ELECTORAL CONTROL AND THE HUMAN CAPITAL OF POLITICIANS*

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Abstract

We develop a model of electoral control in which politicians in a legislative body allocate their time between providing constituency services to their voters, and pursuing the objectives of legislative cliques and factions. While a politician's human capital symmetrically increases his inherent ability to engage in both endeavors, our analysis uncovers an equilibrium bias towards the latter. As a result of the strategic interdependencies among legislators, a trade-off arises between politicians' human capital and voters' ability to exert electoral control. We characterize conditions under which an increase in the human capital of politicians makes voters worse off by encouraging all politicians to divert their attention away from their constituents.

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1 Introduction

How does the human capital of politicians affect the quality of political representation? Conventional scholarly wisdom suggests that citizens with greater skills and expertise should be more productive in service to their voters.[1] As a consequence, a fundamental imperative for any political system is to draw these individuals into political careers (Besley, 2005; Ferraz & Finan 2011; Merlo & Mattozzi 2007 and 2008). This idea is founded on a presumption that politicians will use their skills and experience to serve the interests of their constituents.

Is this presumption correct? Politicians of all abilities face *competing demands* on their attention: from inside the legislature, in particular, they can pursue a range of activities of which some are more valuable to their voters than others. In the absence of effective electoral incentives, politicians may not prioritize those activities which are most beneficial to their voters.

Our aim is to understand how politicians' skills and experience affect their responsiveness to electoral incentives. We unearth circumstances in which improvements in the inherent productive capacity of politicians aggravate problems of electoral control to such an extent that voters are *worse off* as a result. Instead of demanding that these skills be applied to activities that they value, voters are forced to scale back how much they demand from their politicians in exchange for re-election. The net diversion of politicians' attention away from activities valued by their constituents outweighs the primitive improvement in their intrinsic ability to serve their voters. Thus, 'better' politicians end up being worse representatives, despite securing re-election on the basis of a thinner record of constituency service.

Our premise that a politician's attention is subject to competing demands is well established. Richard Fenno describes a politician's time as "the scarcest and most precious [resource]... which dwarfs all others in posing critical allocative dilemmas... Time is at once what the member has the least of and what he has the most control over.... When he is doing something at home, he must give up doing some things in Washington, and vice versa" (Fenno, 1977, 890-891). Voters rely on electoral incentives to resolve this allocative dilemma in their favor.

These electoral incentives may be more or less effective. Former House majority leader Eric Cantor was dismissed in his primary election in 2014, due in significant part to his thin record of constituency engagement.

[1] We use the terms *human capital*, *quality*, and *competence* interchangeably to summarize the diverse set of inherent and acquired skills and experiences which contribute to a politician's capacity to 'get things done.' This includes, for example, rhetorical ability in debates, policy-specific expertise, and mastery of labyrinthine parliamentary procedures and law-making processes.

Cantor's universally acknowledged skills would have allowed him to provide a host of benefits to his constituents. Yet his constituents were willing to re-appoint him repeatedly *in spite* of his apparent inattentiveness. More generally, while some politicians cultivate a formidable reputation for serving their constituents—former Senators Jesse Helms and Robert Byrd were acknowledged exemplars—others are much less attentive. We provide an account of why some politicians who appear to ignore their local constituencies are replaced, while others survive.

Our approach takes seriously Fenno's notion that politicians face competing demands upon their skills and capabilities by constructing an explicit account of a politician's external environment *inside politics*. We focus this account on a politician's involvement in political parties, cliques, and power structures (collectively referred to as 'factions') within a legislature. The activities of these groups—acting in concert to spoil a vote, or securing a senior position within the party for a member—produce benefits for politicians which are often discounted by constituency voters. As a consequence of their immersion in these associations, politicians are subject to potent centralized incentives which may confound the decentralized incentives of local elections. Our main contribution is to show how problems of electoral control become endogenously more severe in the presence of politicians of higher quality, despite the fact that politicians' skills are assumed to be *equally valuable across tasks*.

In our model, we conceive a legislature as a set of bilateral agency relationships between constituency voters (for whom we reserve the pronoun 'he') and their representatives (for whom we reserve the pronoun 'she'). Within the legislature, politicians allocate a fixed amount of time between delivering constituency service to their voters (which is electorally valuable) and colluding with one another to advance the goals of their legislative faction. We assume that a politician's human capital is observable and we model it as the amount of effective time at his disposal.

The presence of legislative factions generates interdependencies in the politicians' return on pursuing factional goals. We assume that such return positively depends on the human capital and time supplied by other politicians to the same activity. In other words, legislative-factional goals involve elements of *team production* (Alchian & Demsetz, 1972): they cannot be achieved solo.

In a benchmark setting with a single district, voters are strictly better off when the competence of their politicians increases. However, the strategic interdependence between politicians in pursuing factional goals weakens voters' ability to discipline their representatives: one voter's attempt to control her own representative may partially impede the other voter's attempt to achieve the same. Politicians distinguished by high levels of human capital exacerbate this externality. Despite their greater intrinsic capacity serve their constituents, these individuals are also more valuable teammates in the pursuit of factional goals. Their presence raises the opportunity cost of providing constituency services for *all* representatives.

As a consequence, voters may suffer from an increase in the human capital of their *own* representative. To see how such an effect might arise, consider a home district in which a politician becomes more productive. This forces voters in other districts to lower their demands in order to balance their representatives' increased return on pursuing factional goals. But this adjustment adversely affects the same trade-off for the politician in the home district, who now faces more engaged legislative teammates; this forces a subsequent reduction in the demands of his own voter. The welfare costs of this contractual adjustment may dominate the direct effect of having a higher quality politician. Improvements in the human capital of politicians therefore reduce the electoral accountability of *all* politicians, who are rewarded with re-election despite providing less service to their constituents.

Our contribution is three-fold. First, we uncover the existence of a trade-off between competence and control in an environment with coarse contractual tools (such as politics) and describe the conditions under which this trade-off becomes more severe.

Second, we derive normative implications for the internal organization of parties, legislative factions and power structures, as well as positive implications for the electoral appeal of candidates with little experience or demonstrated expertise. Unlike more traditional explanations based on identity, we show that voters might rationally expect candidates that are known to be inherently less experienced or qualified to be more reliable in serving them. They may therefore prefer these candidates for purely instrumental reasons.

Third, we provide a microfoundation for a widely employed modeling shorthand in the political economy literature known as *valence*, used to describe those non-policy attributes of a politician which are universally valued by voters regardless of their ideological disposition.[2] Our analysis identifies a qualified set of circumstances under which valence is not a viable shorthand, and our critique holds whenever a given valence characteristic increases, or is correlated with, the general skills of a politician.

[2] The introduction of the concept of valence is attributed to Stokes (1963), and plays a crucial role in many seminal contributions, including Banks & Sundaram (1993 and 1996), Rogoff & Siebert (1988), Ansolabehere & Snyder (2000).

2 Related Literature

Our depiction of the politician's participation in a political team in the legislature builds upon a literature in political science which conceives of parties and voters as *competing principals* (Carey, 2007; Hix, 2001). Our approach is also inspired by the idea—dating back to at least Downs (1953)—that politicians achieve their goals in a group. Recent studies have modeled parties as teams of politicians (Dewan & Hortala-Vallve, 2013; Krasa & Polborn, 2013), and explored how within-party interactions may distort the supply of competent politicians (Mattozzi & Merlo, 2011), increase problems of moral hazard (Zudenkova, 2012), or affect competition for local public goods (Persico et al., 2011).

Morelli & Caselli (2004) and Merlo & Mattozzi (2007 and 2008) show how outside options from the private sector that are correlated with underlying human capital could crowd out competence and intrinsic motivations in the candidate pool. Bernheim & Kartik (2013) distinguish between two dimensions of candidate characteristics—public spiritedness and honesty—and show how public policy interventions such as politicians' pay and anti-corruption measures affect the quality of representation. Mattozzi & Snowberg (2014) also derive an inter-district externality: strategic delegation to more able politicians for the pursuit of pork undermines voters' redistributive goals, since more able politicians are assumed also to have higher private income.

Camara (2013) emphasizes the interaction of heterogeneous dimensions of a politician's ability. Since politicians and voters have heterogeneous ideological tastes, voters trade off various dimensions of quality at different rates. Finally, in Bernhardt, Camara & Squintani (2011), a more heterogeneous pool of politicians increases the expected quality of challengers, but also the extremism of their expected policy choices.

Amongst all these models, ours is unique in deriving voters' induced payoffs over politicians in an environment where these payoffs do not come from either a primitive or equilibrium relationship between competence and ideology.

The remainder of the paper is organized as follows: Section 3 introduces the model. Section 4 presents a set of preliminary results, including the analysis of a single-district version of the model (where improvements in the quality of their representatives cannot hurt voters). Section 5 characterizes equilibrium, and Section 6 reconsiders the welfare consequences of politicians' human capital. In Section 7, we discuss how some of our important assumptions can be relaxed. Section 8 concludes.

3 The Model

There are two districts, A and B, each of which consists of a voter and a representative: with a slight abuse of notation, we denote by $J \in \{A, B\}$ the voter in district J, and by lowercase letter $j \in \{a, b\}$ the representative from district J. While in office, each politician simultaneously chooses a *time allocation*, $t^j \in [0, 1]$, where t^j is the time which he devotes to constituency service and $1 - t^j$ is the time which he devotes to participating in his legislative faction, clique or power structure. Each politician is characterized by an observable *quality* q^j. Each voter benefits solely from her representative's constituency service, which is a function of the latter's quality and time allocation:[3]

$$u^J = q^j t^j.$$

Each voter chooses a *re-election strategy*: $r^J : \mathbb{R}_+ \to \{0, 1\}$, which is the probability with which she re-elects her representative, as a function of the observable level of constituency service. Politicians value holding office, as well pursuing the goals of their legislative factions; the latter can be thought of as 'rewards', including cabinet positions, more prominent roles in the party, or the diversion of public funds for private use. Without loss of generality, we normalize to one the present discounted value from being re-elected.

We also assume that the production of factional rewards is a team problem between the two representatives: the benefit from these rewards depends on the politicians' quality, the time that they each devote to their faction, and a stochastic (and unobservable to the voters) productivity shock, θ:

$$w(\mathbf{t}, \mathbf{q}, \theta) = \theta(1 - t^a)(1 - t^b)q^a q^b.$$

Thus, each politician enjoys, directly, the benefits from producing the factional output.[4] For analytical tractability, we assume that θ is drawn from a logistic distribution with location and scale parameters μ and s, respectively; we also denote its cumulative distribution function by $F(\theta)$. Each representative's payoff is therefore given by:

$$w(\mathbf{t}, \mathbf{q}, \theta) + r^J.$$

The timing of the game is as follows:

[3] The assumption that voters benefit solely from constituency service simplifies the exposition, but can be relaxed.

[4] One might alternatively suppose that the output is divided between politicians, according to a fixed rule, or according to their relative contribution, or some other (endogenous) criterion. Our results are robust to such alternative specifications.

1. Nature determines each representative's quality q^j, which is publicly observed.
2. Each voter chooses a re-election strategy (a function of observed constituency service u^J).
3. Nature determines θ, privately observed by each representative.
4. Each representative simultaneously chooses his time allocation t^j.
5. Each voter's payoff u^J is realized, and her re-election decision r^J is made.
6. Each representative's payoff is realized.

3.1 Discussion

Our approach to modeling legislative cliques and factions permits a broad interpretation of these activities. The key is that voters at best care significantly less about them than the direct benefits of constituency service. To fix ideas, we briefly discuss two examples which lie within the scope of our theory.

