritual repeated every primary season in the US, as the possibilities of victory of some candidates start to decrease, some of their supporters quit. This often forces the hand of the candidate, who soon afterwards quits as well. Consider the 2011-2012 primary season. On June 9, 2011, Reuters reported, "Key members of Republican Newt Gingrich's presidential campaign team resigned on Thursday in a devastating blow to his 2012 election hopes." Later that year, Michele Bachmann's campaign manager Ed Rollins, and his deputy stepped down for "health reasons" arguing that she lacked "the finances, campaign structure and ideas to win it."

The loyalty-merit trade-off also plays a significant role in the French primaries, full of quits, betrayals, and changes of sides. One example: Bruno Le Maire, a prominent senior Conservative French politician and former Minister of Agriculture, was the foreign affairs advisor for the presidential campaign of Francois Fillon. As Fillon's campaign struggled due to his controversial past and legal issues, Le Maire distanced himself from it, and on February 28, 2017, announced on Twitter his resignation, right after Fillon confirmed that he would continue campaigning despite the news that he was under investigation. Le Maire was later appointed Finance Minister by the winner, Emmanuel Macron.

UK politics also present these patterns. On the Labour side, Tom Watson, the Deputy Leader of the Labour Party, resigned from his position and as an MP shortly before the 2019 general election—on the first day of campaigning.[8] The expectations for the upcoming

[8] See Tom Watson stands down as Labour deputy leader and MP, FT, Novermber 6, 2019.

election were low, but the press saw the departure as a blow to the party's unity and electoral prospects. Similarly, with the prospect of a losing general election, some of the brightest lights of the Conservative Party announced they are not running for their seats. By May 2024,[9] 65 MPs had announced they would not run for office, triggering a comparison with the historical record in 1997, in the run-up to Tony Blair's "landslide" election win, when 75 Tory MPs decided not to run for their seats. The list included top figures such as the Northern Ireland Secretary (Chris Heaton-Harris), Nadim Zahawi, ex-Tory Chairman and Chancellor, Dominic Raab, ex-deputy prime minister and justice secretary, and Theresa May, ex-PM.

2.2. Loyalists

Following his election in 2024, Donald Trump appointed a Cabinet and senior White House staff composed largely of loyalists who had stood by him through legal battles and the primaries. Figures such as Stephen Miller, Kash Patel, Pamela Bondi and Richard Grenell, all known for their unwavering support, were rewarded with key positions. Loyalty to him, rather than experience or technocratic expertise, was the dominant criterion in assembling his second administration.[10]

On the other side of the aisle, the core team of President Biden was with him for decades, accompanying him in his political journey to the White House. Ron Klain, his first Chief of Staff at the White House, advised Biden during his 1988 and 2008 presidential campaigns; Mike Donilon, his senior advisor and (according to Klain) "chief strategist" to Biden as President and Vice President, was an advisor to President Biden since 1981.

Emmanuel Macron's core team was formed by four aides: his chief of staff when he was Minister of Economics, secretary general of Elysee since 2017 (Alexi Kohler) and three fiercely loyal young (all born in the 1980s) aides including Clement Beaune (on Macron's staff since 2014-2016, later presidential campaign, special advisor, G20 sherpa, Europe Minister, Transport Minister); Stephane Sejourné (on Macron's staff 2014-2016, then in his campaign, as political advisor, Member of the European Parliament and head of parliamentary group, Minister of Foreign Affairs and European Commissioner); and Gabriel Attal (ex-Spokesman, ex-Prime Minister, also a loyalist since 2016).

Italian mogul Silvio Berlusconi drafted business associates and friends for his political adventure and then rewarded them with powerful jobs. For instance, Berlusconi's personal

[9] See Huffington Post, May 20, 2024: Every Tory MP Quitting at the Next Election

[10] See e.g. https://time.com/7175034/donald-trump-administration-new-members/

lawyer, Cesare Previti, co-founded Forza Italia and was later appointed Minister of Defense in 1994. Another co-founder, Marcello Dell'Utri, held various political positions and was a top executive in Berlusconi's enterprises.

Indian Prime Minister Narendra Modi's cabinet has several loyalists who have been with him since his days as Chief Minister of Gujarat. Amit Shah, the Home Minister, is the most prominent example. "The key architect in remaking India", on the side of Modi for 40 years, Shah's unwavering support has been crucial in consolidating Modi's power within the Bharatiya Janata Party (BJP) and across India.[11]

3. Tournaments between political teams

To model an electoral contest, we consider a tournament between two teams, each consisting of one leader (the principal) and one follower (the agent). In Section 4.3, we extend the analysis to multiple followers.

Elections are winner-take-all contests: the leaders only care about their chance of winning. We discuss the incentives of the followers below.

3.1. Model set up

Skills and effort. The output of each team depends on skill (q), effort (e) and luck, to be specified below.

$$Y = y(e, q) + \textit{luck}$$

Agents may be high skill, $q = H$ or low skill, $q = L < H$. Agents can choose to perform effort or not, $e \in \{0, 1\}$, where:

$$y(1, H) = H > y(1, L) = L.$$

The agent has the option of quitting at an interim stage, in which case she can access an outside option that depends on her skill and the firm obtains a payoff:

$$y(0, H) = y(0, L) = Z < L.$$

An agent who quits cannot be replaced, either because quitting is quiet (a form of perfunctory performance, as in Hart and Moore (2008)) or because the tournament is already too

[11] See a great Long Read on him in The Guardian, May 16, 2024.

advanced. Hence the assumption that output in this case is $Z < L$.[12] Also notice that the agent cannot commit upon joining the team not to quit at the interim stage.

We make the stark assumption that the outside option of a low-skill agent L is 0. Therefore, low-skill agents are also "loyal" agents who do not quit the team when there is a set-back. In contrast, high-skill agents are also more productive in other environments – they are "mercenaries" who can always ensure a minimum payoff $\omega > 0$ by quitting the team. Section 2.3. discusses this key assumption, and others, after we prove our main proposition below.

Tournament and contracts. The tournament starts with the leader hiring a follower, who can reject or accept the offer to work with the leader. We assume there are no monetary payments: the reward for the follower is the job and perks that she can obtain when her team wins. Followers also have limited liability: they cannot be asked to post a bond (or pay to be hired). If the team wins the tournament, the agent receives a prize W, if she loses she gets 0. The prize W is an "in kind" prize, consistent with the political application: the "spoils system."[13]

Note that, the main contracting constraint is that the prize W is exogenously given (not that rewards are non-monetary). As long as only the result of the tournament–winning or not– is contractible, the optimal contract would specify a bonus B if and only the tournament is won. In Section 4.2, we analyze such optimally-designed bonuses.

We assume throughout that, ex-ante, the prize W is sufficiently attractive so that a high-skill agent participates in a symmetric contest (where which she wins with probability 1/2).

Assumption 1. (Ex ante participation constraint) *$W \geq 2\omega$:*

Assumption 1 implies that the ex ante participation constraint of a high-skill agent is always satisfied. Hence, if effort were to be contractible, an H agent would accept a binding contract (thereby giving up her outside option ω), and the leader would optimally hire an

[12] This assumption is in the spirit of the fundamental transformation of Williamson (1988). As Hart and Moore (2008) argue, the two parties may have relation-specific investments, or it may be hard to find alternative partners on short notice. For instance, in the case of an electoral contest, the election is too close to successfully rejig the campaign team.

[13] The term "spoils system" derives from the phrase "to the victor belong the spoils" with which senator William L. Marcy referred to Andrew Jackson´s practice, upon winning the Presidential election in 1828, of firing one in ten government employees and replacing them with his followers (Howe (2007)). Although this practice has been moderated in the US with civil service reform, political appointees in the US are still appointed to all top-level jobs in government and to ambassador positions in the foreign service .

H agent: the cost to the leader is the same, the H agent is willing to commit to $e = 1$, and $y(H, 1) > y(L, 1)$. Instead, we have assumed agents cannot commit not to quit at the interim stage: e is non-contractible.

Timing, information and luck. After accepting to be part of the team, but before effort is chosen, followers receive an interim signal. For instance, in the context of political tournaments, this could be primaries, public opinion polls, economic news (such as an unemployment report), a court decision, etc. This signal is informative about the relative position of the two teams. We let S_i be the signal for each team i. Since only relative positions matter, we simplify notation by only keeping track of the difference between the signals of the two teams, $S = S_i - S_j$, with $S \in \{-\delta, \delta\}$, with equal probability: news can simply be good or bad.

After observing the interim signal, each follower simultaneously decides whether or not to exert effort or quit. Given Assumption 1, a high-skill agent H never quits after good news. A key question in our analysis will be whether an H agent quits after learning bad interim news. Note that a low-skill agents L never quit, regardless of interim news, as their outside option equals 0.

Finally, the tournament itself takes place, with the realization of ex post luck ε_i, a random variable from a symmetric distribution with mean 0 and support on a finite interval in the real line, $\mathcal{I}$.

Assumption 2. (Quitting leads to failure) *If an agent quits at the interim stage after receiving bad news, then her team loses the tournament:*

$$Z + \textit{Bad interim news} + \textit{Ex post luck} < L$$

That is, we posit that ex post luck,[14] even in the best case scenario, is never enough to overcome the impact of quitting. While this assumption is not needed for our results to hold qualitatively, it substantially simplifies the analysis.

Since only relative ex-post luck matters, and slightly abusing notation, we let $\varepsilon = \varepsilon_j - \varepsilon_i$, a random variable distributed according to a single-peaked cumulative density function G.

[14] Formally, bad interim luck is $-\delta$ and ex-post luck is at best $\sup_{\varepsilon_i, \varepsilon_j \in \mathcal{I}}(\varepsilon_i - \varepsilon_j)$.

3.2. The value of loyalty

Since a leader loses the tournament if the agent quits at the interim stage, the value of hiring a low-skill agent depends on whether a high-skill agent will stick around in the face of adverse interim news. If a high-skill agent always exerts effort, she is clearly preferred over a low-skill agent!