(1) *The party within the party*: Much of the British Labour Party's history is plagued by factional competition over the party's electoral agenda. This competition was especially acute during the late 1930s, when the Socialist League, a faction of leftist intellectuals and Labour MPs led by Stafford Cripps attempted to stir the Labor Party into an alliance with the British Communist Party and the Independent Labour Party.[5] Richard Crossman, then a Labour councillor on Oxford city council, wrote of Cripps and his followers: "they dilate on the need for Communist affiliation... as though these items were of the slightest interest to any save the minority of politically conscious electors... Their busy activity is self-intoxicating, but millions of people... have not seen a Labour canvasser for five years, far less seen any signs of practical activity by the local Labour Party."

(2) *Climbing the greasy pole*: As House majority leader, Eric Cantor enjoyed a unique capacity to direct legislation to help his district. Yet, his primary defeat in June 2014 was attributed to his apparent beguilement with Washington politics at the expense of his constituency voters.[6] A local journalist summarized the popular sentiment: "...Cantor's real constituency wasn't the folks back home. His constituency was

[5] The initial membership included Labour's future leading parliamentarians Aneurin Bevan and Clement Attlee.
[6] See, for example "Seven reasons Eric Cantor lost": *http://www.cnn.com/2014/06/11/politics/why-eric-cantor-lost/*.

> the Republican leadership and the Republican establishment. That's who he really answered to."[7] A local Democrat strategist put it more bluntly: "People talk. And they talk about Eric Cantor. 'Where is he?' His constituent services suck. He was never in the district."[8]

From the politicians' perspective, the factional activity entails a common value. However, this is perfectly consistent with a view that factional politics is ultimately a competitive pursuit. Even if there is ideological or material conflict between different groups of politicians, *within* each clique, camp or faction there must necessarily be a degree of common purpose. In this case, the payoff can be interpreted as the ideological value to like-minded politicians from successfully defeating a bill on the floor, or pushing their political agenda onto the party's platform.

Another important feature of our approach, which is in line with most empirical work, is that *quality* is conceived to be a summary characteristic of a politician's productive capabilities which augments her output across a range of activities. Higher values may arise from previous experience in other political offices, or represent innate characteristics such as intelligence and charisma. It could also be interpreted as institutionally derived authority stemming from senior positions on committees or within a party or legislative caucus.

The random variable θ captures an array of factors, i.e., 'windows of opportunity' for a team of politicians to achieve their goals, affecting the return of time spent on the outcome of the joint activity, and its value vis à vis holding office. For example, if an incumbent party leader is unexpectedly beset by a personal scandal, representatives from a minority faction might be willing to sacrifice some of their re-election chances in order to take over the internal organization of the party. What is crucial is that these opportunities cannot be perfectly anticipated by voters at the time of election.

We assume that the politicians' time allocations towards factional pursuits inside the legislature are strategic complements: the return to one politician from engaging in such activities increases in the other politician's time allocation towards the faction. We will later show that our assumption of strategic complementary is not crucial for our results. Nonetheless, complementarity is implicit in the very existence of legislative factions and political parties. At the state legislative level in the US, legislative parties often resemble "a football team that rallies together for the purpose of winning" (Ingram et. al, 1996, p. 66). In her study of the 'Fresh Start

[7] *http://thefederalist.com/2014/06/11/why-we-fired-eric-cantor*

[8] 'How Eric Cantor Lost', TIME: *http://goo.gl/904fmZ*. In addition to his failure to provide sufficient constituency service, another factor which contributed to his defeat was his tendency towards compromise and collaboration with Democrats, to which his constituents were deeply opposed.

Group', a faction within the British Conservative Party, Smedley (1998) highlights the imperative for teamwork, coordination and collective action within the faction. According to one of its members "there is only one thing that any government understands and that is the arithmetic... if you can hold out as a fairly solid group, and it has got to be convincing and people have got to hold together... you hold enormous influence" (Smedley, 1998, p. 153). Even where factions compete with another, there is still an imperative for cooperation within the team.

Finally, each representative enjoys the factional output independent of whether she wins re-election. Parties find ways to reward loyal politicians who provide substantial services even when they are not re-elected to the same legislative office. Parties may offer posts in non-elected offices, or facilitate the lateral move of politicians into other elected offices at regional or local levels of government. For example, the UK Member of Parliament for Tooting, Sadiq Khan, was nominated as Labour's candidate for Mayor of London in September 2015.[9] As a Member of Parliament, he successfully steered the leadership campaign of Edward Miliband in 2010, and also nominated his successor, Jeremy Corbyn, for the leadership election in 2015.

4 Preliminary Analysis

Cut-off strategies

We begin by showing that it is without loss of generality to restrict attention to equilibria in which each voter uses a *cut-off* strategy: each voter re-elects her representative if the latter delivers an amount of constituency service which is equal to or greater than a certain threshold. We show that it is possible to span all pure strategy equilibrium payoffs and outcomes with cut-off strategies.

DEFINITION 1 *A voter J uses a* cut-off *strategy if there exists $\underline{u}^J \in \mathbb{R}_+$ such that*

$$r^J(u^J) = \begin{cases} 1 & \textit{if } u^J \geq \underline{u}^J \\ 0 & \textit{if } u^J < \underline{u}^J. \end{cases}$$

[9] We are grateful to an anonymous referee for bringing this case to our attention.

An equilibrium in cut-off strategies is an equilibrium in which each voter's strategy is a cut-off strategy.[10]

CLAIM 1 *For any equilibrium in pure voting strategies, there exists an equilibrium in cut-off strategies which induces the same distribution over the action profile of the representatives, and the same distribution over all players' payoffs.*

Henceforth, we refer to a voter J's strategy simply as $\underline{u}^J$. This is the threshold of provided constituency services above which she will re-elect her politician.

The single district case: full appropriability

We begin by examining a benchmark setting in which there is a single politician. The most natural way to do so in the context of our model is to assume that representative $-j$ is not a strategic player, and fix his effort allocation to an exogenous $\bar{t}^{-j}$. Representative $j's$ return from pursuing partisan goals is then $\theta(1-t^j)q^j\rho$, where $\rho \equiv (1-\bar{t}^{-j})q^{-j}$ is a constant. So, whenever θ is positive, j's optimal effort choice is either to just satisfy the re-election constraint, i.e. provide $t^j = \frac{\underline{u}^J}{q^j}$, or eschew the voter's demands and set $t^j = 0$. He will prefer the former if and only if θ, the return to engaging in legislative factional pursuits, is not too high. Formally, his strategy is:

$$t^j = \mathbb{I}_{\{\theta<0\}} + \mathbb{I}_{\left\{\theta\in\left[0,\frac{1}{\underline{u}^J\rho}\right]\right\}}\frac{\underline{u}^J}{q^j}.$$

As a consequence, the expected value to voter J is $V^J = \max_{\underline{u}^J} \underline{u}^J \left\{F[1/(\underline{u}^J\rho)] - F(0)\right\} + q^jF(0)$. Notice that $\underline{u}^J$ enters the voter's payoff both through the services delivered conditional on the representative working for the voter (the *intensive* margin), but also through the probability with which such services are delivered (the *extensive* margin). Our first result is positive.

PROPOSITION 1 *(APPROPRIABILITY THEOREM)*

The voter's expected value is strictly increasing in her representative's quality.

[10] If, in the representatives' subgame, a representative j is otherwise indifferent between two strictly positive levels of effort, t^j and $\tilde{t}^j < t^j$ for $\theta \geq 0$, we assume that he chooses $\tilde{t}^j$. If, instead, $\theta < 0$, a representative's weak best response is $t^j = 1$, and we assume that this played. Note that for any tuple of re-election strategies, we show that each representative chooses an action $t^{j'} < 1$ with positive probability. Thus, the set of $\theta > 0$ realizations for which j is indifferent between any two levels of effort has measure zero, so this does not affect our argument.

Proof. The optimal utility cutoff $\underline{u}^J$ must be such that $F[1/(\rho\underline{u}^J)] - F[0] - f[1/(\rho\underline{u}^J)]/(\rho\underline{u}^J) \geq 0$. Denote by $\underline{t}$ the optimal threshold cutoff (i.e., $\underline{u}^J = \underline{t}q^j$) chosen by the voter. We can then write $V^J = q^j\underline{t}(F[1/(\rho q^j\underline{t})] - F[0]) + q^jF[0]$, and verify that

$$\frac{\partial V^J}{\partial q^j} = \underline{t}\left(F[1/(\rho q^j\underline{t})] - F[0] - \frac{f[1/(\rho q^j\underline{t})]}{\rho q^j\underline{t}}\right) + F[0] = \underline{t}\left(F[1/(\rho\underline{u}^J)] - F[0] - \frac{f[1/(\rho\underline{u}^J)]}{\rho\underline{u}^J}\right) + F(0) > 0. \quad \square$$

Proposition 1 implies that, *holding the behavior of other voters and representatives constant*, the voter is always able to appropriate a *strictly* positive share of the surplus generated by an increase in her representative's quality. For this reason, we call it the *Appropriability Theorem*. We will show that this is a partial equilibrium result: when the strategic interaction between representatives and voters across districts is properly accounted for, the Appropriability Theorem might fail. Not only may voters fail to appropriate a strictly positive share: they may be strictly worse off.

The representatives' subgame

We now solve the model in which both districts' politicians and voters are fully strategic. We begin with the subgame in which each representative chooses his time allocation. Assume without loss of generality that $\underline{u}^J q^{-j} \in \min\{\underline{u}^A q^b, \underline{u}^B q^a\}$. We also assume that when there are multiple equilibria of this subgame, politicians are able to coordinate on the weakly Pareto dominant one.[11]

We show that equilibria can be indexed according to the realization of θ, which is a measure of the attractiveness of achieving legislative-factional objectives. When θ is large, politicians can never be induced to serve their voters: both will dedicate themselves entirely to the faction. When, instead, θ lies on an intermediate range, one politician will meet the demands of his voter and dedicate the remainder of his time to the faction: the other will work solely for the faction. Finally, when θ is small (but positive), both politicians satisfy their voters' respective re-election demands, and allocate their remaining (possibly zero) time to legislative-factional objectives.

CLAIM 2 *In the representatives' subgame:*

[11] Notice that this criterion produces, in this environment, a complete ranking. An alternative approach would be to assume that, even working solo, one legislator can produce an arbitrarily small but positive output regardless of the participation of the other politician. Nonetheless, it is natural to assume that politicians working together within a legislative faction can coordinate on the Nash equilibrium which is weakly Pareto dominant.

1. *(Faction Equilibrium) when* $\theta \geq (\underline{u}^J q^{-j})^{-1}$*, both representatives work exclusively for their legislative faction:* $t^j = t^{-j} = 0$*;*

2. *(Asymmetric Equilibrium) when* $\theta \in [(\underline{u}^{-J} q^j - \underline{u}^J \underline{u}^{-J})^{-1}, (\underline{u}^J q^{-j})^{-1})$*, one representative meets his re-election threshold and the other works exclusively for the legislative faction:* $t^j = \underline{u}^J / q^j,\ t^{-j} = 0$*;*

3. *(Constituency Equilibrium)* $\theta \in [0, \min\{(\underline{u}^{-J} q^j - \underline{u}^J \underline{u}^{-J})^{-1}, (\underline{u}^J q^{-j})^{-1}\})$*, both representatives satisfy their re-election thresholds:* $t^j = \underline{u}^J / q^j,\ t^{-j} = \underline{u}^{-J} / q^{-j}$*;*

4. *(Aligned Equilibrium) when* $\theta < 0$*, both representatives work exclusively for their voters:* $t^j = t^{-j} = 1$.

In order for the asymmetric equilibrium to be feasible, there must be a sufficient asymmetry in the stringency of the voters' relative re-election demands so that one of the politicians would be prepared to abandon his voter regardless of the behavior of the other politician. Denote by $\lambda^J \equiv q^j / \underline{u}^J > 1$ the *leniency* of voter J's standard. Higher values of λ^J indicate that the voter is demanding a smaller proportion of her representative's time in return for re-election, thereby leaving more time available to him for other activities. We will say that voter $-J$ is *relatively demanding* if $\lambda^J - \lambda^{-J} \in [0, 1]$ and that $-J$ is *extremely demanding* if $\lambda^J - \lambda^{-J} > 1$. We show that the possibility of an asymmetric equilibrium requires that one voter is being extremely demanding. That is, only if $\lambda^J - \lambda^{-J} > 1$ does there exist an interval of θ realizations such that an asymmetric equilibrium can arise. In this equilibrium, the representative serving the extremely demanding voter is prepared to divert his attention unilaterally towards factional pursuits.

For a given pair of thresholds $\underline{u}^A$ and $\underline{u}^B$, each voter receives her demanded level of service if and only if θ falls below a cut-off value (and is positive). The particular cut-off, however, may vary across voters. Without loss of generality, assume that voter $-J$ is relatively demanding, i.e. $\lambda^J - \lambda^{-J} \geq 0$. In that case, the relatively lenient voter J is served by her politician so long as the value of factional goals is not high (the politician meets the threshold when $\theta \leq (\underline{u}^J q^{-j})^{-1}$ and only works for the voter when $\theta < 0$). On the other hand, the appropriate cut-off for the relatively demanding voter ($-J$) depends on just how relatively demanding she is. If she is not extremely demanding ($\lambda^J - \lambda^{-J} \leq 1$), then her representative will shirk only if the other voter's representative does the same. In that case, the relatively demanding voter's cut-off does not affect the probability that her politician will serve her. But if she is extremely demanding ($\lambda^J - \lambda^{-J} > 1$), her politician would be prepared to shirk on her unilaterally. In that case, the relatively demanding voter is served only if the reward from factional

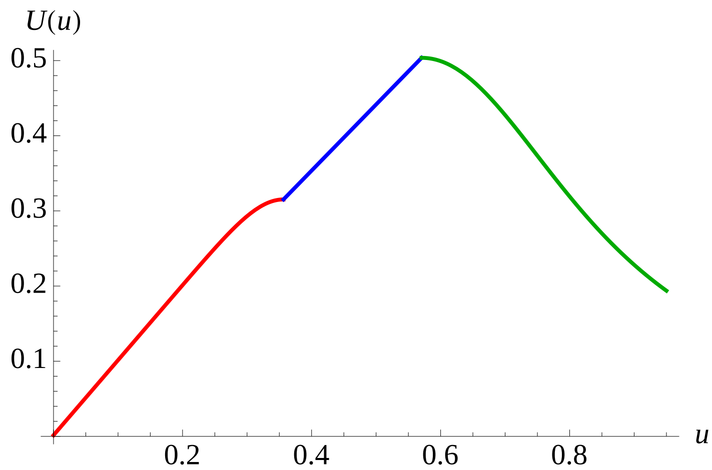


Figure 1: Example of voter's payoff $U(u)$ as a function of her re-election standard, u. Parameters are: $\mu = 2.25$, $s = .35$, $q^a = q^b = .95$.

goals is low ($\theta \leq (\underline{u}^{-J}q^j - \underline{u}^J\underline{u}^{-J})^{-1}$). Thus, the pivotal events which determine whether either voter is served are not necessarily the same. This observation is important for our subsequent analysis.

5 Equilibrium Analysis

Having characterized the behavior of each representative, we now derive the equilibrium strategies of each of the voters. We focus on voter J's problem, keeping fixed the other voter's strategy $\underline{u}^{-J}$. We can define J's payoff $U(u; \underline{u}^{-J})$ as a function of her own standard, u. An equilibrium is then a strategy profile $(\underline{u}^J, \underline{u}^{-J})$ such that

$$\underline{u}^J \in \arg\max_{u\in[0,q^j]} \{U(u; \underline{u}^{-J})\}; \ \underline{u}^{-J} \in \arg\max_{u\in[0,q^{-j}]} \{U(u; \underline{u}^J)\}.$$

We must first construct payoff function for each voter. Using Claim 2, we can write $U(u)$ as follows:

$$U(u) = (q^j - u)F(0) + \begin{cases} uF[(uq^{-j})^{-1}] & \text{if } u \leq \frac{q^j}{q^{-j}}\underline{u}^{-J} \\ uF[(\underline{u}^{-J}q^j)^{-1}] & \text{if } u \in \left(\frac{q^j}{q^{-j}}\underline{u}^{-J}, \frac{q^j}{q^{-j}-\underline{u}^{-J}}\underline{u}^{-J}\right] \\ uF[(u(q^{-j} - \underline{u}^{-J}))^{-1}] & \text{if } u > \frac{q^j}{q^{-j}-\underline{u}^{-J}}\underline{u}^{-J} \end{cases}$$

Figure 1 graphs an example of the payoff function. To understand the construction, notice that there are three relevant portions of the domain of voter J's strategy, holding fixed the strategy of voter $-J$. When J is relatively lenient, her probability of being served is the probability that her politician's rewards from factional goals are not high $i.e., (\theta \leq \underline{u}^J q^{-j})^{-1})$. Thus, a higher re-election threshold $\underline{u}^J$ generates a higher payoff for her *conditional on her representative's choice to serve her* (more favorable intensive margin), but also increases the set of θ realizations for which her representative chooses to shirk (less favorable extensive margin). This corresponds to the first (red) portion of the payoff function depicted in Figure 1. On the other hand, when the voter is being extremely demanding, the representatives' subgame admits an asymmetric equilibrium. In this case, we know from our earlier analysis that she is served if and only if the rewards to her politician from factional goals are low ($\theta \leq (\underline{u}^{-J} q^j - \underline{u}^J \underline{u}^{-J})^{-1}$). As in the previous case, her strategy affects both her intensive and extensive margin, but the latter is now more responsive to her choice of re-election threshold than in the case where she is relatively lenient. The reason is that now her representative chooses to abandon her even when the other does not. This is shown in the third (green) portion of the payoff function depicted in Figure 1.

Suppose, however, that voter J is relatively demanding but not *extremely* demanding (i.e., $\lambda^{-J} - \lambda^J \in (0, 1]$). Then, her representative will work for her if and only if the other representative chooses to work for his own voter. The latter happens if and only if the rewards from factional goals are not high ($\theta \leq (\underline{u}^{-J} q^j)^{-1}$). Notice, however, that the relatively demanding voter's re-election threshold ($\underline{u}^J$) plays no role in this decision: it depends solely on the re-election threshold adopted by the relatively lenient voter.

As such, the relatively—but not extremely—demanding voter effectively cedes control over the incentives of her representative to the relatively lenient voter. In this case, her payoff expressed as a function of her re-election threshold is linear and strictly increasing on the second (blue) interval of Figure 1. We record this as a Proposition.

PROPOSITION 2 *(ELECTORAL CONTAMINATION)*
So long as $\underline{u}^{-J} < q^{-j}$, there exists an interval of re-election thresholds:

$$\left(\frac{q^j}{q^{-j}}\underline{u}^{-J}, \min\left\{q^j, \frac{q^j}{q^{-j} - \underline{u}^{-J}}\underline{u}^{-J}\right\}\right], \tag{1}$$

in which the voter J cannot affect the probability of her representative providing constituency service.

We learn from Proposition 2 that if the voter J were to choose a relatively demanding strategy—i.e., $\lambda^{-J} - \lambda^J \in [0, 1]$—she would face no trade-off between the intensive and extensive margin. In that case, she would always prefer the highest possible demand on this sub-interval. But what about other possible best responses? We next consider cases in which the voter J chooses to be relatively lenient ($\lambda^{-J} - \lambda^J \leq 0$), or instead to be extremely demanding ($\lambda^{-J} - \lambda^J \geq 1$).

To motivate our subsequent analysis, suppose that the remaining voter has chosen to hold her politician to the highest possible standard ($\underline{u}^{-J} = q^{-J}$). In that case, voter J is necessarily relatively lenient, regardless of her strategy. Thus, her problem is:

$$\max_{u^J \in [0,q^j]} u^J \left[F\left(\frac{1}{u^J q^{-j}} \right) - F(0) \right] + q^j F(0). \tag{2}$$

In the Appendix, we show that this problem has a unique solution: either the voter J also chooses to hold her representative to the highest possible standard ($u = q^j$), or she picks an interior solution u^* which satisfies the first-order condition associated with (2). This first-order condition equates the marginal benefit from increasing u^J to the voter's payoff—conditional on the representative working for her—with the marginal cost to the probability with which the representative chooses to work for her. That is, u^* is the solution to:

$$F\left(\frac{1}{u^* q^{-j}} \right) - F(0) = f\left(\frac{1}{u^* q^{-j}} \right) \frac{1}{u^* q^{-j}}. \tag{3}$$

We can re-write the solution $u^* = \frac{K}{q^{-j}}$, where K solves:

$$F(K^{-1}) - F(0) = f(K^{-1}) K^{-1}. \tag{4}$$

This formulation of u^* emphasizes that the voter's problem of controlling her representative's behavior stems from two distinct primitives.

First, the shape of $F(\theta)$ determines the sensitivity of a representative's incentives in a neighborhood of the product $u^J q^{-j} = K$. If the density $f(\theta)$ is steep in a neighborhood of K, small changes in this product are expected to induce large changes in the representative's propensity to serve his voter. Thus, K measures the voter's trade-offs that relate to her uncertainty about the private value of factional pursuits, θ. Higher values of K, loosely speaking, imply that the voter can balance the representative's incentives at comparatively higher demands.

CLAIM 3 *K is decreasing in the mean (μ) of θ, the value of factional pursuits.*

When the mean (μ) rises, voters anticipate relatively higher factional rewards and therefore a higher risk that their representatives will abandon them. At an interior solution, they respond by scaling back their demands. Intuitively, the representative's behavior is less sensitive to small changes in the product $K = u^J q^{-j}$: if the voter wants to raise the prospect that she is served, only a very large fall in K will trigger even a modest improvement in the extensive margin.[12]

The second primitive which is directly relevant to representative j's incentives is the quality of the other representative, q^{-j}. Higher values of q^{-j} raise representative j's value to abandoning his voter at any given realization of θ. Thus, as q^{-j} rises, the threshold above which representative j is willing to shirk *falls*. Once again, this calls on voter J to lower her own demands in order to re-balance her representatives incentives.

We are now able to fully characterize the equilibrium, which is unique and takes one of three possible forms. The conditions relate the product of politicians' intrinsic quality— $q^a q^b$—to the distribution of private benefits from factional service, θ, via the interior solution K.

First, we outline the conditions for a *demanding* equilibrium to exist. In this case, each voter holds her politician to the highest possible standard of service, forcing him to devote all of his time to constituency service in return for re-election. Each voter receives the highest possible value conditional on being served. However, by being maximally demanding, she also maximizes the risk that she is abandoned by her representative. This equilibrium occurs when the interior solution $u^* = \frac{K}{q^{-j}}$ is greater than the total effective time available to her politician, q^j, i.e., $K \geq q^a q^b$.