Consider therefore the incentives of a high-skill agent. An H agent exerts effort at the interim stage and foregoes her outside option if and only if:

$$\mathbb{P}\left[\underbrace{y(1,H) - y(e_j,q_j)}_{Production} + \underbrace{S}_{Interim\ signal} > \underbrace{\varepsilon}_{Luck}\right] \cdot W \geq \omega \tag{1}$$

or still

$$G\left(H - y(e_j,q_j) + S\right) \cdot W \geq \omega,$$

where $G(.)$ is the cumulative distribution of $\varepsilon = \varepsilon_j - \varepsilon_i$, W is the value of winning and ω is an H agent's outside option.

Hence, when the interim news is good, $S = \delta$, an H agent who exerts effort wins with a probability larger than or equal to $G\left(H - \max\{H, L, Z\} + \delta\right) > 1/2$. Since $W > 2\omega$ (Assumption 1: ex ante participation constraint), the interim incentive constraint (1) is then satisfied as well: an H agent always sticks around with good news.

In contrast, when the interim news is bad, $S = -\delta$, an H agent sticks around ($e_i = 1$) if and only if

$$G\left(H - y(e_j,q_j) - \delta\right) \cdot W \geq \omega \tag{2}$$

Consider first the case where H faces an L agent on the opposing team, so that $y(e_j,q_j) = L$. An H agent then works after the realization of bad interim news if and only if:

$$(H - L) - \delta \geq G^{-1}\left(\frac{\omega}{W}\right). \tag{3}$$

Hence, following "bad" interim news, an H agent facing an L agent stays (exerts effort) if and only if $-\delta \geq S^*$, where

$$\underbrace{S^*}_{Threshold\ interim\ signal} = \underbrace{G^{-1}\left(\frac{\omega}{W}\right)}_{H\text{'s relative opportunity cost}} - \underbrace{(H - L)}_{Skill\ differential}$$

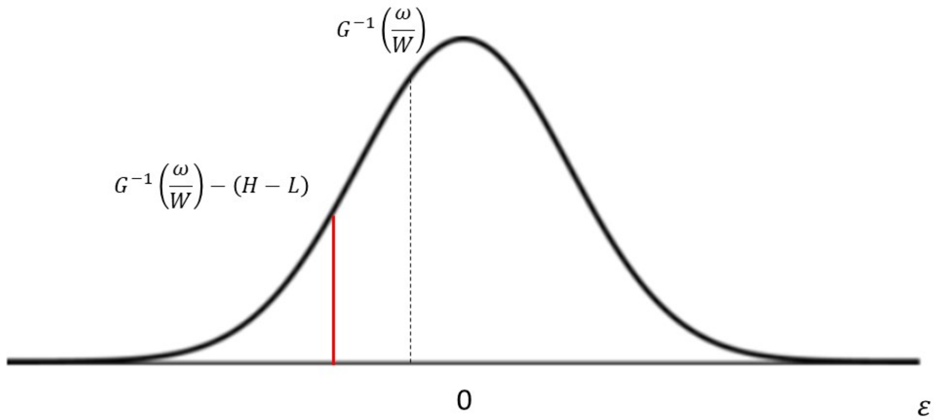

Figure 1 – Theshold for H to stay with bad news in an asymmetric contest

If the above constraint is not satisfied, that is, $-\delta < S^*$, high-skill agents are basically buying a real option when they join a political campaign: they will stay around until the interim signal is realized (say, a primary election), see if their prospects are good, and if not, quit. They behave like "mercenaries", always on the winning team.

For $-\delta < S^*$, the leader then optimally hires an L agent (a "loyalist"). If his opponent hires an H agent (a "mercenary"), his team will win every time the rival H agent receives bad news (1/2 of the time) and at least some of the times the rival H agent receives good news (by having good luck!). So, he will win with a probability larger than 1/2. Similarly, if his opponent hires an L agent, hiring an H agent would result in a winning probability lower than 1/2. It follows that for $-\delta < S^*$, there exists a unique equilibrium in which both leaders hire low-skilled agents (loyalists).

We are now ready to state our main proposition:

Proposition 1. *There is a unique equilibrium:*

1. *If $-\delta < S^*$, both leaders choose a low-skill agent L.*
2. *If $-\delta > S^*$, both leaders choose a high-skill agent H.*

Interestingly, whenever $-\delta \in \{S^*, S^{**}\}$, with

$$S^{**} = G^{-1}\big(\frac{\omega}{W}\big) > S^*, \tag{4}$$

an H agent who receives bad interim news sticks around when facing an L agent, but quits when facing another H agent (as this reduces her probability of winning). Despite this, both leaders hire an H agent in equilibrium.

Intuitively, strategic considerations matter for the choice of talent: When $-\delta \in \{S^*, S^{**}\}$, a talented follower H quits with bad interim news, but also induces the rival team to give up when they face setbacks. In contrast, a loyal but low-skill follower would not have had this strategic effect. Because of this 'discouragement effect' on the rival team, high-skill followers are then optimally chosen even though they are expected to quit with bad news. Finally, note that for $-\delta > S^{**}$, an H agent always sticks around, regardless of her opponent, and is thus (trivially) preferred over an L agent.

From Proposition 1, the key for the leader's hiring decision is the threshold $S^* = G^{-1}\big(\frac{\omega}{W}\big) - \big(H - L\big)$. Hiring "for merit" is preferred when this threshold is sufficiently low relatively to $-\delta$. This depends, first, on skill: loyalists are preferred when the relative opportunity cost of mercenaries ω/W is high, or when skill is less relevant so that the skill difference between mercenaries and loyalists $H-L$ is small. Second, interim information plays a key role. When there is a good interim signal, so that the informativeness of the interim signal δ is relatively large, loyalists are preferred.

Figures 2 and 3 and illustrate the threshold S^*. In Figure 2, the signal S is highly informative: $-\delta < S^*$. Even taking into account the skill advantage $H - L$ that it will obtain by running against a L opponent team, a leader who employs an H agent, does not have a high enough winning chance to ensure the H agents stays around. In contrast, in Figure 3, the signal S is rather uninformative, $-\delta > S^*$. An H agent then sticks around when facing an L agent.

Finally, loyalists will be less likely preferred if ex post luck plays a larger role. From Figure 2, a mean-preserving spread of the distribution $G(\varepsilon)$ reduces $G^{-1}\big(\frac{\omega}{W}\big)$ and, hence, the threshold S^*. The following proposition summarizes these results.

Proposition 2 (Comparative Statics)**.** *Loyalists are more likely to be preferred:*

1. *When ω/W is higher (relative opportunity cost of talent is higher) or $H-L$ is smaller (skill differential is smaller).*

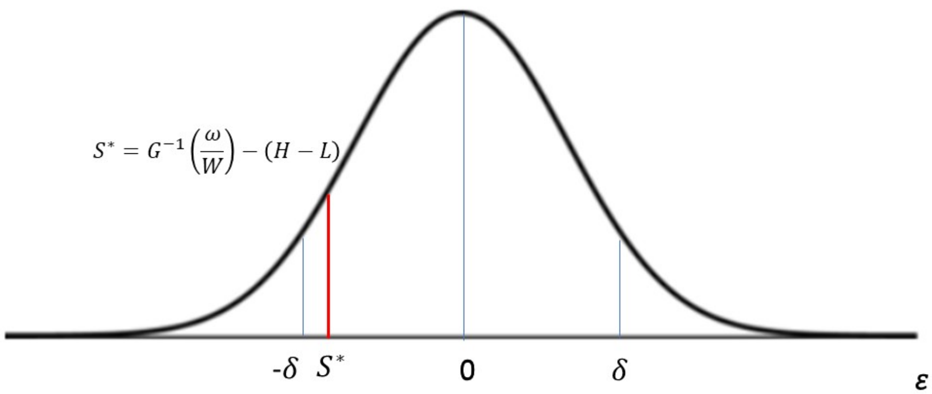

Figure 2 – Highly informative signal

2. *The interim information is more relevant: δ is larger.*
3. *Ex post luck is less relevant: if distribution $G_B(\varepsilon)$ is a mean preserving spread of distribution $G_A(\varepsilon)$ then hiring a loyalist is more likely under G_A than under G_B.*

3.3. Remarks about modeling choices

The objective of our model is to study the leader's hiring decisions in a context where more skilled agents have outside options that make them less likely to persevere through bad news. We review here the key assumptions that we have made.

Our model investigates contexts where success is binary. But tournaments do not need to be winner-take-all for our findings to hold true. All that is needed is a significant disparity between the rewards of winning and the penalties of losing. The assumption that such a large gap exists holds true not just in politics but also in various areas like research and development (R&D) races, innovation competitions, and startup contests. Corporate promotions often function as winner-takes-all competitions as well, with losers typically exiting the organization.[15]

[15] Two famous instances are the race for Jack Welch's succession in GE and the more recent race for

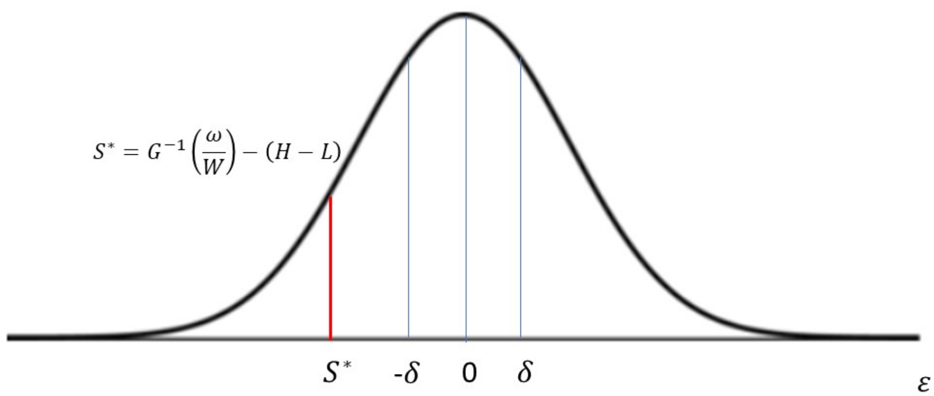

Figure 3 – Uninformative signal

A second crucial aspect of our model involves the significance of interim information regarding the likelihood of success, which enables followers to reassess their decision to participate. In reality, news and updates typically emerge continuously, except perhaps in the context of primaries. However, by consolidating this information into a single moment, our analysis becomes sharper and easier. A continuous version of the model would also include a threshold below which agents would choose to exit.