Suppose, instead, $K < q^a q^b$. A fully demanding equilibrium can no longer be supported: each voter would prefer to fine-tune her politician's incentives. In both of the remaining possible equilibrium forms, one voter—who is the relatively lenient of the two—indeed chooses the interior solution $u^* = \frac{K}{q^{-j}}$. In principle, the remaining voter $-J$ may choose a strategy which renders her (1) *relatively lenient*, (2) *relatively demanding*, or (3) *extremely demanding* with respect to her own representative's re-election.

Given the relatively lenient voter's strategy, under what circumstances will $-J$'s be extremely demanding on

[12]We were unable to analytically establish a similarly general result for s, the variance of the distribution of θ. Numerical work suggests that K is decreasing in s. In these cases, the result stems from the fact that with a higher variance, the density $f(\theta)$ becomes less steep in a neighborhood of K. Since the extensive margin is less responsive to changes in the voter's demands, she is forced to lower these demands more dramatically in order to obtain a meaningful improvement in her probability of being served.

her own representative? This is equivalent to choosing $\underline{u}^{-J}$ such that:

$$\lambda^J - \lambda^{-J} \geq 1 \iff \frac{q^j}{\underline{u}^J} - \frac{q^{-j}}{\underline{u}^{-J}} = \frac{q^j q^{-j}}{K} - \frac{q^{-j}}{\underline{u}^{-J}} \geq 1. \tag{5}$$

If $q^a q^b < 2K$, there is no strategy $\underline{u}^{-J}$ which satisfies (5): even if the voter $-J$ were to choose the most demanding standard $\underline{u}^{-J} = q^{-j}$ we still obtain $\lambda^J - \lambda^{-J} < 1$. Thus, the effective choice of voter $-J$ is between either being relatively lenient, or relatively demanding. We show in the Appendix that the latter is always preferred, and so our problem is to find the optimal relatively demanding strategy. However, Proposition 2 established that whenever a voter is relatively demanding, her choice of standard has no effect on her representative's incentives to serve her, and instead determines only her consumption in the event that she is served. Thus, a relatively demanding voter's payoff is strictly increasing in her choice of standard, which results in $\underline{u}^{-J} = q^{-J}$.

Therefore, when $q^a q^b \in [K, 2K]$, one voter chooses $\underline{u}^J = \frac{K}{q^{-j}} < q^j$, and one voter is maximally demanding, i.e., she chooses $\underline{u}^{-J} = q^{-j}$. We refer to this as a *semi-demanding* equilibrium.

Finally, suppose that K is small, i.e., $2K < q^a q^b$. Given that one voter chooses the lenient standard $u^* = \frac{K}{q^{-j}}$, there are now responses by the voter $-J$ which induce her to be extremely demanding vis-a-vis her own representative, i.e., there exists $\underline{u}^{-J} < q^{-j}$ such that (5) is satisfied. In this case, the best response is the largest threshold for which the voter's representative will shirk if and only if the other representative is willing to do the same, i.e., it solves $\lambda^J - \lambda^{-J} = 1$, or:

$$\underline{u}^{-J} = \frac{q^{-j}}{q^j - \underline{u}^J}\underline{u}^J = \frac{K}{q^j - K/q^{-j}}. \tag{6}$$

So, when $q^a q^b > 2K$, one voter chooses $\underline{u}^J = \frac{K}{q^{-j}} < q^j$ and the other chooses $\underline{u}^{-J} = \frac{K}{q^j - K/q^{-j}}$. We refer to this set of strategies as a *lenient* equilibrium, since neither voter is demanding the maximal possible time of her legislator in return for re-election.

PROPOSITION 3 *(EQUILIBRIUM) There exists at most one (up to a permutation in the districts) pure strategy equilibrium:*

(i) ("Demanding Equilibrium") when $q^a q^b < K$*, both voters choose the highest possible standard* $\underline{u}^J = q^j$*,* $J \in \{A, B\}$

(ii) ("Semi-Demanding Equilibrium") when $q^a q^b \in [K, 2K]$*, one voter chooses the interior solution* $\underline{u}^J = K/q^{-j}$ *, and the other chooses the highest possible standard:* $\underline{u}^{-J} = q^{-j}$

(ii) (Lenient Equilibrium) when $q^a q^b > 2K$ *one voter chooses the interior solution* $\underline{u}^J = K/q^{-j}$*, and the other chooses the highest standard conditional on avoiding an asymmetric equilibrium in the representatives' subgame:* $\underline{u}^{-J} = \frac{K}{q^j - K/q^{-j}}$*.*

Notice that the most lenient electoral standards are applied in a context where politicians' abilities are highest, i.e., where the product of q^a and q^b is highest. Thus, electoral incentives are weakest when the aggregate human capital of legislative politicians is highest.

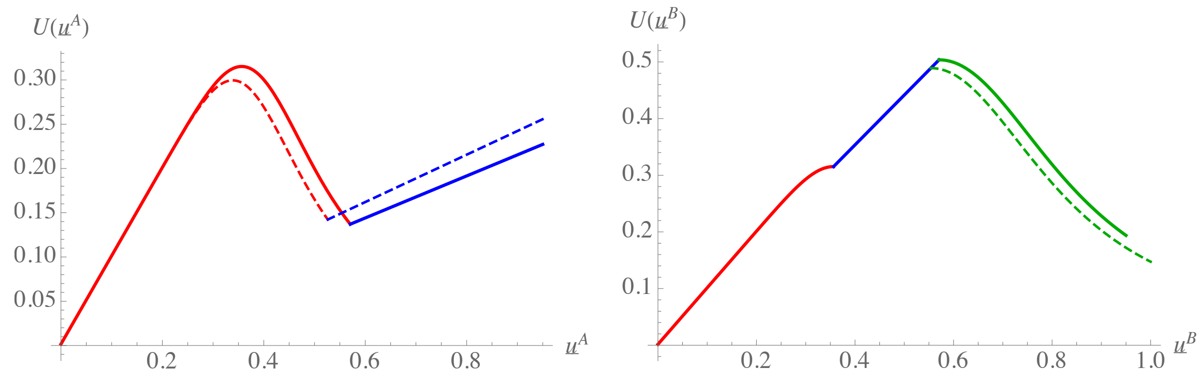
6 The Consequences of Human Capital

We now turn to the analysis of our motivating question: what are the consequences for voters of improvements in the human capital of politicians? Recall that in the single-district benchmark, the answer is always positive: voters are always strictly better off when there representatives competence increases. Does this conclusion survive the introduction of multiple districts?

First, a voter can never benefit from an improvement in the human capital of the other district's politician. Such an improvement always increases the incentive of her own representative to abandon her, which worsens her problem of electoral control. We record this observation as a Lemma.

LEMMA 1 *Each voter is (weakly) worse off from an increase in the competence of the other voter's representative.*

Although neither voter can benefit from improvements in the competence of the other voter's politician, we showed in Proposition 1 that in a world with no between-legislator interactions, voters always benefit from improvements in the quality of their own politicians. We show that this conclusion need not hold once proper



(a) Voter A's payoff $U(\underline{u}^A)$ (b) Voter B's payoff $U(\underline{u}^B)$

Figure 2: Illustration of Lenient Equilibrium. Parameters are $\mu = 2.25$, $s = .35$, $q^a = .95$, and $q^b = .95$ before (thick) and $q^b = 1$ after (dashed) an increase in representative b's quality.

account is taken of a legislator's external environment. The following proposition formally establishes this finding.

PROPOSITION 4 *(CONDITIONAL APPROPRIABILITY THEOREM)*

(i) In the Demanding and Semi-Demanding Equilibrium, each voter's payoff is increasing in the quality of her own politician: the Appropriability Theorem holds.

(ii) In the Lenient Equilibrium, the relatively lenient voter's payoff is increasing in the quality of her own politician. If the mean of θ is sufficiently large, however, the relatively demanding voter's payoff is strictly decreasing in the quality of her politician: the Appropriability Theorem fails.

How can a voter be strictly worse off even when *her own* politician's quality increases? To make the discussion concrete, we illustrate with a numerical example of the Lenient Equilibrium.[13] Figure 2 shows the payoff of each voter A and B in a Lenient Equilibrium under two sets of parameters. We fix the mean of the distribution of party rewards ($\mu = 2.25$), and its variance ($s = .35$). Throughout, we hold constant the quality of the politician a who serves voter A to be $q^a = .95$. The thick lines show the equilibrium payoffs for voters when politician B's quality is $q^b = .95$. By contrast, the dashed lines show the corresponding payoffs when politician B's quality is increased to $q^b = 1$. Under $q^b = .95$, the Lenient Equilibrium induces voter A to choose re-election threshold $\underline{u}^A = .356$ and voter B to choose a re-election threshold $\underline{u}^B = .571$. The equilibrium payoffs for each voter are $U(\underline{u}^A) = .300$ and $U(\underline{u}^B) = .504$.

[13]In what follows, all figures are approximated to the third decimal.

Now consider an increase of the quality of representative b to $q^b = 1$. Since politician b has more effective time at his disposal, representative a finds colluding with him on factional objectives more attractive: it effectively raises his opportunity cost of diverting his time towards his voter. Since voter A is choosing her threshold to balance the intensive and extensive margin, this forces her to respond with a greater degree of leniency, by adjusting her demands down. As a result, a is able to devote more effort to the pursuit of the factional goal. But this adjustment affects politician b's trade-off in precisely the same way: his legislative team mate now has additional time to work with him as a result of his more lenient voter. Voter B recognizes that, at her old contract, her representative b would now be prepared to shirk regardless of the behavior of representative a. In order to re-balance her own representative's trade-offs, voter B is forced to become correspondingly more lenient. This spiral of adjustment continues until we reach a new equilibrium in which each voter's demands fall to $\hat{\underline{u}}^A = .338$ and $\hat{\underline{u}}^B = .554$, respectively. The new equilibrium payoffs are $U(\hat{\underline{u}}^A) = .299$ and $U(\hat{\underline{u}}^B) = .486$. Clearly, both voters are strictly worse off. But *both* politicians enjoy a lower hurdle to re-election.

More generally, Proposition 4 shows that the progressive erosion of electoral control that takes place in each district renders even voter B strictly worse off after the increase in her representative's human capital, in spite of the fact that her politician has become inherently more productive. Notice that the voters themselves play a central role in this story. By competing implicitly with one another for control of their own representative, they force each other into a spiral of collective deleterious adjustments, rewarding their representatives with re-election on a thinner record of constituency service.

7 Extensions

In this section, we discuss our most important assumptions, and ways in which they can be relaxed. We discuss our first extension in detail, and elsewhere confine the formal extensions to the Appendix.

Sanctioning versus selection: In our baseline model, each voter is indifferent at the time of her decision between re-election and dismissal: her decision has no *direct* payoff consequences. This implicitly endows voters with the freedom to choose any schedule of rewards for any level of constituency service. As such, voting serves purely as a tool for *sanctioning* past performance.

A complementary perspective is that voting is also a tool for *selecting* politicians whose characteristics are valued by voters. If, at the time of an election, the voter's assessment of the representative is strictly higher *or* strictly lower than that of his potential replacement, the voter will have a strict preference over her re-election decision. Any act of sanction arises indirectly via the primary objective of selecting politicians.[14]

We provide conditions for the failure of the Appropriability Theorem in a two-period career concerns model of electoral selection (Persson & Tabellini, 2000). Ironically, even when voters rationally use elections to select politicians with higher human capital, they may suffer when the aggregate level of human capital increases.

Suppose that voters and representatives believe that each representative's quality q is a random variable which is equally likely to be low ($q = 0$) or high ($q = \bar{q} \in (0, 1)$). For simplicity, we assume that each voter's payoff (u^J) is either 0 or 1; if her representative devotes time t^j to constituency service, $u^J = 1$ with probability qt^j. Representatives therefore value re-election both because they receive a lump-sum payoff of 1, and because of the continuation payoff from future factional pursuits.