Third, we assume no additional monetary rewards apart from those associated with success. Although agents in reality receive payments such as salaries, what matters in politics is the substantial discrepancy between the non-monetary rewards tied to attaining power and the consequences of losing. Winners benefit from the "spoils system," wherein the leader distributes available positions among their followers. The monetary rewards are, by comparison, puny.

Goldman Sachs succession. Welch announced on November 3, 1999 that he would retire on April 2001, announcing that the CEO would be chosen out of three competing candidates (Jeff Immelt, Jim McNerney and Robert Nardelli) (see "GE'S Jack sets the date to hit the road; top candidates scramble to inherit throne," NYPost November 3, 1999); and the more recent 2018 succession at Goldman Sachs betweeen co-Presidents Harvey Schwartz and David Solomon (see ' "Goldman Succession Battle: Tame, Placid, Bald" by Matt Levine, Bloomberg, March 14, 2018). In both cases, the losers quit their jobs after being passed over for the succession.

In other 'winner-take-all'-like settings, such as start-ups, monetary rewards may be important. As we show in Section 4.2 optimal contracts then still specify a prize W if and only if the tournament is won, but this prize is now endogenously designed and dependent on the skill level. As long as followers have limited liability, our results carry through qualitatively. Indeed, for a high-skilled agent to remain loyal, the expected bonus must compensate for her outside option under both good and bad news. Therefore, in order to ensure loyalty, an H-type needs to be paid rents, whereas an L-agent does not. This often leads to the inefficient hiring of L-types (that is, if effort were to be contractible, an H-type would have been hired). We refer to Section 4.2 for a more detailed discussion.

Lastly, we posit that politicians require the assistance of other agents to achieve success. In the main analysis, we simplify this by assuming each leader needs one follower. However, in the next section, we extend the analysis to encompass the more realistic scenario of multiple followers who must collaborate. Both cases give rise to an agency problem, given the risk of inefficient exit at the interim stage. This results from the correlation between agent skill and their outside options. If agents' skills are general, highly skilled individuals are also more productive outside the team. Another way to interpret this assumption is that the politician seeking loyalty relies on friends and family who are more loyal, but because they are extracted from a narrower pool, are on average less skilled.[16]

4. Extensions

Having established the value of loyalty in our basic model, we now extend our analysis to study more or less competitive elections, monetary incentives, as well as multi-agent teams.

4.1. More or less competitive elections.

Elections can be more or less competitive for at least two reasons. First, there may be a clear favorite to win the election, such as an incumbent politician. Second, multiple candidates ($n > 2$) may compete against each other, as is often the case in primaries or municipal elections. In both cases, we establish a sense in which more competition increases the value of loyalty.

[16] To the extent that the skill is more specific to the individual politician followed, the problem we study would be attenuated or (if the skill is completely specific) disappear.

4.1.1. Asymmetries: Incumbency advantage

Elections are less competitive when there is a clear favorite to win the election. If one team is ahead, and the other is behind (for instance, one leader is the political incumbent), will the leader of the disadvantaged team choose to hire high-skill followers in order to break in? Or will he prefer to play it safe? How will the incumbent react?

To answer this question, we consider a simple variant of our model with asymmetric competition. We restrict our attention to uniform distributions of ex-post luck: $G(\varepsilon)$ is uniform on $[-\overline{\varepsilon}, \overline{\varepsilon}]$, so that $\overline{\varepsilon}$ is a measure of the importance of ex-post luck. We assume that one of the teams, the *incumbent team* I, has a larger chance of winning the tournament. We express this advantage in the form of a skill "handicap" K in favor of the incumbent. Thus,

$$y_I = y(e_I, q_I) + K,$$

whereas $y_E = y(e_E, q_E)$ for the *entrant* team E.

We assume that K is not too large, so that with good news, an H follower of the entrant always stays around: $K \leq K^{max}$ where

$$G(\delta - K^{max}) \cdot W = \omega.$$

Note that since $W/2 > \omega$, we have $K^{max} > \delta$. Indeed, given that G is uniform, $K^{max} = \delta + \overline{\varepsilon}\left(1 - \frac{2\omega}{W}\right)$.

Consider now first the incentives of the *incumbent* to recruit a high-skill agent. Intuitively, as the asymmetry increases, the incumbent team is clearly ahead. Thus, for K sufficiently large, an H agent feels sufficiently safe so that they stay until the end of the tournament, regardless of whether the interim news is good or bad. There is then no downside for the Incumbent to hiring an H agent. In particular, whenever $K \geq \delta$, the incumbent team has at least a chance of

$$G(K - \delta) \geq 1/2.$$

of winning the tournament, even when facing bad news and also the entrant hires an H agent. Since $W/2 > \omega$, an H agent then never quits the incumbent team.

Next, consider the incentives of the *entrant*. For the team that is behind, the reason to recruit a high-skill agent is different. As the asymmetry increases, the value of having loyal workers, those who work with bad news, is reduced as the entrant rarely wins in the latter case. It may then be optimal for the entrant to gamble it all on the chance of good news. This is trivially the case when the entrant team always loses with bad news (and a low-skill agent). Hiring a high-skill agent, again, then has no downside.

Formally, if the incumbent hires an H agent, hiring a high-skill agent is also optimal for the entrant whenever

$$G(\delta - K) - G\left(\delta - K - (H - L)\right) \geq G\left(-\delta - K - (H - L)\right), \tag{5}$$

where the LHS is the higher chance of winning when interim news is good, and the RHS is the opportunity cost of never winning when interim news is bad. Constraint (5) is always satisfied when $(H-L)+\delta+K \geq \overline{\varepsilon}$ and an entrant with a low-skill agent never wins with bad news. More generally, 'betting on good interim news' is optimal for the entrant whenever

$$K \geq \overline{\varepsilon} - \delta - 2(H - L), \tag{6}$$

Thus, the entrant will hire a high-skilled agent when asymmetries (K) are large and/or interim luck (δ) and skill differences ($H - L$) are important relative to ex-post luck ($\overline{\varepsilon}$). The following proposition holds:

Proposition 3. *Suppose we are in the (interesting) case $-\delta < S^*$, where both leaders choose L agents when they are at a level playing field ($K = 0$), and assume $W/3 \geq \omega$. Then there exists a minimum handicap K^A such that for $K > K^A$, both the incumbent and the entrant chose H agents.*

In summary, Proposition 3 show that increasing the asymmetry between both teams leads them *both* to prefer to hire meritocratic agents (where they would have hired loyal low-skilled workers before). Note that this result is in contrast with what would be expected in a model where loyal supporters are those that do not backstab the leader, prevalent in the rest of the literature (Galasso and Nannicini, 2011; Zakharov, 2016). In those papers, more equal (external) competition would lead the leader to take higher risks (of backstabbing) by appointing more talented followers. In contrast, when loyalty is about staying in the face of adversity, as Proposition 3 shows, it is the lack of symmetry what makes leader comfortable appointing talented supporters.

The technical condition $W/3 \geq \omega$ is a sufficient (but not necessary) condition to ensure ensure that $K^A < K^{max}$. If the outside option ω is larger than $W/3$, then the entrant's H agent may quit with both good and bad interim news for $K = K^A$.

4.1.2. Increasing the number of players

So far, we have considered two competing teams (consisting of a leader and one/multiple followers). How do our results hold up when multiple ($n > 2$) teams compete and how does an increase in political competition (more teams) affect the incentives to recruit mediocre vs high-skilled followers?

A key assumption we need to make regards the nature of "interim information". We consider two ways of generalizing our baseline model:

(1) One team receives good interim information, $S = \delta$, all other teams receive bad interim information, $S = -\delta$.

(2) Half of all teams receive good interim information, $S = \delta$, the other half receives bad interim information, $S = -\delta$.

Only one team receives good interim info. Assume there a n competiting teams and let there be exactly one team that receives good interim info – e.g. one team wins a primary or is the winner of a debate.

We first generalize the following result, which also held for $n = 2$:

Lemma 1. *If an H agent quits following bad interim news, assuming all other leaders recruit L agents, then the leader optimally recruits an L agent as well. The unique pure-strategy equilibrium is then one in which all leaders recruit L agents. In contrast, if an H agent does not quit in this case, no equilibrium exists with only L agents.*

The intuition is similar to that for $n = 2$. Assume all other leaders recruit an L agent. When hiring an L agent, the leader wins in $1/n$ of all cases. When hiring an H agent, in contrast, the leader loses whenever there is bad news, which occurs in $(n-1)/n$ cases. In the other $1/n$ cases, he does not always win. Hence, with an H agent, the leader wins in less than $1/n$ cases.

A direct consequence is that an equilibrium with only L agents exists if and only if an H agent facing $(n-1)$ L agents quits with bad news. Indeed, if an H agent does not quit, she is clearly preferred over an L agent.

We are now ready for our main result.

Proposition 4. *Consider two settings with respectively n_1 and $n_2 > n_1$ competitors and let $W/n_2 > \omega$ (ex ante constraint H agents is satisfied). A (unique) pure-strategy equilibrium* *with only L-agents exists for a larger parameter range when there is more competition ($n = n_2$).*

Intuitively, more competition reduces the chances of winning the tournament, making H agents more likely to quit when facing bad news. As a result, more competition makes it weakly more desirable to recruit low-skilled loyalists rather than high-skilled mercenaries.

Half of all teams receive good interim info. Consider next the case where half of all teams receive good information. In particular, assume that there are $n = 2m$ teams, so that m teams receive good news and m teams receive bad interim news.

As long as $H - L$ is not too large, we can establish the equivalent result of Lemma 1:

Lemma 2. *Assume $H - L$ is not too large. If an H agent quits following bad interim news, assuming all other leaders recruit L agents, then the leader optimally recruits an L agent as well. The unique pure-strategy equilibrium is then one in which all leaders recruit L agents. In contrast, if an H agent does not quit in this case, no equilibrium exists with only L agents.*

Note that when $H - L$ is sufficiently large, it may be optimal to recruit an H agent who will quit halfway whenever there is bad interim news. The much larger chance of an H agent winning when the interim news is good (which occurs in half of all cases) then more than compensates for the certain loss when there is bad interim news.