At the second date, each representative (either the representative from the first period if he was retained, or a new representative if he was replaced) allocates all of his time to the faction. This implies that the voter's value from a representative at the start of the second date is strictly increasing in his quality. In other words, *at the time of elections, voters place higher value on politicians of higher skills and experience*. This yields a simple retention rule for the voter: re-elects her representative if she receives a payoff $\underline{u}^J = 1$; otherwise replace her with the challenger.

Since each representative's payoff is linear in his time allocation, he either devotes all of his resources to the faction ($t^j = 0$), or to constituency service ($t^j = 1$). Moreover, if one representative devotes all of his resources to constituency service, the other representative strictly prefers to do so, since factional rewards cannot be produced solo.

LEMMA 2 *In the representatives' sub-game, if*

$$\theta \geq \left(\frac{2}{\bar{q}} + \bar{q}\mathbb{E}[\theta > 0]\right) \equiv \theta^*(\bar{q}),$$

each representative allocates all of his time to factional pursuits.[15] *Otherwise, each representative allocates all of his time to constituency service.*

[14] The implied latitude for voters' ability to sanction past performance in environments where the retention decision is not directly payoff-relevant is discussed and criticized by Fearon (1999).

[15] We use the notation $\mathbb{E}[\theta > 0] = \int_0^\infty \theta\, f(\theta) d\theta$.

The first term in θ^* reflects the fact that more time allocated to constituency service induces a higher prospect of re-election.[16] The second term reflects the fact that the politician benefits more in the future from being high ability when the realized opportunity to achieve factional goals (θ) is high. This benefit is indirectly increased by the screening power of elections: from either politician's perspective, the expected quality of the other politician in the second period is higher than in the first.

When the expected quality of a politician $\bar{q}$ increases, there are two competing effects. First, conditional on the benefits of the factional pursuit not being too large, i.e., $\theta \leq \theta^*$, a higher $\bar{q}$ raises the level of constituency benefits delivered to the voter. But increased skills also raise each representative's value to pursuing factional activities, possibly lowering the threshold θ^*. If this latter effect is sufficiently strong, the first-order impact of increasing expected productivity is to increase the diversion of politicians' time away from constituency service.

PROPOSITION 5 *There exist primitives $F(\cdot)$ and $\bar{q}$ such that the voter's payoff is strictly decreasing in $\bar{q}$: the Appropriability Theorem fails.*

We illustrate with a numerical example, providing further analytic results in the Appendix.[17]

EXAMPLE 1 *Let $f(\theta) = 2\theta$, where $\theta \in [0, 1]$. Then, the voter's payoff is strictly decreasing in $\bar{q} \in (0, 1)$.*

In our benchmark analysis, the voter is able to change her demands as the skills of her politician change. In the Lenient Equilibrium, this harms the voter since her rational response to higher skills is to lower her demands. In the present setting, however, her demands are unresponsive to changes in human capital, since $\bar{q}$ is symmetric across both challengers and incumbents. This implies that she is *always* better off on the intensive margin.

However, the voter may suffer on the extensive margin if the increased attractiveness of factional activities diverts the attention of her representative. Precisely because of the voter's lack of commitment, she cannot scale back her demands in order to re-balance her representative's trade-offs. Thus, even in the setting with selection, voters may fail to capture the benefits of improved skills and experience.[18]

[16]It is multiplied by 2 because of the comparative advantage of performing constituency service: in order to enjoy the fruits of factional pursuits, *both* representatives must be high ability, with probability $\frac{1}{4}$. But in order to derive a return from constituency service, only the representative in question needs to be high ability, with probability $\frac{1}{2}$.

[17]In this extension, $F(0) > 0$ generates a strict preference on the part of the voter for retaining representatives of high quality, but in this example we set $F(0) = 0$ for simplicity. In the Appendix, we study a more general distribution function $f(\theta; \epsilon) = \frac{2\theta}{1-\epsilon^2}$ on support $[-\epsilon, 1]$ for $\epsilon \in [0, 1)$, and show that our result also holds even when $\epsilon > 0$. The example then corresponds to the special case $f(\theta; 0)$ for $\theta \in [0, 1]$.

[18]Another reason why the voter might lack the implicit freedom that is derived in a pure moral hazard framework could arise

Valuable factional goals: In the baseline model, voters do not value their politicians' connivance in legislative-factional politics. We consider an alternative setting in which voters derive a benefit from factional activities, which is unobserved at the time they decide whether to re-elect their representatives.[19] We suppose that each voter's expected benefit from the factional activity is $\zeta q^j q^{-j}(1-t^j)(1-t^{-j})$, where $\zeta \geq 0$.

When $\zeta = 0$, a voter derives value only from her own representative's constituency service; when $\zeta > 0$, however, each voter derives value from the actions of *both* representatives, since the factional reward is the product of each of their quality-adjusted time allocations. There are two potential strategic consequences. First, a voter might adjust her demands in order to divert her *own* representative away from constituency service to factional service. Second, a voter might adjust her demands in order to divert the *other* representative away from constituency service towards factional service.

Our analysis is guided primarily by the issue of robustness. In particular, we ask: when does an improvement in human capital force voters to lower their demands on their representatives, when they would otherwise strictly prefer their politicians to focus their ability and skills on constituency service? That is, when does the electoral externality across districts which generates our welfare result continue to exist?

Recall that each voter's benefit from the factional pursuit depends not only on ζ, but also on both representatives quality-adjusted time allocated to that activity. $q^j q^{-j}(1-t^j)(1-t^{-j})$. When one voter lowers her standard, the marginal cost is constant, since her payoff is linear in constituency service. But the marginal benefit of asking her own representative for less constituency service depends on her forecast of how much time the other voter's politician will put into factional service $(1-t^{-j})$, and her own intrinsic quality, q^{-j}. The latter is a primitive, but the former depends on the strategy of the other voter.

Suppose that the quality of the other politician (q^{-j}) is low, or the other voter is leaving her very little time to devote to the faction, i.e., $\frac{u^{-J}}{q^j}$ is large, or that the distribution of θ—the representatives' private return from factional pursuits—makes it likely that he will opt to serve his voter. Then, voter J's benefit from encouraging

if she had an intrinsic bias to retain or replace the incumbent. This could arise, for example, due to her partisan attachments. Our results are robust to the introduction of such intrinsic motives, so long as they are not overwhelming relative to the difference in expected payoffs from a high- versus a low-ability politician. We thank an anonymous referee for pointing out this additional source of potential dynamic inconsistency in the voter's re-election decision.

[19] Allowing observable factional output has consequences with respect to voters' payoffs and information. If a voter can observe the output from the legislative-factional activity, she can infer the realization of θ. This would allow her to offer more complicated re-election contracts that constrain her politician to a significantly greater degree. Besides the theoretical implications, un-observability can be defended on empirical grounds: while voters observe the aggregate output of legislative activity, it is usually hard for a politician to credibly claim credit for these outcomes. As Grimmer (2013a and 2013b) documents, legislators typically choose to campaign on individual accomplishments that do not suffer from this problem.

her representative to divert attention to the faction is decreased: in essence, she does not want her politician focusing on the team output if she expects that the other member of the team (the other district's representative) is unlikely to make a valuable contribution.

In the Appendix, and in line with this discussion, we formulate a simple condition that must be satisfied in order for the electoral externality at the core of our results to hold. The condition is: $\max\{q^a, q^b\} < \frac{1}{2\zeta}$. This clarifies the empirical contexts in which the pathologies of electoral control that we identify in the benchmark analysis are most likely to arise. Our analysis is most likely to be relevant when representatives' private return from factional activities is not too high and when the innate quality of politicians is also not too large—a phenomenon that is consistent with our model's implications for the voter's revealed preferences over politicians' quality.

Factions and Strategic Complementarity We assume that the production of legislative-factional benefits for politicians is characterized by strategic complementarity, an assumption that we believe captures important aspects of legislative politics and is supported by anecdotal evidence (cfr. Section 3.1). However, an alternative perspective is that cliques allow their members to specialize on specific tasks within the group.

To see how the Appropriability Theorem might fail in this environment, suppose that the contributions of each politician to the legislative-factional output are strategic substitutes. In the legislators' subgame, one politician has incentives to free-ride on the other's factional work while continuing to secure his own re-election. Depending on the strategies played by each voter, the burden may fall disproportionately upon one politician to serve as the "party mule."

Consider an increase in the human capital of the politician who was doing comparatively less of the factional work. This improvement leads to a re-balancing of legislative-factional tasks between the politicians, and thus to a more equal division of labor between them with respect to the pursuit of these goals. This makes one voter worse off and effectively represents a transfer of extensive margin from her to the other voter. But there is a second effect which harms *both* voters. This arises from the existence of scenarios in which the factional goal can be achieved only if both politicians wholly apply themselves to its pursuit. Raising either politician's human capital increases the set of circumstances in which both politicians can, if and only if they work wholly in concert, achieve their goals. Thus, the equilibrium consequences of raising the skill of either politician may render both politicians more likely to abandon their respective voters (see Appendix B.1).

8 Conclusion

In this paper, we provide a framework to study the relationship between the skills and experience of politicians, and their performance towards voters. Our account is founded on the notion that politicians must balance the demands of "competing principals" (Carey, 2007), which we capture using a novel multi-principal, multi-agent theoretical framework. We show that when a common set of underlying skills may be applied to the satisfaction of these competing demands, the value of these skills to voters may be severely attenuated. Not only do voters often fail to capture any benefit from the presence of more able politicians: they may even suffer from it. Our results suggest that voters may be better served by less experienced or demonstrably qualified candidates.

Our theory complements a small but growing body of empirical work which attempts to relate the human capital of politicians to measures of their political outputs (Ferraz & Finan 2011, Gagliarducci & Nannicini 2013, Mocan & Altindag 2013, Fisman et al. 2013). One way to make sense of the rather mixed findings exemplified by these studies is to compare the contexts in which they take place. Our results suggest that in legislative environments where factional incentives are potent, or where party organizations are strong, one should expect to find a much weaker relationship between politicians' skills and experience, and the benefits that flow to voters. Our theory also suggests the importance of distinguishing between the 'inputs' and 'outputs' of representation: both *human capital* and *effort* are needed in order for voters to be served. Effort is not merely an output, but an input in the production function.

At a deeper level, our results raise a positive and normative challenge to contemporary theories of political economy: what does it truly mean for a politician to be 'better' or 'worse'? How do politicians' inherent capacity to produce benefits to voters actually translate into valuable political outputs? Even in the relatively simple environment presented here, these questions do not admit straightforward answers. We are hopeful, nonetheless, that the tractable framework we have presented can generate new avenues of theoretical and empirical research into the role of alternative institutional arrangements—in particular with respect to electoral institutions—in addressing the externalities faced by voters when attempting to control their representatives in multi-district environments. With respect to the normative analysis of political institutions, our theory shows that the internal organization of parties and the regulation of legislative factions—in particular, the strength and career implications of their internal power structures—can act as a fundamental constraint on the extent to which the human capital of politicians can be used for the greater good.

Appendix

A Proofs

Proof of Claim 1

Fix a strategy profile, and define $U_J = \{k \in \mathbb{R} : r^J(k) = 1\}$. We first prove two ancillary results.

CLAIM 4 *If* $k, k' \in U_J$ *and* $k < k'$, $t^j = \frac{k'}{q^j}$ *is played with probability* 0 *by* j *if* $\theta \geq 0$.

Proof. The payoff to j from choosing $t^j \in [0,1]$ is $\theta q^j q^{-j}(1 - t^{j'})(1 - t^j) + \mathbf{1}[q^j t^j \in U_J]$. Suppose $t^{j'} < 1$. Then, for any $\theta > 0$ (i.e., generically) it is immediate that a choice of $t^j = \frac{k'}{q^j}$ is strictly dominated by $\tilde{t}^j = \frac{k}{q^j}$, since in both cases she collects the payoff of 1, but in the latter, she obtains a higher payoff on the partisan activity. If $t^{j'} = 1$, or $\theta = 0$, the representative is indifferent over all effort levels, and by our earlier selection, she plays $t^j = \frac{k'}{q^j}$ with probability 0. □

CLAIM 5 *For any* $k \notin U_J$, $k > 0$, $t^j = \frac{k}{q^j}$ *is played with probability* 0 *by* j *if* $\theta \geq 0$.

Proof. Straightforward extension of the previous argument. □

CLAIM 6 *If* $\theta < 0$, *a representative* j*'s best response is to set* $t^j = 1$, *for any strategy* r^J *and* r^{-J}.

Proof. If representative j believes $t^{-j} < 1$ is played with positive probability, she strictly prefers $t^j = 1$. If she believes $t^{-j} = 1$ with probability 1, then $t^j = 1$ is a weak best response. By our earlier selection, she plays $t^j = 1$ with probability 1. □

Since the politician cannot feasibly deliver $u^J > q^j$, these claims imply that it is without loss of generality to restrict attention to strategies which specify $r^J(k)$ for $k \in [0, q^j]$. Define $\underline{u}_J$ such that $\{u \in U_J | u < \underline{u}_J\} = \emptyset$. First, we claim that $\underline{u}_J$ exists in an equilibrium. Suppose not. This implies $0 \notin U_J$, and for every $u \in U_J$, there exists $u' \in (0, u)$ such that $u' \in U_J$. This implies that whenever the realized θ is such that $\theta > 0$ and

$$\theta(1 - t^{-j}) \left(1 - \frac{u}{q^j}\right) q^j q^{-j} < 1 \tag{7}$$

for at least one $u \in U_J$, the best response of j does not exist, by Claim 4, which means that we cannot have an equilibrium.

By Claims 4 and 5, for any $\theta \geq 0$ (except a zero-measure set) representative j has a best response which is drawn from the set of actions $\{0, \frac{\underline{u}_J}{q^j}\}$, and whenever $\theta < 0$, a representative prefers $t^j = 1$. The same is true for representative $-j$. Then, let voter J choose a strategy in which she assigns $r^J(u) = 1$ if $u \geq \underline{u}_J$, and $r^J(u) = 0$ otherwise. This induces the same probability distribution over representative's actions in the representatives' subgame, and thus the same payoffs for all players. Since this is an equilibrium in cut-off strategies, the argument is complete. □

Proof of Claim 2

Since j faces lower standards, whenever he prefers allocating all effort towards the partisan activity, so does $-j$. As a consequence, there are four possible pure strategy equilibria. First, $t^j = t^{-j} = 0$, which requires j, who faces lower standards, to prefer forgoing reelection:

$$\theta q^j q^{-j} \geq \theta q^j q^{-j}(1 - \underline{u}^J/q^j) + 1.$$

Second, $t^j = \underline{u}^J/q^j$ and $t^{-j} = 0$, which requires j, who faces lower standards, to prefer re-election and $-j$, who faces very high standard, to prefer foregoing reelection:

$$\theta q^j q^{-j} < \theta q^j q^{-j}(1 - \underline{u}^J/q^j) + 1$$
$$\theta q^j q^{-j}(1 - \underline{u}^J/q^j) \geq \theta q^j q^{-j}(1 - \underline{u}^J/q^j)^{-j}(1 - \underline{u}^{-J}/q^{-j}) + 1.$$

Third, $t^j = \underline{u}^J/q^j$ and $t^{-j} = \underline{u}^{-J}/q^{-j}$, which requires both representatives to prefer re-election (depending on the difference between the re-election standards, either condition can be more stringent):

$$\theta q^j q^{-j}(1 - \underline{u}^J/q^j) \leq \theta q^j q^{-j}(1 - \underline{u}^J/q^j)^{-j}(1 - \underline{u}^{-J}/q^{-j}) + 1 \quad \text{if} \quad \underline{u}^J q^{-j} < \underline{u}^{-J} q^j - \underline{u}^J \underline{u}^{-J}$$
$$\theta q^j q^{-j} < \theta q^j q^{-j}(1 - \underline{u}^J/q^j) + 1 \quad \text{otherwise.}$$

Finally, $t^j = 1$ and $t^{-j} = 1$, whenever $\theta < 0$.

Proof of Claim 3

CLAIM 7 *Let* $H(u) = u\left[F\left(\frac{1}{uq'}\right) - F(0)\right] + qF(0))$. *Under the assumptions*

$$\arg\max_{u\in\left[0,q\frac{u'}{q'}\right]} H(u) = \min\left\{\frac{K}{q'}, q\frac{u'}{q'}\right\},$$

where K *is the unique positive solution of*

$$\frac{f(K^{-1})}{K} = F(K^{-1}) - F(0). \tag{8}$$

Moreover, $K \in \left[\frac{1}{2\mu}, \frac{1}{\mu}\right]$.

Proof. As a preliminary observation, notice that $H(u) > 0 \quad \forall u > 0$.

Step 1 We show that $H(u)$ is strictly concave in $\left[0, \frac{1}{\mu q'}\right)$ and strictly convex in $\left(\frac{1}{\mu q'}, q\frac{u'}{q'}\right]$, whenever the interval exists. To see that, notice that $H''(u) \propto f'\left(\frac{1}{uq'}\right)$. By the unimodality of the logistic pdf, $f'(x) > (\leq) 0 \Leftrightarrow x < (\geq)\mu$.

Step 2 We show that in the interval $\left[0, \frac{1}{\mu q'}\right)$, $H(u)$ admits a unique interior maximizer:

$$\frac{K}{q'} = \arg\max_{u\in\left[0,\frac{1}{q'\mu}\right]} H(u).$$

satisfying $K \in [\frac{1}{2\mu}, \frac{1}{\mu}]$. First, perform the following change of variable: $p = \frac{1}{uq's}$ and $m = \frac{\mu}{s}$. Then, we can write:

$$H'(u) = -\frac{pe^{m+p}}{(e^m + e^p)^2} + \frac{1}{e^{m-p} + 1} - \frac{1}{e^m + 1} \equiv G(p). \tag{9}$$

We observe:

$$G'(p) = \frac{pe^{m+p}\left(e^p - e^m\right)}{(e^m + e^p)^3} \propto e^p - e^m. \tag{10}$$

Suppose $K < \frac{1}{2\mu}$. Using our change of variables, this is equivalent to $p > 2m$, implying $G'(p) > 0$. Hence, it is sufficient to show that $G(2m; m) > 0$. We obtain

$$G(2m; m) = \frac{-2e^m m + e^{2m} - 1}{(e^m + 1)^2} \equiv \Gamma(m)$$

Since $\Gamma(0) = 0$, we just need to show that its derivative is positive. Differentiating $\Gamma(\cdot)$ yields

$$\Gamma'(m) = \frac{2e^m \left(e^m - 1\right) m}{\left(e^m + 1\right)^3} > 0.$$

We conclude that $K \geq \frac{1}{2\mu}$. Next, we show that $K \leq \frac{1}{\mu}$. Using the same change of variables as before, we have:

$$H'\left(\frac{1}{q'\mu}\right) = F(\mu) - F(0) - \mu f(\mu) = \frac{1}{2} - \frac{m}{4} - \frac{1}{1 + \exp(m)}.$$

To see why the derivative is negative, notice that

$$\frac{d}{dm}\left\{\frac{m}{4} + \frac{1}{1 + \exp(m)}\right\} = \frac{1}{4} - \frac{\exp(m)}{[1 + \exp(m)]^2} > 0$$

which follows from the fact that $\frac{\exp(m)}{[1+\exp(m)]^2}$ is decreasing.[20] Since $\left(\frac{m}{4} + \frac{1}{1+\exp(m)}\right)|_{m=0} = \frac{1}{2}$, we conclude that $K \leq \frac{1}{\mu}$.

Step 3 We show that in the interval $\left[\frac{1}{\mu q'}, q\frac{u'}{q'}\right)$, $H(u)$ is strictly decreasing. To do that, we perform the same change of variable as before:

$$H'(u) \equiv G(p) = -\frac{pe^{m+p}}{\left(e^m + e^p\right)^2} + \frac{1}{e^{m-p} + 1} - \frac{1}{e^m + 1}. \tag{11}$$

Given our assumptions on the range ($u \geq \frac{1}{\mu q'}$), it must be that $m \geq p$, so that $G'(p) < 0$. Since $G(0) = 0$, it must be that $G(p) = H'(u) < 0$ in $\left[\frac{1}{\mu q'}, q\frac{u'}{q'}\right)$. □

COROLLARY 1 *We have that* $\forall z \in \left(\frac{1}{2\mu}, \frac{1}{\mu}\right)$, $f(z^{-1}) > f(0)$.

Proof. Using the change of variable $\mu/s = m$, $1/(Ks) = p$, we have that

$$f(z^{-1}) > f(0) \Leftrightarrow \frac{\left(e^m + 1\right)^2 e^p}{\left(e^m + e^p\right)^2} > 1 \Leftrightarrow \left(e^p - 1\right)\left(e^{2m} - e^p\right) \geq 0,$$

Since, by Claim 7, $2m > p > m > 0$. □

CLAIM 8 *K is decreasing in μ.*

[20]Its derivative is proportional to $1 - \exp(m) < 0$) and $\frac{\exp(0)}{[1+\exp(0)]^2} = \frac{1}{4}$.

Proof. Let $\tilde{H}(z) = z[F(z^{-}1) - F(0)]$. Since $K = \arg\max_{z \in \left[\frac{1}{2\mu}, \frac{1}{\mu}\right]} \tilde{H}(z;\mu)$, we show that, in that domain, the function $\tilde{H}(z;-\mu)$ has increasing differences. To do that, notice that, since $\frac{dF(x)}{d\mu} = -f(x)$, we have $\frac{\partial \tilde{H}(z;\mu)}{\partial \mu} = z[f(0) - f(z^{-1})]$. Differentiating with respect to z yields

$$\frac{\partial^2 \tilde{H}(z;\mu)}{\partial \mu \partial z} = f(0) - f(z^{-1}) + \frac{f'(z^{-1})}{z}.$$

By Corollary 1, $f(0) - f(z^{-1}) < 0$. Since $z < 1/\mu$, we must have $\frac{f'(z^{-1})}{z} < 0$, which completes the proof. □

Proof of Proposition 3

CLAIM 9 *$U(u^J | \underline{u}^{-J} = q^{-j})$ is strictly increasing in its domain if and only if $q^j q^{-j} \leq K$.*

Proof. The claim follows from substituting $u^{-J} = q^{-J}$ in Claim 7. We obtain that $q^j \underline{u}^{-J}/q^{-j} = q^j$. Since $K/q^{-j} \geq q^j$, we must have that $q^j = \arg\max_{[0,q^j]} U(u^J | \underline{u}^{-J} = q^{-j})$. If, instead, $K/q^{-j} < q^j$, the unique interior solution is characterized in Claim 7. □

CLAIM 10 *$U(u^{-J} | \underline{u}^J = K/q^{-j})$ is maximized at $u^{-J} = q^{-J}$ if and only if $q^j q^{-j} \leq 2K$.*

Proof. Suppose, first, $q^j q^{-j} \leq 2K$. Feasibility of $\underline{u}^J = K/q^{-j}$ implies $q^j q^{-j} \geq K$. Consider, first, $U(u^{-J} | \underline{u}^J = K/q^{-j})$ for $u^{-J} \in [0, q^{-j}\underline{u}^J/q^j]$. Substituting $\underline{u}^J = K/q^{-j}$ allows us to re-write this first interval in voter $-J$'s strategy domain as $u^{-J} \in [0, \frac{K}{q^j}]$; moreover, $\frac{K}{q^j} \leq q^{-j}$ and Claim 7 implies that $U(u^{-J} | \underline{u}^J = K/q^{-j})$ is strictly increasing on $[0, q^{-j}\underline{u}^J/q^j]$. Since $q^j q^{-j} \leq 2K$, we have $q^{-j}K/(q^j q^{-j} - K) \geq q^{-j}$, and Proposition 2 establishes that $U(u^{-J} | \underline{u}^J = K/q^{-j})$ is strictly increasing on $u^{-J} \in [q^{-j}\underline{u}^J/q^j, q^{-j}]$. We conclude $U(u^{-J} | \underline{u}^J = K/q^{-j})$ is maximized at $u^{-J} = q^{-J}$ if $q^j q^{-j} \leq 2K$.