As long as $H - L$ is not too large, however, the result from our baseline model with two teams (and the one where only one out of n teams receives good news) carries through: recruiting a high-skilled agent who gives up halfway half of the time is sub-optimal. In the latter case, we obtain again our result that more competition results in (weakly) more mediocrity:

Proposition 5. *Assume $H - L$ is not too large. Consider two settings with respectively n_1 and $n_2 > n_1$ competitors and let $W/n_2 > \omega$. A (unique) pure-strategy equilibrium with only L-agents exists for a larger parameter range when there is more competition ($n = n_2$).*

4.2. Monetary Incentives

While political labor markets are characterized by winner-take-all contests where non-monetary rewards dominate, similar dynamics can emerge in private markets. Start-ups, for instance, often rely on equity and stock options rather than high salaries to attract talent. As in our model, talent may abandon ship when the chance of success decreases. This section extends our analysis to settings where monetary incentives can be used to retain talent.

Consider again a tournament between two teams, each consisting of one leader (the principal) and one follower (the agent). All assumptions are as in the main model, except that:

1. The winning team earns a price P, the losing team 0.
2. Leaders can offer contracts to followers specifying a fixed wage w and a winning bonus W in case of a win.

As in the main model, followers have limited liability and cannot post a bond (or pay to be hired). Wlog, it will be optimal to set the fixed wage w equal to 0 and only pay the agent in case of a win. The leader is residual claimant: her pay-off is $P - W$ in case of win and 0 otherwise. Since the interim news is non-contractible, the bonus W cannot depend on it.

This setup endogenizes the prize W followers receive upon winning. This matters for two reasons. First, a leader can save on bonus payments by hiring a low-skilled agent. As a low-skilled agent's outside option equals 0, it will be optimal to set $W = 0$ when hiring an L-type. Second, the size of the bonus W determines high-skill agent loyalty. A leader can now decide to induce *full loyalty* from an H-agent, that is offer a bonus that is high enough to make her stay even when interim news is bad; or he can induce *partial loyalty* from the agent, by offering a bonus that only makes her stay after good interim news. Note that hiring an H-agent who is never loyal is strictly dominated by hiring an L-agent.

As a benchmark, we first characterize when it is optimal to hire high-skilled agents in the absence of moral hazard (when agents cannot quit). Denote by G^{H-L} the probability that a high-skilled team wins against a low-skilled team when neither agent quits:

$$G^{H-L} \equiv (1/2)G(H - L + \delta) + (1/2)G(H - L - \delta) \tag{7}$$

Lemma 3. *Assume that loyalty is contractible (no moral hazard/quitting possible, $e = 1$). There is a unique equilibrium in which both leaders hire a high-skilled agent if and only if*

$$(G^{H-L} - 1/2) \cdot P > \omega \tag{8}$$

Intuitively, hiring low-skilled agents saves on bonus payments and may therefore be optimal when P/ω is sufficiently low, even when loyalty is not an issue.

In what follows, we will assume that the prize for the winner P is sufficiently large so that, in the absence of moral hazard (agents cannot quit, $e = 1$), it is optimal for both leaders to hire a high-skill agent:

Assumption 3. (High types are efficient)

$$\frac{P}{\omega} > \frac{1}{G^{H-L} - 1/2}$$

When agents have the option to quit, a leader must offer a bonus to a high-skilled follower which is sufficiently large so that the latter either stays when interim news is good (partial loyalty) or stays regardless of the interim news (full loyalty). For example, an equilibrium in which both leaders induce full loyalty from an H-agent would require a bonus $W = \omega/G(-\delta)$. Note that in expectations, that is before any interim news is realized, and H-type would then earn more than her outside option ω.

We now state our main result: In equilibrium, low-skilled agent may be hired to ensure loyalty, (i) even though monetary incentives can be used to ensure full loyalty from high-skilled agents, and (ii) even though only high-skilled agents are hired in the absence of moral hazard/loyalty problems.

Proposition 6. *Whenever*

$$\frac{P}{\omega} < \frac{1}{G(-\delta + H - L)} \frac{G(\delta + H - L)}{G(-\delta + H - L)} \tag{9}$$

leaders only induce partial loyalty from a high-skilled agent. In equilibrium, both leaders then hire low-skilled agents. When

$$\frac{1}{G(-\delta + H - L)} \frac{G(\delta + H - L)}{G(-\delta + H - L)} < \frac{P}{\omega} < \frac{1}{G(-\delta)} \frac{G(\delta)}{G(-\delta)} \tag{10}$$

leaders induce partial loyalty from a high-skilled agent when the other team hires a high-skilled agent, but full loyalty when facing a low-skilled opponent. Any equilibrium then involves at least one leader sometimes hiring a low-skilled agent.[17]

Assumption 3 and Condition (10) will both be satisfied for intermediate value of P/ω whenever $G(\delta)/G(-\delta)$ is sufficiently large, that is when interim information is sufficiently

[17] Since G is symmetric around 0 and single-peaked, $\frac{1}{G(-\delta+H-L)} \frac{G(\delta+H-L)}{G(-\delta+H-L)} < \frac{1}{G(-\delta)} \frac{G(\delta)}{G(-\delta)}$.

informative.[18] Similarly, Assumption 3 and Condition (9) can also be simultaneously satisfied.[19] When a follower has the option to quit, low-skilled agents are then hired, even though in the absence quitting teams consist of high-skilled agents only.

Intuitively, inducing full loyalty requires paying a bonus which exceeds, in expectation, the agent's outside option. To avoid paying high-skilled agents rents, a principal may therefore prefer to only induce loyalty when it is cheap, that is when interim news is good. But if high-skilled agents only stay with good news, it is strictly optimal to hire a low-skilled agent instead. Low-skill agents are both cheaper (they do not require a bonus payment in case of a win), and more reliable, since they never quit.

When the price of winning P is high enough relative to the outside option of the high-skilled agent ω, that is when

$$\frac{P}{\omega} > \frac{G(\delta)}{G(-\delta)G(-\delta)},$$

a leader optimally induces full loyalty from high-skilled agents.[20] However, inducing full loyalty requires paying rents to high-skilled agents. These rents may make it optimal to hire low-skilled agents, even when Assumption 3 is satisfied. This case is summarized in the next proposition.

Proposition 7. *Whenever*

$$\frac{P}{\omega} > \frac{G(\delta)}{G(-\delta)G(-\delta)} \tag{11}$$

a leader optimally induces full loyalty from a high-skilled agent. If and only if

$$\frac{P}{\omega} < \frac{1}{(G^{H-L} - 1/2)} \frac{G^{H-L}}{G(H - L - \delta)}, \tag{12}$$

there is then nevertheless a unique equilibrium in which both leaders hire a low-skilled agent.

As shown in Appendix, there always exists an intermediate range of values for P/ω for which both Assumption 3 and Condition (12) are simultaneously satisfied. When a follower

[18] For example, assume $G^{H-L} = 2/3$ and $G(\delta) = 3/4$, then Assumption 3 is equivalent to $P/\omega > 6$ and the second inequality of Condition (9) is equivalent to $P/\omega < 12$.

[19] For example, let $g(.)$ be uniform on $[-1, 1]$, and $H - L = 0.1$ and $\delta = 0.7$. Then $G(-\delta + H - L) = 1/5$, $G(\delta + H - L) = 9/10$ and $G^{H-L} = 11/20$. Hence Assumption 3 is equivalent to $P/\omega > 20$ and Condition (9) to $P/\omega < 22.5$. Condition (10) is equivalent to $P/\omega < 340/9 = 37.78$.

[20] To be precise, this assumes the opponent hires a low-skilled agent or a fully loyal high-skilled agent. No (pure strategy) equilibrium exists, however, where leaders hire a partially loyal high-skilled agent.

has the option to quit, only low-skilled agents are then hired, even though in the absence quitting, teams consist uniquely of high-skilled agents.[21]

For large values of P/ω it will be optimal to hire high-skilled agents. In particular, when

$$\frac{P}{\omega} > \frac{1}{G^{H-L} - 1/2} \frac{0.5}{G(-\delta)}, \tag{13}$$

the unique equilibrium has both leaders hiring a high-skilled follower, and inducing them to be loyal at all times.[22] However, for intermediate values of P/ω, specifically when

$$\frac{1}{G^{H-L} - 1/2} \frac{G^{H-L}}{G(H+L-\delta)} < \frac{P}{\omega} < \frac{1}{G^{H-L} - 1/2} \frac{0.5}{G(-\delta)},$$

asymmetric equilibria exist in which one team hires a high-skilled agent (and induces her to be fully loyal) and the other team hires a low-skilled agent. This is because inducing full loyalty is more expensive when facing a (loyal) high-skilled agent.

4.3. Political Teams with Multiple Followers

We extend now the above framework to a political team with many members. In line with our previous analysis, we assume that all efforts are strongly complementary– all agents efforts are necessary for the political team to succeed, any one agent withholding effort sinks the entire team.

4.3.1. Homogeneous tasks: O-Ring

Following Kremer (1993), consider n complementary tasks where output is multiplicative in skills: $y_i = \prod_{k=1}^{n} q_k$. Without moral hazard, this implies positive assortative matching: high-skill agents should work together, since the cross derivative of output with respect to the skills of two different followers is positive. As Kremer argues, in O-ring sectors, production requires a homogeneously (highly) skilled labor force - introducing a low-skill agent wastes the talent of the rest of the team.

We add now non-contractible effort $e_k \in \{0, 1\}$. Thus agent k produces $e_k q_k$, and the

[21] For example, assume $H - L = \delta/2$, $G(\delta/2) = 5/8$, $G(\delta) = 2/3$, and $G(3\delta/2) = 3/4$, so that $G^{H-L} = 9/16$. Then Assumption 3 requires $P/\omega > 16$, Condition (11) requires $P/\omega > 6$ and Condition (12) requires $P/\omega < 128/3$. So any $P/\omega < 128/3$ will result in a low-skilled agent being hired by both teams whereas for $P/\omega > 16$, a high-skilled agent would have been hired if the latter could commit never to quit.