Suppose, instead, $q^j q^{-j} > 2K$, i.e., $q^{-j}K/(q^j q^{-j} - K) < q^{-j}$. As before, $U(u^{-J} | \underline{u}^J = K/q^{-j})$ is strictly increasing on $u^{-J} \in [q^{-j}\underline{u}^J/q^j, q^{-j}K/(q^j q^{-j} - K)]$. Now, however, we must also consider a strategy $u^{-J} \geq q^{-j}K/(q^j q^{-j} - K)$. Voter $-J$'s payoff from such a strategy is:

$$U(u^{-J} | \underline{u}^J = K/q^{-j}) = u^{-J}\left[F\left(\frac{1}{u^{-J}(q^j - K/q^{-j})}\right) - F(0)\right] + q^j F(0). \tag{12}$$

Differentiating this function and comparing it with equation 8 in Claim 7 establishes that this payoff is strictly decreasing whenever $u^{-J}(q^j - K/q^{-j}) > K$, that is whenever $u^{-J} > \frac{K}{q^j - K/q^{-j}}$, which is the lower bound of the interval under consideration. We conclude that $U(u^{-J}|\underline{u}^J = K/q^{-j})$ is maximized at $u^{-J} = q^{-j}K/(q^j q^{-j} - K)$ if $q^j q^{-j} > 2K$ $\square$

CLAIM 11 *When* $q^j q^{-j} > 2K$,
(i) $U(u^{-J}|\underline{u}^J = K/q^{-j})$ *is strictly quasi-concave in its domain, with a peak at* $u^{-J} = \frac{K}{q^j - K/q^{-j}}$.
(ii) $U(u^J|\underline{u}^{-J} = \frac{K}{q^j - K/q^{-j}})$ *is strictly decreasing in* $\left[q^j \frac{K}{q^j q^{-j} - 2K}, q^j\right]$*, when it exists.*

Proof. Part (i) is immediate from the proof of Claim 10.
Part (ii). By a similar argument of the necessity part of Claim 10, $U(u|\underline{u}^{-J} = \frac{K}{q^j - K/q^{-j}})$ is strictly decreasing in the interval

$$\left[q^j \frac{\underline{u}^{-J}}{q^{-j} - \underline{u}^{-J}}, q^j\right] = \left[q^j \frac{K}{q^j q^{-j} - 2K}, q^j\right]$$

provided it exists (which requires $q^j q^{-j} > 3K$). $\square$

We now prove the Proposition. Part (i) follows directly from Claim 9. Part (ii) follows directly from Claims 7, 9 and 10. Consider, finally, part (iii). The optimality of $-J$'s strategy is immediate from Claim 11.i. So, we need only establish that J's best response to $\underline{u}^{-J} = \frac{K}{q^j - K/q^{-j}}$ is $\underline{u}^J = K/q^{-j}$. By Claim 11.ii and Claim 7, J's best response is either K/q^{-j} or $q^j \min\{\frac{K}{q^j q^{-j} - 2K}, 1\}$. Notice that Claim 9 and the fact that $q^j q^{-j} > 2K > K$ immediately imply that K/q^{-j} dominates q^j. Hence, we just need to show that, when $q^j q^{-j} > 3K$, K/q^{-j} also dominates $q^j \frac{K}{q^j q^{-j} - 2K}$. This is equivalent to showing that, when $q^j q^{-j} > 3K$

$$U\left(K/q^{-j} \,\middle|\, \underline{u}^{-J} = \frac{K}{q^j - K/q^{-j}}\right) > U\left(\frac{q^j K}{q^j q^{-j} - 2K} \,\middle|\, \underline{u}^{-J} = \frac{K}{q^j - K/q^{-j}}\right) \tag{13}$$

Substituting for the expression of $U(\cdot)$, equation (13) is equivalent to

$$\frac{K}{q^{-j}}\left[F\left(\frac{1}{K}\right) - F(0)\right] > \frac{q^j K}{q^j q^{-j} - 2K}\left[F\left(\frac{q^{-j} q^j - K}{K q^j q^{-j}}\right) - F(0)\right]$$

Since $q^j q^{-j} > 3K$, we have that

$$\frac{q^j K}{q^j q^{-j} - 2K}\left[F\left(\frac{q^{-j} q^j - K}{K q^j q^{-j}}\right) - F(0)\right] < \frac{K}{q^{-j}}\left[F\left(\frac{q^{-j} q^j - K}{K q^j q^{-j}}\right) - F(0)\right] < \frac{K}{q^{-j}}\left[F\left(\frac{1}{K}\right) - F(0)\right]$$

hence, K/q^{-j} is the unique best response to $\underline{u}^{-J} = \frac{K}{q^j - K/q^{-j}}$.

Proof of Lemma 1

Define by $V^J(q^j, q^{-j})$ voter J's equilibrium value from the electoral game. In the demanding voter equilibrium,

$$V^J(q^j, q^{-j}) = q^j F[(q^j q^{-j})^{-1}].$$

In the Semi-Demanding Equilibrium, the value to each voter is given by

$$\begin{aligned} V^J(q^j, q^{-j}) &= KF[(K)^{-1}]/q^{-j} + F[0](q^j - K/q^{-j}) \\ V^{-J}(q^j, q^{-j}) &= q^{-j} F[(K)^{-1}]. \end{aligned}$$

Finally, in the Lenient voter equilibrium, the value to each voter is given by

$$\begin{aligned} V^J(q^j, q^{-j}) &= KF[(K)^{-1}]/q^{-j} + F[0](q^j - K/q^{-j}) \\ V^{-J}(q^j, q^{-j}) &= KF[(K)^{-1}]/(q^j - K/q^{-j}) + F[0](q^{-j} - K/(q^j - K/q^{-j})). \end{aligned}$$

Simple inspection leads to the conclusion that each voter is weakly worse off when the quality of the other voter's representative increases.

Proof of Proposition 4

We use the values defined in the proof of the previous Lemma. In the demanding voter equilibrium, we have $V^J_{q^j} = F[(q^j q^{-j})^{-1}] - f[(q^j q^{-j})^{-1}]/q^j q^{-j} > 0$ by $K \geq q^j q^{-j}$. In the Semi-Demanding equilibrium, we have $V^J_{q^j} = F[0] > 0$, and $V^{-J}_{q^{-j}} = F[K^{-1}] > 0$. In the Lenient Voter equilibrium, we have $V^J_{q^j} = F[0] > 0$, and

$$V^{-J}_{q^{-j}} = \frac{-K^2}{(K - q^{-j} q^j)^2}(F[K^{-1}] - F[0]) + F[0]. \tag{14}$$

We therefore want to establish conditions under

$$\frac{K^2}{(K - q^{-j} q^j)^2}(F[K^{-1}] - F[0]) > F[0] \tag{15}$$

Step 1: We show that the LHS of (15) is strictly increasing in K. The derivative takes the sign:

$$2\frac{q^j q^{-j}}{q^j q^{-j} - K}\left(F(K^{-1}) - F(0)\right) - K^{-1}f(K^{-1}), \tag{16}$$

which takes the sign of $2\frac{q^j q^{-j}}{q^j q^{-j}-K} - 1 > 0$ since K is defined by $F(K^{-1}) - F(0) = K^{-1}f(K^{-1})$.

Step 3: We have shown that $K \in \left(\frac{1}{2\mu}, \frac{1}{\mu}\right)$. The upper bound on K implies that is sufficient to establish:

$$\frac{K^2}{(K - q^{-j}q^j)^2}\left(\frac{1}{2} - F[0]\right) > F[0]. \tag{17}$$

In turn, $\frac{K^2}{(K-q^{-j}q^j)^2}$ is strictly increasing in K, so we can evaluate this term at $K = \frac{1}{2\mu}$, and obtain the sufficient condition:

$$\varphi(\mu) = \exp[\mu/s] - 3 + 8q^j q^{-j}\mu - 8(q^j)^2(q^{-j})^2\mu^2 > 0. \tag{18}$$

We have $\lim_{\mu\to\infty}\varphi(\mu) = \infty$, which completes the argument.

B Extensions and additional results

B.1 Substitutability in factional goals

This section supports the discussion in section 7 of the main text. Suppose that the payoff from factional activities is as follows

$$w(\mathbf{t}, \mathbf{q}, \theta) = \begin{cases} R > 1 & \text{if } (1-t^j)q^j + (1-t^{-j})q^{-j} > \theta \\ 0 & \text{otherwise} \end{cases},$$

where θ is drawn, as in the original model, from a logistic distribution with location μ and scale s (but whose interpretation is now related to the cost, rather than the benefit, of factional activities). In that case, the representatives' subgame has five equilibrium subregions, depending on the realization of θ, $Q \equiv q^j + q^{-j}$, and the voters' thresholds. Specifically, and assuming wlog that $u^J < u^{-J}$, we have the following result (whose proof, based on the same logic as Claim 2, is omitted).

CLAIM 12 *The representatives' subgame has the following equilibria:*

(i) when $\theta \leq Q - u^J - u^{-J}$*, both politicians serve their constituents*

$$\{t^j = u^J/q^j;\, t^{-j} = u^{-J}/q^{-j}\}$$

(ii) when $\theta \in (Q - u^J - u^{-J}, Q - u^{-J}]$*, either politician can be the party mule:*

$$\{t^j = u^J/q^j;\, t^{-j} = 0\} \text{ or } \{t^j = 0;\, t^{-j} = u^{-J}/q^{-j}\}$$

(iii) when $\theta \in (Q - u^{-J}, Q - u^J]$*, only politician* $-j$ *shirks (is the only possible party mule)*

$$\{t^j = u^J/q^j;\, t^{-j} = 0\}$$

(iv) when $\theta > (Q - u^J, Q]$*, neither politician serves his voter*

$$\{t^j = 0;\, t^{-j} = 0\}.$$

(v) when $\theta > Q$*, both politicians serve their voters*

$$\{t^j = u^J/q^j;\, t^{-j} = u^{-J}/q^{-j}\}.$$

As is standard in the literature, we select on the welfare-maximizing equilibrium whenever there is multiplicity. This leads to selecting, in the range $[\theta_1, \theta_2]$, the equilibrium $\{t^j = 0;\, t^{-j} = u^{-J}/q^{-j}\}$. We now move to the analysis of the strategic interaction between the two voters. The voters' payoff functions (maintaining that $u^J < u^{-J}$) are given by:

$$\begin{aligned} U^{-J}(u|u^J) &= [1 - F(Q) + F(Q-u)]u \\ U^J(u|u^{-J}) &= [1 - F(Q) + F(Q - u - u^{-J}) + F(Q-u) - F(Q - u^{-J})]u. \end{aligned}$$

We now illustrate the potential failure of the Appropriability Theorem. Consider $q^a = 10$ and $q^b = 15$, $\mu = 25$ and $s = \frac{1}{10}$. We obtain a 'demanding' equilibrium in which each voter asks for all the available time of her politician: $\underline{u}^A = q^a$ and $\underline{u}^B = q^b$. The equilibrium payoffs for each voter are $U(\underline{u}^A) = 5$

and $U(\underline{u}^B) = 7.5$. Now, consider an increase in the quality of representative a to $q^a = 10.1$. Both voters continue to hold their representatives to the most demanding standard, but their equilibrium values fall to $U(\underline{u}^A) = 2.716$ and $U(\underline{u}^B) = 4.034$. There is a common loss to both voters which arises from a widening of the interval $(Q - u^J, Q]$. This is the interval in which both politicians enjoy the payoff R if and only if they both apply themselves entirely to the faction (point (iv) above). But voter A further suffers because the set of θ realizations for which her politician becomes the party mule (according to region (ii) of the legislators' subgame) increases. This is partly a transfer to voter B, but if the loss on the extensive margin due to the previous effect is sufficiently large, both voters are worse off. Note that this comparative static also applies if, in the representatives' subgame when either politician can be the party mule (ii), we select the equilibrium $\{t^j = u^J/q^j; t^{-j} = 0\}$.