[22] As we show in Appendix, Conditions (13) and (12) cannot be simultaneously satisfied.

modified team production function yields output:[23]

$$Y = \prod_{k=1}^{n}(e_k q_k) + luck. \tag{14}$$

As before, agents can be high skilled or low skilled. The timing and contracting assumptions remain the same. Thus P_i, the probability that team i wins is given by:

$$\mathbb{P}\left[\prod_{i=1}^{n}(e_i q_i) - \prod_{j=1}^{n}(e_j q_j) + S > \varepsilon\right] \tag{15}$$

which is analogous to equation 1. The winning team takes all: each agent in the winning team receives their share W of the spoils.

If followers withhold their effort, they obtain their outside value ω. For simplicity, we assume that the support of ε is such that $|\varepsilon| < \delta + L^n$, so that a team that withholds their effort after receiving bad interim news, automatically loses (this is the equivalent to Assumption 2).

Finally, we assume leaders coordinate team efforts to avoid equilibria where agents quit only because they expect teammates to quit.[24] Note that if a leader could not coordinate team efforts, and he anticipated a perverse equilibrium, he would always hire low-skilled agents.

Proposition 8 generalizes Proposition 1 to this setting. Define first the threshold signal with multiple agents S^m:

$$\underbrace{S^m}_{\textit{Threshold interim signal}} = \underbrace{G^{-1}\left(\frac{\omega}{W}\right)}_{\textit{H's relative opportunity cost}} - \underbrace{\left(H^n - L^n\right)}_{\textit{Skill differential}}$$

Proposition 8. *In the unique equilibrium of the game:*

Teams are homogeneous: all team members are either high or low skill.

[23] Note that this is equivalent to setting $Z = 0$ in our main model.

[24] This is in contrast with Winter (2004), who also builds on Kremer (1993), but assumes that agents must be induced to exert effort in every equilibrium of the game. As he shows, asymmetric (monetary) incentives are then always optimal.

1. *If $-\delta < S^m$, the leaders choose "loyalty": both competing teams will be entirely low skilled.*
2. *If $-\delta > S^m$, the leaders choose "merit": both competing teams will be entirely high skilled.*

Discussion. Extending the analysis to teams with multiple followers generates some new results. First, teams are homogeneous: there is no gain in mixing loyalists and high-skill agents. The leader will choose one of the extreme configurations. Second, consider the conclusions of Kremer (1993) in the same model but without moral hazard. There, production in O-ring sectors requires homogeneously (highly) skilled labor force. Here, a low skilled but loyal labor force may be optimal to ensure the team is able to withstand bad news. This will be more likely when interim news is more informative, when skills are less important to win, and when the number of necessary tasks is smaller.

4.3.2. Heterogeneous tasks

In sequential production processes, failure in later tasks can be more costly since earlier tasks can often be repeated. Kremer (1993) shows that, absent moral hazard, higher quality workers should be employed in later stages where mistakes are more costly, which helps explain patterns in international trade, industry wages, and vertical integration. We show that with loyalty concerns, this result may reverse: talent may be optimally allocated to earlier, less critical tasks.

Consider a team with agents H and L performing two sequential tasks. Task 1 can be repeated costlessly n times, while task 2 can only be attempted once, making it a "bottleneck" task. The timing is:

1. Task 1 is undertaken. This task may be repeated costlessly n times until successful. Production takes place as long as workers succeed once. Skill allocated on task 1 is q_1.
2. After task 1 is completed, interim information as above, $S \in \{\delta, -\delta\}$ arrives.
3. Agents decide whether to quit or stay.
4. If task 1 was completed successfully, and the agent in charge of task 2 has stayed, he can perform task 2 but can only do so once. Production requires success on both tasks.

Given these assumptions, output of team i can be written:

$$Y = (1 - (1 - e_{1i} q_{1i})^n)\, e_{2i} q_{2i}. \tag{16}$$

Hence the probability that team i wins a contest against team j is given by:

$$\mathbb{P}\big[\,(1-(1-e_{1i}q_{1i})^n)\,e_{2i}q_{2i}-(1-(1-e_{1j}q_{1j})^n)\,e_{2j}q_{2j}+S>\varepsilon\big], \tag{17}$$

which is the analog to (4) in our baseline model. As above, low-skill agents participate regardless of expected earnings in both the first or second stage.

Analysis. We first show, following Kremer's intuition, that, absent incentive conflicts, being "bad" at the first task is indeed less consequential and hence the first best allocation is: assign low-skill agents L to the first task L and high-skill agents H to the second task.

Lemma 4. *Absent moral hazard ($e_{1i}=e_{2i}=1$), higher skill agent must be assigned to the "bottleneck" task (task 2).*

Now introduce moral hazard, as above, and consider the interim stage participation. A low-skill agent always participates, since her opportunity cost is 0. A high-skill agent assigned to the second task must decide on participation. We can define, exactly as before, a threshold S^s

$$S^s=G^{-1}\left(\frac{\omega}{W}\right)-((1-(1-L)^n)\,H-(1-(1-H)^n)\,L) \tag{18}$$

By Lemma 4, the term in brackets in (18) is positive so that the RHS of (18) is negative. Hence we can operate analogously as in the previous section:

Proposition 9. *In the unique equilibrium of the game:*

If $-\delta<S^s$, leaders choose to place loyal agents in the "bottleneck" task.

If $-\delta>S^s$, leaders choose to place (as in the first best) the high-skill agents in the bottleneck task.

Note that, given the equilibrium is symmetric, first-stage participation is ensured if

$$\mathbb{P}\big[\,(1-(1-L)^n)\,H+S-\varepsilon_i>(1-(1-L)^n)\,H+\varepsilon_j\big]W\geq\omega, \tag{19}$$

that is, as before, $W\geq 2\omega$.

The logic is as above, but simpler (since there are only two workers in each team and, hence, two cases to check) and we omit the proof.

When interim information matters, our results reverse Kremer (1993)'s efficient allocation: loyal but less skilled agents may be optimally assigned to critical bottleneck tasks, while high-skill talent is used in replaceable early tasks. This allocation becomes more likely when high-skill agents have valuable outside options (ω/W high), when skill differences are modest, and when interim signals are more informative.

5. Institutional Responses

We finally turn our attention to potential solutions to the challenge of low-skill political teams. We explore four possible ideas, each of which has its own trade-offs.

5.1. Electoral Reforms: length of campaign and electoral system

Electoral campaign design influences talent retention. Lengthy campaign create more opportunities for interim information–primaries, polls, scandals, economic reports–, which our analysis shows can trigger departures of talented followers. A society that wants to increase talent in politics may consider electoral reforms such as shorter campaigns or more concentrated primaries.

However, this is not without cost. Putting candidates through the grueling marathon that are, for instance, American primaries may reveal useful information about the skills of leader and followers. Such information would be lost in a shorter and, ostensibly, more "talent-friendly" campaign. The optimal length of the campaign, then, would trade off the information revelation advantages of longer campaigns, versus the reduction in talent they may cause.

Electoral systems also affect the winner-take-all nature of political contests. Majoritarian (or, in the UK, first-past-the-post) systems create stark binary outcomes. In contrast, in a proportional system, coalitions may allow for intermediate outcomes, where parties that do not do well in the election can nevertheless participate in government. In the logic of our model, proportional systems may find it easier to attract and retain political talent.

5.2. Career Politicians

Another potential institutional response to the kind of tension we study is the development of career politicians, who paradoxically may play a role in mitigating opportunistic behavior in politics. Their limited outside career options, stemming from specialized political skill sets and networks, reduce their incentive to quit during setbacks. This reduces the risk of opportunistic behavior and softens the loyalty-merit trade-off we have studied.

Again, such a choice would not come for free. A system where "only career politicians need apply" is one where talent may be lost from the get go: the solution may simply advance the moment at which the merit versus talent trade-off takes place. Moreover, career politicians may become entrenched, less responsive to evolving public needs and more prone to cronyism.

5.3. Ideology as a commitment device

Ideology can generate loyalty within a team. Ideologically committed followers are less likely to quit during setbacks because their beliefs align with the ideological platform they support. They are also less tempted by outside offers or competing platforms. This reduced opportunism ensures that they remain loyal to their chosen platform. The cost is that a more ideological platform may also reduce the chance of winning.

A simple reinterpretation of the model allows us to study the trade off between ideology and moderation:

1. Agents may choose to exert effort (stay) or not (quit): $e \in \{0, 1\}$.
2. All agents have the same skill level, but there are two types: *partisan followers* (activists, ideologues,...) who never quit; and *opportunistic followers* who stay if the expected value of winning is higher than their opportunity cost ω.
3. Leaders choose between two platforms:
   - A centrist platform M that increases the probability of winning, since it appeals to broader swathes of the public, but only attracts "opportunistic" followers;
   - An ideological platform I, with a lower chance of winning but "partisan" followers.
4. Output depends on platform quality $Q_i \in \{M, I\}$, effort e_i of the production team i, and luck. As before, we have an interim signal (S) and a luck factor (ε_i). An agent i on platform i wins against agent j on platform j with probability:

$$\mathbb{P}_i = Pr\left[y(e_i, Q_i) - y(e_i, Q_j) + S > \varepsilon\right]$$

   where $y(1, M) = M > y(1, I) = I > 0$. As before, $y(0, Q_i) = Z << 0$.

Following our earlier analysis in Proposition 1, an ideological platform is preferred when:

$$-\delta \leq G^{-1}\big(\frac{\omega}{W}\big) - \big(M - I\big)$$

Whenever the latter condition holds, ideology is required to ensure loyalty.

The above framework can further be amended to have both high-skilled and low-skilled (partisan or opportunistic) followers, where only H followers have access to an outside option. Abusing notation, let $y(1, Q, H) = y(1, Q)$ and $y(1, Q, L) = L \cdot y(1, Q)$ with $L < 1$. Skill does not affect output when $e = 0$. A leader now has two options to ensure loyalty: choosing an ideological platform or hiring low-skilled agents. The following result follows

Proposition 10. *(i) An ideological platform only hires high-skilled followers. (ii) A moderate platform hires low-skilled followers if and only if:*

$$-\delta < G^{-1}\big(\frac{\omega}{W}\big) - (1 - L)M. \tag{20}$$

(iii) An ideological platform is preferred over a moderate one if and only if (20) holds and $I > L \cdot M$.

Note that when (20) holds, either low-skilled agents or an ideological platform are needed to ensure loyalty. Whenever $I > L \cdot M$, an ideological platform with high-skill agents maximizes the chances of winning. The reverse is true when $I < L \cdot M$.

5.4. Leader Loyalty

We next consider the possibility that a long-term relationship can be formed between the leader and the follower. Such a relationship may incentivize high-skill followers to stick around when facing bad interim information, in the expectation that in the event of a loss, the leader will "run" again and offer her another chance at the big price. The formal analysis is in the Online Appendix, but we sketch here fully the argument.

We consider an (infinitely) repeated game in which, in each period, there is a contest between two leaders. Just as the follower, the leader is motivated by the value of the prize, W, but may also have something better to do than wait around for another chance to win. In particular, after any loss, the leader has the opportunity to run again. However, with probability φ, he has an outside option $\omega_L > W/2$ and will 'quit'. A leader exits when either (1) his team wins, (2) his agent quits when bad news is revealed, or (3) he quits after a loss. A leader who exits is replaced by a new leader in the next period.

Consistently with the political application, we assume betrayal is hugely damaging: when a leader decides not to run again, agents who were loyal are left in the cold – they have lost the chance to access their outside opportunity ω; symmetrically, if agents abandon the leader half-way, the leader loses and cannot run again. This captures in a stylized way the idea that quitting before the leader collapses preserves outside options, while being betrayed is extremely costly.

Our first result (Online Appendix Proposition OA1) shows that if the leader's probability of running again is high enough and both parties are patient enough, there is a unique equilibrium in which the leader chooses a high-ability follower and that follower always remains loyal. This is true, even when short-run considerations would push the leader to appoint loyal but mediocre followers. Thus, the repeated setting allows the leader to commit to rehire a follower after losses, inducing the follower to stay and produce effort: loyalty emerges endogenously.

Yet commitment can also force the leader to keep unsuitable subordinates. Suppose ability or suitability declines in a Markov manner. The second result (Online Appendix Proposition OA2) shows that leader loyalty can be costly when the follower's type can change. If the leader promises always to stick with the same follower, then that follower is incentivized to stay. But if the follower's ability becomes low, the leader is stuck if the agreement is to rehire the same agent no matter what. If the leader ever deviates by firing the follower when her skill drops, high-skill agents anticipate that they will be dropped in the event of a bad state, and so they will not remain loyal in the first place. This would destroy the high-ability equilibrium and push the leader to choose a guaranteed loyal but less skilled team from the start. In other words, the agent's incentive to stay despite bad news comes from anticipating that any setback does not end the relationship; but then the leader must honor this unwritten agreement by refusing to drop the follower even after her skill decays or circumstances shift.

6. Conclusion

As Besley (2005) argues "no society can run effective public institutions while ignoring the quality of who is recruited to public office." And yet, as we argue here, the choices of "who is best for the job" are likely to be contaminated by the search for loyalty in the preceding political contest. Such contests are winner-take-all: the winner reaps large rewards while the loser gains nothing. Leaders are likely to surround themselves with loyal followers, at the expense of merit, especially when talented individuals have attractive opportunities outside of politics and interim information may substantially sway the odds of victory.

We extend our analysis to scenarios with varying degrees of election competitiveness. Where there is a clear favorite (e.g. due to incumbency advantage), both competing teams are likely to place merit ahead of loyalty. In contrast, heightened competition, such as when many similar teams compete, increases the value of loyalty due to the higher likelihood of followers quitting. These results stand in contrast with the previous literature on loyalty, which emphasize the "backstabbing" mechanism and where more external competition leads to a larger focus on talent. Finally, in contrast to Kremer (1993)'s analysis of O-ring teams, we show that when a team of followers work together with strong complementarities, task allocation may diverge from efficiency, with loyalists assigned to critical bottleneck tasks.

We study several potential responses to the challenges posed by loyalty-driven political organizations. These include modifying campaign length and informativeness, increasing the role of career politicians, relying on the influence of ideology, and developing leader loyalty in long-term relationships.

While this paper primarily focuses on politics, where non-monetary goals are paramount, the ability to use monetary incentives to motivate agents does not negate the value of loyalty, as we show. This suggests that our analysis also applies to start-up contests, research and development races, and innovation competitions. Corporate promotions often function as winner-takes-all competitions as well, with losers typically exiting the organization. More generally, there is anecdotal evidence that loyalty plays a key role in the upper echelons of large firms, although cash payments can compensate for changes in promotion probabilities. How both aspects are traded off in firms is left for future research.

Appendix

A. Proofs

A.1. Proofs for Subsection 3.2

Proof of Proposition 1. Only the case $-\delta > S^*$ remains to be shown. When $-\delta > S^{**}$, an H agent never quits regardless of the opponent. Hiring an H agent is then (trivially) optimal. In contrast, for $-\delta \in \{S^*, S^{**}\}$, following bad news, an H agent quits when facing an H agent, but not when the rival is an L agent. Hiring an H agent is then again always optimal: when the opponent is an H agent, hiring an L agent would result in the rival H agent never quitting and a probability of winning smaller than $1/2$.

A.2. Proofs for Subsection 4.1

Proof of Proposition 3. Let $K^A = max\{\delta, \overline{K}\}$ where $\overline{K} = \overline{\varepsilon} - \delta - 2(H-L)$. We have shown above that for $K > K^A$, it is optimal for both the incumbent and the entrant to hire a high-skilled agent. We conclude by providing conditions so that $K^A < K^{max}$ and, hence, $K > K^A$ does not violate $K < K^{max}$. We already know that $K^{max} > \delta$. Given that G is uniform, $K^{max} > \overline{K}$ whenever

$$\overline{\varepsilon}\left(\frac{2\omega}{W}\right) \leq 2\delta + 2(H-L), \tag{21}$$

We further must have that $-\delta < S^* = G^{-1}\left(\frac{\omega}{W}\right) - (H-L)$. Given that G is uniform, $S^* = -\overline{\varepsilon}\left(1 - \frac{2\omega}{W}\right) - (H-L)$. Hence, $-\delta < S^*$ is equivalent to

$$\delta > \overline{\varepsilon}\left(1 - \frac{2\omega}{W}\right) + (H-L). \tag{22}$$

It follows that a sufficient condition for constraint (21) to hold is that

$$\overline{\varepsilon}\left(3 \cdot \frac{2\omega}{W} - 2\right) \leq 4(H-L), \tag{23}$$

This will be satisfied whenever either $3\omega \leq W$ or $\overline{\varepsilon} \leq 4(H-L)$.

Proof of Lemma 1. We only proof the first part (the second part is direct). Assume all other leaders recruit an L agent. When hiring an L agent, the leader wins in $1/n$ of all cases. When hiring an H agent, in contrast, the leader loses whenever there is bad news, which occurs in $(n-1)/n$ cases. In the other $1/n$ cases, he does not always win. Hence, with an H agent, the leader wins in less than $1/n$ cases. A direct consequence is that a Nash equilibrium with only L agents exists if and only if an H agent facing $(n-1)$ L agents quits with bad news. Indeed, if an H agent does not quit, she is clearly preferred over an L agent. Finally, an all L equilibrium is the unique pure-strategy equilibrium. In any other pure-strategy equilibrium (where some or all of the other leaders recruit H agents), some H agents must quit following bad news (if no one quits, then each H agent is even more inclined to quit than with all L opponents). The leader(s) of those H agents then again win in less than $1/n$ cases, and are better off hiring an L agent.

Proof of Proposition 4. Given Lemma 1, we only need to show that an H agent is weakly more likely to quit following bad news when facing more teams (n is larger), assuming all other teams have recruited an L agent. This is trivially the case.

Proof of Lemma 2. Assume all other leaders recruit an L agent. When hiring an L agent, the leader wins in $1/(2m)$ of all cases. When hiring an H agent, in contrast, the leader loses for sure whenever he receives bad news, which occurs in $1/2$ of all cases. In the other $1/2$ cases, where his H agent receives good news, he faces $(m-1)$ L opponents who also received good news and m L agents who received bad interim news. If $H = L$ he then wins with a probability strictly smaller than $1/m$. By continuity, the same will be true as long as $H - L$ is not too large. It follows, then, that her total probability of winning is smaller than $(1/2) * (1/m)$ so that he is strictly better off selecting an L agent as well. The remainder of the proof is identical to that of Lemma 1.

Proof of Proposition 5. Analogous to the Proof of Proposition 4.

A.3. Proofs for Subsection 4.2

Proof of Lemma 3. When agents cannot quit, that is $e = 1$ can be enforced, their expected pay-out must equal their outside option, that is ω for an H-type and 0 for an L-type. Regardless of the type hired by the other team, hiring an H-type instead of an L-type increases the probability of winning by $G^{H-L} - 1/2$, where G^{H-L} is given by (7) . It follows that, in the absence of moral hazard ($e = 1$), both leaders optimally hire an H-type in equilibrium if and only if:

$$\left(G^{H-L} - 1/2\right) \cdot P > \omega,$$

When the above inequality is violated, both leaders hire an L-type in equilibrium.

Proof of Proposition 6. Take as a given that the leader has hired an H-type. When should the leader induce full loyalty from this agent (so that she stays after both good and bad interim news) as opposed to partial loyalty (where she stays only after good news)? Note that hiring an H-type and inducing no loyalty (the agent never stays) is strictly dominated by hiring an L-agent. Wlog, we will therefore assume that leaders hire an L-agent, a partially loyal H-agent or a fully loyal H-agent.

1) Consider first the case where the other leader has hired a fully loyal H-agent.

Let W^* be the wage required to induce partial loyalty (effort only when interim news is good), and W^{**} the wage required to induce full loyalty (effort in any state of nature). Then $W^* = \omega/G(\delta)$ and $W^{**} = \omega/G(-\delta)$. Inducing full loyalty is then preferred over inducing partial loyalty if and only if

$$(1/2)G(-\delta) \cdot (P - W^{**}) > (1/2)G(\delta) \cdot (W^{**} - W^*) \tag{24}$$

where the LHS is the expected net gain from an H-agent staying loyal when interim news is bad, and the RHS is the expected cost of paying a higher bonus when interim news is good (and the team wins).

Simplifying, we obtain that inducing full loyalty is preferred if and only if

$$\frac{G(-\delta)}{G(\delta)} > \frac{W^{**} - W^*}{P - W^{**}} = \frac{1 - W^*/W^{**}}{P/W^{**} - 1} = \frac{1 - \frac{G(-\delta)}{G(\delta)}}{P/W^{**} - 1}$$

or still, if and only if

$$P/W^{**} > G(\delta)/G(-\delta)$$

or, since $W^{**} = \omega/G(-\delta)$, if and only if

$$P/\omega > \frac{G(\delta)}{G(-\delta)G(-\delta)} \tag{25}$$

2) Second, consider the case where the other leader has hired a partially loyal H-agent

(who only stays when the interim news is good).

Inducing full loyalty then again requires paying a bonus W^{**} as above. Inducing partial loyalty, on the other hand only requires a bonus $W = \omega$, as the team always wins with good news. It follows that inducing full loyalty is preferred over partial loyalty if and only if

$$(1/2)G(-\delta) \cdot (P - W^{**}) > (1/2) \cdot (W^{**} - \omega) \tag{26}$$

where the LHS is the expected net gain from an H-agent staying loyal when interim news is bad, and the RHS is the expected cost of paying a higher bonus when interim news is good (and the team always wins).

Note that Condition (24) is strictly weaker than Condition (26). It follows that when Condition (25) is violated, then condition (26) will be violated as well: If it is not optimal to induce full loyalty from an H-agent when facing another fully loyal H-agent, then it is also not optimal to do so when facing a partially loyal H-agent.

3) Third, and finally, consider the case where the other leader has hired an L-type.

Then $W^{**} = \omega/G(H - L - \delta)$ and $W^{*} = \omega/G(H - L + \delta)$, and inducing full loyalty from an H-type is preferred over partial loyalty if and only if

$$(1/2)G(H - L - \delta) \cdot (P - W^{**}) > (1/2)G(H - L + \delta) \cdot (W^{**} - W^{*}) \tag{27}$$

or still, if and only if

$$P/\omega > \frac{G(H - L + \delta)}{G(H - L - \delta)G(H - L - \delta)} \tag{28}$$

Consider now the choice of the leaders which agent to hire, an H-agent or an L-agent. Assume first that Condition ((28) is violated, that is

$$P/\omega < \frac{G(H - L + \delta)}{G(H - L - \delta)G(H - L - \delta)}$$

so that it is optimal to induce only partial loyalty from an H-agent when facing an L-agent. Provided that $g(.)$ is symmetric around 0 and (weakly) single-peaked, Condition (28) is strictly weaker than Condition (25). Indeed, then

$$G(\delta) - G(-\delta) \geq G(\delta + H - L) - G(\delta + H - L),$$

and thus also

$$\frac{G(\delta)}{G(-\delta)} \geq \frac{G(\delta + H - L)}{G(-\delta + H - L)}$$

Since $G(H - L - \delta) > G(-\delta)$, it then follows that

$$\frac{G(\delta)}{G(-\delta)G(-\delta)} > \frac{G(H - L + \delta)}{G(H - L - \delta)G(H - L - \delta)}$$

It follows that if Condition (28) is violated, then Conditions (25) and (26) are violated as well. As result, it is then optimal for a leader to induce only partial loyalty from an H-agent, regardless of the choices of the other leader.

But this implies that when (28) is violated, each leader strictly prefers to hire an L-agent rather than an H-agent. First, if the other team has hired an H-agent, the latter will quit with bad news for her team. An L-agent therefore always wins against such an agent when news is bad for the other team, and sometimes when news is good. Hiring an L-agent then result in probability of winning higher than 1/2 and requires no bonus pay-outs. Second, if the other team has hired an L agent, then by the same logic, it must again be optimal to hire an L-agent. This guarantees a probability of winning of 1/2, whereas hiring an H-agent would result in winning less than 1/2 of the time. In addition, hiring an L-type saves on bonus payouts.

We conclude that if Condition (28) is violated, the only equilibrium is one in which both leaders hire an L-agent. This concludes the proof of the first part of the proposition.

Consider now the case where

$$\frac{G(H - L + \delta)}{G(H - L - \delta)G(H - L - \delta)} < P/\omega < \frac{G(\delta)}{G(-\delta)G(-\delta)}.$$

Then (28) is satisfied and it is optimal to induce full loyalty from an H-agent when facing an L-agent. At the same time both (25) and (26) are violated, so it is optimal to only induce partial loyalty from an H-agent when facing another H-agent.

In any equilibrium, at least one of the two leaders must then (at least sometimes) hire an L-agent. Indeed, if both leaders always hire H-agents in equilibrium, then

$$P/\omega < \frac{G(\delta)}{G(-\delta)G(-\delta)}$$

implies that both would only induce partial loyalty. But each leader can then do better by deviating and hire an L-agent instead (winning more than 1/2 of the times, and paying no bonus). So hiring only H-agents cannot be an equilibrium. This concludes the second part of the proposition.

Proof of Proposition 7. Assume

$$P/\omega > \frac{G(\delta)}{G(-\delta)G(-\delta)},$$

so that a leader optimally induces full loyalty from a high-skilled agent, provided that his competitor hires an L-agent or a fully loyal H-agent. Note first that no (pure strategy) equilibrium can exist where a partially loyal H-agent is hired. Indeed, given the condition P/ω above, hiring a partially loyal H-agent can only be optimal if the other leader also hires a partially loyal H-agent. But both leaders hiring a partially loyal H-agent cannot be an equilibrium, as each leader then strictly prefers to hire an L-agent in response. So the only (pure strategy) equilibria that can exist are those with L-agents and fully loyal H-agents.

An equilibrium in which each leader hires an L-agent exists if and only if

$$(G^{H-L} - 1/2) \cdot P < G^{H-L} \cdot \frac{\omega}{G(H - L - \delta)} \tag{29}$$

where the LHS is the expected increase in gross pay-offs from hiring a fully loyal H-agent when the rival team has an L-agent, and the RHS are the required bonus payments that induce full loyalty. Since $\frac{G^{H-L}}{G(H-L-\delta)} > 1$, the above condition is not in contradiction with Assumption 3.

An equilibrium in which each leader hires a fully loyal H-agent, in contrast, exists if and only if

$$(G^{H-L} - 1/2) \cdot P > (1/2) \cdot \frac{\omega}{G(-\delta)} \tag{30}$$

Note that since

$$\frac{G^{H-L}}{G(H - L - \delta)} = (0.5) \left(1 + \frac{G(H - L + \delta)}{G(H - L - \delta)}\right) < (0.5) \left(1 + \frac{G(\delta)}{G(-\delta)}\right) = \frac{0.5}{G(-\delta)},$$

conditions (29) and (30) cannot be satisfied at the same time. It follows that given conditions (29) and (30), the above identified equilibria are unique.

Finally, when

$$\frac{G^{H-L}}{G(H-L-\delta)} < (G^{H-L} - 1/2) \cdot \frac{P}{\omega} < \frac{0.5}{G(-\delta)},$$

there exist two asymmetric equilibria, as it is optimal to hire a fully loyal H-agent when facing an L-agent and, conversely, it is optimal to hire and L-agent when facing a fully loyal L-agent.

A.4. Proofs for Subsection 4.3

Proof of Proposition 8. The proof is as before, but now we must consider the possibility of teams with followers with heterogeneous skills. Consider first the case $-\delta < S^m$. The postulated equilibrium is that both teams select only L agents (both teams choose loyal agents). Suppose instead that one of the leaders decides to go for "merit" and hires an all-H team. The reasoning now is exactly like in Proposition 1. The H workers who observe signal S only work with good news; but they do not always win in that case. This means the probability of winning is smaller than 1/2. This is a lower probability than what could be attained with an "All-L" team. Now consider a new deviation- one where the leader replaces just one "loyal" worker with a merit-based hire.

The H worker works iff:

$$G\left(\left(L^{n-1}(H-L)\right) + S\right) W > \omega$$

That is if:

$$S > G^{-1}\left(\frac{\omega}{W}\right) - \left(L^{n-1}(H-L)\right)\right)$$

but, by assumption,

$$-\delta < S^m = G^{-1}\left(\frac{\omega}{W}\right) - \left(H^n - L^n\right) < G^{-1}\left(\frac{\omega}{W}\right) - \left(L^{n-1}(H-L)\right)$$

Intuitively, it is even less likely the good worker works with bad news, since the output of the team is smaller than in the previous–full deviation– case.

Consider now the equilibrium where both teams select only H agents: $-\delta > S^m$. Consider first a global deviation: one of the leaders decides to go for "loyalty" and hire L agents. This case is analogous to the one in Proposition 1, and the proof is the same. The H workers in the other team work iff:

$$G\left(H^n - L^n + S\right) W > \omega$$

That is if

$$S > G^{-1}\big(\frac{\omega}{W}\big) - \big(H^n - L^n\big)$$

Since, by assumption

$$-\delta > S^m = G^{-1}\big(\frac{\omega}{W}\big) - \big(H^n - L^n\big)$$

The inequality above always holds, and H agents work with good and bad news. Since both H and L workers always work, and $H^n > L^n$, deviating does not pay. Would a partial deviation now work? For the same reason, a partial deviation to L (hiring one L in an all-H team) is even less likely to work.

Note that for

$$G^{-1}\big(\frac{\omega}{W}\big) > -\delta > S^m$$

the H agents in a symmetric contest will quit when bad news arrives since $G^{-1}\big(\frac{\omega}{W}\big) > -\delta$. However, it is still optimal to hire H agents, as this guarantees a probability of winning of 1/2. In contrast, hiring L agents would induce the H agents in the other team to stay with bad news since $-\delta > \Delta^*$ (as shown above) – resulting in a probability of winning smaller than 1/2.

Proof of Lemma 4. By induction. For $n = 1$ the assignment is indifferent. For $n = 2$, $H\left(1-(1-L)^2\right) \geq L\left(1-(1-H)^2\right) \Leftrightarrow LH(H-L) > 0$. Call the difference between the presumed correct allocation and the presumed incorrect one d: $d(H,L,n) = H\left(1-(1-L)^n\right) - L\left(1-(1-H)^n\right)$. Suppose now this difference is positive for n. A sufficient condition for the claim to be true for n+1 is: $d(H,L,n+1) - d(H,L,n) > 0$. But indeed $d(H,L,n+1) - d(H,L,n) = HL\left((1-L)^n - (1-H)^n\right)$, which is indeed positive, as we wanted to show.

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A. ONLINE APPENDIX: Formal Analysis of Leader Loyalty (Section 5.4)

A.1. Preliminaries

We consider an (infinitely) repeated game in which, in each period, there is a contest between two leaders. At the end of the period, a leader exits (and is replaced by a new leader) when either (1) his team wins, (2) his agent quits when bad news is revealed, or (3) the leader gives up after a loss.

As in our baseline model, in each period, both leaders chose the skill of their follower optimally, and have the choice between an H-agent and an L-agent (the extension to multiple followers per leader is direct).

We assume throughout that we are in the (interesting) case where the unique static equilibrium is the one where both leaders hire a low-skill agent L. The question we explore is whether and how loyal leaders allow for this equilibrium to be improved.

Assumption 4. (Low skill agents in static equilibrium) $-\delta < S^*$

Just as the follower, the leader is motivated by the value of the prize, W, but may also have something better to do than wait around for another chance to win. In particular, after any loss, the leader has the opportunity to run again. However, with probability φ, he has an outside option $\omega_L > W/2$ and will 'quit'.

A.2. The value of a loyal leader

Let ρ be the discount factor, that is how much followers value the future. If a leader who runs again always rehires a loyal follower (but not a disloyal one), then the expected utility of an H follower who remains loyal and does not quit after bad news is:

$$U_F^{stay} = \frac{1}{2}\left[P(win|\delta)W + P(lose|-\delta)\varphi\rho U_F^{stay}\right] + \frac{1}{2}\left[P(win|-\delta)W + P(lose|\delta)\varphi\rho U_F^{stay}\right]$$

As in the static equilibrium, it will be sufficient to show that given an opponent team with an L agent, it is optimal to hire an H agent. When facing an L-agent, we have that

$$U_F^{stay} = \frac{W}{2} \frac{G(H-L-\delta) + G(H-L+\delta)}{\left(1 - \frac{\varphi\rho}{2}\left[1 - G(H-L-\delta) + 1 - G(H-L+\delta)\right]\right)} \tag{31}$$

Following bad interim news, an H agent facing an L agent then stays if and only if

$$G(H-L-\delta)W + (1 - G(H-L-\delta))\,\varphi\rho U_F^{stay} \geq \omega \tag{32}$$

Note that U_F^{stay} is increasing in $\varphi\rho$ and $U_F^{stay} = W$ if $\varphi\rho = 1$. Hence, (32) is always satisfied if $\varphi\rho = 1$ and the leader always runs again/there is no discounting. In contrast, since -$\delta < S^*$, (32) is violated if $\varphi\rho = 0$ and the leader never runs again. Since the LHS of (32) is increasing in $\varphi\rho$, it follows that there exists a $\rho^r \in (0,1)$ such that the incentive constraint (32) is satisfied if and only if

$$\varphi\rho \geq \rho^r.$$

We obtain the following characterization of the equilibrium, operating analogously to Proposition 1 :

Proposition 11. *For any $-\delta < S^*$, there exists a $\rho^r \in (0,1)$ such that:*

(i) If $\varphi\rho \geq \rho^r$, the only equilibrium team composition is "meritocratic": both leaders choose an H follower;

(ii) If $\varphi\rho < \rho^r$, the only equilibrium has both leaders choosing a L follower (as in the static case).

Proof of Proposition 11. If $\varphi\rho \geq \rho^r$, a leader facing an opponent with an L agent, will choose an H agent, and will win with a probability larger than 1/2 as the H agent stays with bad news. A leader facing an opponent with an H agent then also prefers to hire an H agent, giving him a probability of winning equal to 1/2. If, instead, he were to hire an L agent, his opponent would win with a probability larger than 1/2. Conversely, if $\varphi\rho < \rho^r$, a leader facing an opponent with an L agent, will also choose an L agent, giving him a probability of winning equal to 1/2. If, instead, he were to hire an H agent, the latter would quit with bad news, resulting in a probability of winning less than 1/2. For the same reason, hiring an L agent is then also optimal when the opponent hires an H agent, as this would give the latter a probability of winning greater than 1/2. □

From Proposition 11, leader loyalty may solve the problem of disloyal subordinates: if leaders are sufficiently loyal (likely to run again) and followers are sufficiently patient, high-skill followers will be loyal and stay even in the presence of bad news.

Note finally that as in our static model, strategic considerations matter in talent choice. Condition (32) only guarantees that a meritocratic H agent stays loyal when facing a team with a low-skilled opponent. It is therefore possible that, when both teams choose H followers, the H follower receiving bad interim news gives up. Nevertheless, choosing a meritocratic H follower is still optimal in the latter case because of the 'discouragement effect': an H follower induces the rival team to give up when they face setbacks, whereas a loyal but low-skill follower would not have this strategic effect.

A.3. The cost of engendering follower loyalty

In the analysis above, we have posited that there is an exogenous probability that leaders will run again after a loss and rehire an agent. We now explore the determinants of such a decision. In particular, "loyal leaders" are not simply leaders that "run again" after a loss. Loyal leaders, by sticking with their followers even when they are not suitable to the particular situation or task, engender in turn loyalty from their followers.

Model amendments. To explore this type of loyalty, we amend our model as follows:

Agent types. There are no intrinsic types; instead agents can be suitable for one project and unsuitable for the next. In particular, each period, a given agent can be H or L. The suitability of the agent evolves period by period according to a Markov process. An H agent becomes L with probability $\lambda > 0$, and an L agent always stays L.

Outside options. If an agent does not quit, she stays, and depending on the result she obtains (as previously) either W (when the tournament is won) or 0. The agent, in each period, also has access to an outside option ω if and only if they are an H in that period. For simplicity, once a worker quits or is not rehired by her current leader, she never gets rehired anymore.

Timing. We study the incentives of the leader at time t to stick with the agent from time $t-1$, even when the agent's type for period t equals L. (i) At the start of each period, the new type of the follower is publicly observed. (ii) Then, a leader who lost in the previous period decides whether to keep the same follower or choose a new one. Each period, there is a continuum of agents to choose from, so there is always an H agent available. (iii) Finally, the tournament takes place. A leader (and his follower) who wins, exits the game, and is replaced by a new leader in the next period.

Equilibria with leader loyalty We now explore the existence of equilibria where new leaders select an H follower in the first period, and subsequently stay loyal to this follower, even when she turns mediocre (becomes an L type). While a long-term relationship then improves the ability of a leader to motivate high-skilled agents to stick around, ultimately, he is also unwilling to get rid of that agent when unavoidably, the latter becomes less suited for the job.

As in the previous section, whenever recruiting an H-agent is optimal when the opponent leader recruits an L-agent, recruiting an L-agent is necessarily a dominated strategy when facing an H-agent as opponent.

Assume therefore that the competing leader has recruited an L agent and denote by U_F^H the continuation utility, at the start of a new period, of an H-agent who never quits following bad interim news. We formally derive U_F^H in the proof of Proposition 12.

Following bad interim news, an H agent facing an L agent then stays if and only if

$$G(H-L-\delta)W + (1-G(H-L-\delta))\,\varphi\rho U_F^H \geq \omega \tag{33}$$

Analogous to the previous section (see Proof below), one can show that there exists a $\rho^R \in (0,1)$ such that the incentive constraint (33) is satisfied if and only if

$$\varphi\rho \geq \rho^R.$$

This yields the following proposition:

Proposition 12. *1. For any $-\delta < S^*$, there exists a $\rho^R \in (0,1)$ such that an H agent facing an L agent stays loyal after bad news if and only if*

$$\varphi\rho > \rho^R$$

2. If $\varphi\rho > \rho^R$, the leader initially starts off with an H-follower (a "meritocratic" team) but he stays loyal to this follower when she turns mediocre.

Proof of Proposition 12. The utility of a follower who does not quit when observing bad news is given recursively by (depending on his type in a given period):

$$U_F^H = \frac{W}{2}\left[P^H(win|\delta) + P^H(win| - \delta)\right] + \frac{\rho\varphi}{2}\left[P^H(lose|\delta) + P^H(lose| - \delta)\right]$$

$$\times\left[(1-\lambda)U_F^H + \lambda U_F^L\right]$$

$$U_F^L = \frac{W}{2}\left[P^L(win|\delta) + P^L(win| - \delta)\right] + \frac{\rho\varphi}{2}\left[P^L(lose|\delta) + P^L(lose| - \delta)\right] U_F^L$$

where $P^H(win|\delta)$ and $P^L(win|\delta)$ are the probabilities of winning given good interim news when the followers are, respectively, of type H and type L (and the opposing team consists of L agents). It follows that

$$U_F^L = \frac{W}{2}\frac{\left(P^L(win|\delta) + P^L(win| - \delta)\right)}{\left(1 - \frac{\varphi\rho}{2}\left(P^L(lose|\delta) + P^L(lose| - \delta)\right)\right)},$$

from which

$$U_F^H = \frac{W}{2}\frac{\left(P^H(win|\delta) + P^H(win| - \delta)\right)}{\left(1 - \frac{(1-\lambda)\varphi\rho}{2}\left(P^H(lose|\delta) + P^H(lose| - \delta)\right)\right)}$$

$$+\frac{\lambda\rho\varphi}{2}\frac{\left(P^L(lose|\delta) + P^L(lose| - \delta)\right)}{\left(1 - \frac{(1-\lambda)\varphi\rho}{2}\left(P^H(lose|\delta) + P^H(lose| - \delta)\right)\right)}\left(U_F^L\right)$$

which is increasing $\varphi\rho$. Moreover, for $\varphi\rho = 1$, both $U_F^L = W$ and $U_F^H = W$.

Consider now incentive constraint (33). Since $U_F^H = W$ for $\varphi\rho = 1$, (33) is always satisfied if $\varphi\rho = 1$. In contrast, since -$\delta < S^*$, (33) is violated if $\varphi\rho = 0$ and the leader never runs again. Since the LHS of (33) is increasing in $\varphi\rho$, it follows that there exists a $\rho^R \in (0,1)$ such that the incentive constraint (33) is satisfied if and only if

$$\varphi\rho \geq \rho^R.$$

The remainder of the proof is analogous to that of Proposition 11.