B.2 Sanctioning versus Selection

We first prove that the voter's optimal retention is to retain her representative if and only if she receives the payoff $u^J = 1$.

LEMMA 3 *The voter re-elects her representative if she receives a payoff $\underline{u}^J = 1$; otherwise, she replaces her representative.*

Proof. The strategy of the representative in district J's induces a CDF $\sigma^j(t^j)$ over time allocations. For any $\sigma^j \in \Delta[0,1]$, such that $\sigma^j(0) < 1$, we have $\Pr(u^J = 1|q = \bar{q}, \sigma^j) \in (0,1)$ and $\Pr(u^J = 1|q = 0, \sigma^j) = 0$. If a strategy induces $\sigma^j(0) = 1$, we impose the off-path belief $\Pr(q = \bar{q}|u^J = 1, \sigma^j) = 1$. Thus, we obtain:

$$\Pr(q = \bar{q}|u^J = 0, \sigma^j) = \frac{1 - \Pr(u^J = 1|\bar{q}, \sigma^j)}{2 - \Pr(u^J = 1|\bar{q}, \sigma^j)} < \frac{1}{2}. \tag{19}$$

Moreover:

$$\Pr(q = \bar{q}|u^J = 1, \sigma^j) = 1 > \frac{1}{2}, \tag{20}$$

The voter's continuation payoff at the start of the second period from a representative is strictly increasing in her posterior belief that the incumbent is high ability, since $F(0) > 0$. Since the prior belief over the challenger's ability places probability $\frac{1}{2}$ on her being ability $q = \bar{q}$, this implies that the voter's strictly prefers to re-elect if $\underline{u}^J = 1$, and strictly prefers to replace if $\underline{u}^J = 0$. □

Proof of Lemma 2

Given a realization of θ, suppose that representative j conjectures that representative $-j$ chooses a strategy over effort levels which is represented by a cumulative distribution function $\tau(t^{-j}|\theta)$. Then, her payoff from effort choice t^j is:

$$\theta(1-t^j)(1-\mathbb{E}_\tau[t^{-j}])\left(\frac{\bar{q}}{2}\right)^2+\left(\frac{\bar{q}}{2}\right)(t^j)+\left(\frac{\bar{q}}{2}\right)t^j\mathbb{E}[\theta>0]\bar{q}\mathbb{E}[q^{-j}], \tag{21}$$

where $\mathbb{E}[\theta > 0] \equiv \int_0^\infty \theta f(\theta)d\theta$ and the expected quality of representative $-j$ is a weighted average of the quality conditional on reelection ($\bar{q}$) and the quality conditional on no-reelection ($\bar{q}/2$):

$$\mathbb{E}[q^{-j}]=\frac{\bar{q}}{2}\mathbb{E}_\tau[t^{-j}]\bar{q}+\left(1-\frac{\bar{q}}{2}\mathbb{E}_\tau[t^{-j}]\right)\frac{\bar{q}}{2}=\frac{\bar{q}}{2}\left(1+\frac{\mathbb{E}_\tau[t^{-j}]\bar{q}}{2}\right).$$

Each representative's objective is linear in t^j: if indifferent over multiple positive effort levels, we maintain our earlier assumption that the representative chooses the smallest level of effort in her set of best responses. Together, this implies that the best response of the representative is either $t^j = 0$ or $t^j = 1$. This completes the first part.

Next, we observe that if representative j anticipates $t^{-j} = 1$, then her strict best response is $t^{-j} = 1$. If she anticipates $t^{-j} = 0$, simple algebra establishes that her best response is to choose $t^j = 0$ if and only if:

$$\theta \geq \frac{2}{\bar{q}}+\bar{q}\mathbb{E}[\theta>0]\equiv\theta^*(\bar{q}). \tag{22}$$

Since each representative's problem is symmetric, this establishes that $t^a = t^b = 0$ if $\theta \geq \theta^*$, and $t^a = t^b = 1$ otherwise.

Proof of Proposition 5

The voter's payoff as a function of $\bar{q}$ is:

$$V(\bar{q})=F(\theta^*(\bar{q}))\left(\frac{\bar{q}}{2}(1+F(0)\bar{q})+\left(1-\frac{\bar{q}}{2}\right)\frac{\bar{q}}{2}F(0)\right)+(1-F(\theta^*(\bar{q})))\frac{1}{2}\bar{q}F(0) \tag{23}$$

$$=\frac{\bar{q}}{2}\left(F(\theta^*(\bar{q}))+F(0)\left(1+\frac{\bar{q}}{2}F(\theta^*(\bar{q}))\right)\right). \tag{24}$$

Taking the derivative with respect to $\bar{q}$ and factoring out one half yields:

$$F(\theta^*(\bar{q})) + \bar{q}f(\theta^*(\bar{q}))\frac{\partial\theta^*(\bar{q})}{\partial\bar{q}} + F(0)\left(1 + \bar{q}F(\theta^*(\bar{q})) + \frac{\bar{q}^2}{2}f(\theta^*(\bar{q}))\frac{\partial\theta^*(\bar{q})}{\partial\bar{q}}\right). \tag{25}$$

Our result claims that there exist primitives $\bar{q}$ and $F(\cdot)$ for which this expression is strictly negative. Define the distribution $f(\theta) = \frac{2\theta}{1-\epsilon^2}$ for $\epsilon \in (0,1)$ on support $[-\epsilon, 1]$. Then, we have $\mathbb{E}[\theta > 0] = \frac{2}{3}\frac{1}{1-\epsilon^2}$ and $\theta^*(\bar{q}) = \frac{2\bar{q}}{3-3\epsilon^2} + \frac{2}{\bar{q}}$. Substituting into (25) yields an expression which is continuous in ϵ for all $\epsilon \in [0,1)$. Evaluated at $\epsilon = 0$, (25) is equal to $\frac{4}{3}\left(\bar{q}^2 - \frac{3}{\bar{q}^2} + 2\right) < 0$ for all $\bar{q} \in (0,1)$. Continuity in ϵ implies there exists $\bar{\epsilon} > 0$ such that the sign also applies for any $0 < \epsilon < \bar{\epsilon}$. The case $\epsilon = 0$ corresponds to the example given in the text.

B.3 Valuable Factional Goals

In the baseline model, we assume that voters are *at best* indifferent about politician's connivance in legislative-factional politics. This is rhetorically valuable, since it allows us to capture the conflict of interest between voters and politicians in a stark fashion. Despite the presence of several examples in which this is a reasonable approximation of constituents' attitudes, there are other situations where voters should reasonably expect to benefit either directly or indirectly from non-constituency service related activities undertaken by their representative. In this section, we address the model's robustness to these considerations.

Suppose that the voter's benefit from politicians' factional activities is unobserved at the time of the reelection decision.[21]. As a starting point, it seems natural to assume that each voter obtains a certain benefit $\zeta q^j q^{-j}(1-t^j)(1-t^{-j})$. One can then interpret the baseline model as a special case of this setting where $\zeta = 0$.

It is immediate to notice that the the analysis of the politicians' subgame is unaffected, and that all the results up to Claim 2 still hold. However, the voter's objective function is now augmented by their factional payoff. As a result, the voter is also directly affected by the *other politician's* decision to shirk. In particular, when she is significantly more lenient than the other voter (that is $u \leq \frac{q^j - u}{q^{-j}}\underline{u}^{-J} \Leftrightarrow u \leq \frac{q^j \underline{u}^{-J}}{q^{-j}+\underline{u}^{-J}}$), there are two relevant thresholds for θ: one below which her politicians chooses to meet his reelection standard, and another (lower) below which also the other politician chooses to meet his reelection criterion. Since she is a residual claimant

[21] Allowing observable factional output changes substantially the strategic interaction between voters and politicians: If a voter can observe the output from the legislative-factional activity, she can infer the realization of θ and thus condition her re-election standard on it. Empirically, we also find this assumption plausible: While voters can observe the aggregate output of legislative activity, it is usually hard for a politician to credibly claim credit for these outcomes (Grimmer, 2013a and 2013b)

of the other politicians' factional time, her expected payoff is lower in below this second threshold. After some tedious algebra, it is possible to show that the voter's expected payoff $U(u)$ is given by

$$\zeta q^j q^{-j} + F(0)(q^j+\Psi) - u\Phi F(0) + \begin{cases} u(1-q^{-j}\zeta)F\left(\frac{1}{uq^{-j}}\right) - \zeta \underline{u}^{-J}(q^j-u)F\left(\frac{1}{\underline{u}^{-J}(q^j-u)}\right) & \text{if} \quad u \leq \frac{q^j\underline{u}^{-J}}{q^{-j}+\underline{u}^{-J}} \\ (u\Phi - \Psi)F\left(\frac{1}{uq^{-j}}\right) & \text{if} \quad u \in \left(\frac{q^j\underline{u}^{-J}}{q^{-j}+\underline{u}^{-J}}, \frac{q^j\underline{u}^{-J}}{q^{-j}}\right] \\ (u\Phi - \Psi)F\left(\frac{1}{\underline{u}^{-J}q^j}\right) & \text{if} \quad u \in \left(\frac{q^j\underline{u}^{-J}}{q^{-j}}, \frac{q^j\underline{u}^{-J}}{q^{-j}-\underline{u}^{-J}}\right] \\ u\Phi F\left(\frac{1}{u(q^{-j}-\underline{u}^{-J})}\right) - \Psi F\left(\frac{1}{\underline{u}^{-J}q^j}\right) & \text{if} \quad u > \frac{q^j\underline{u}^{-J}}{q^{-j}-\underline{u}^{-J}} \end{cases}$$

where $\Phi = 1 - \zeta(q^{-j} - \underline{u}^{-J})$ and $\Psi = \zeta q^j \underline{u}^{-J}$.

CLAIM 13 *(i) If $\zeta < 1/q^{-j}$, then the function $U(\cdot)$ is strictly increasing in $\left(\frac{q^j}{q^{-j}}\underline{u}^{-J}, \frac{q^j}{q^{-j}-\underline{u}^{-J}}\underline{u}^{-J}\right]$.*
Moreover, there exists $\overline{\zeta} < 1/2q^{-j}$, such, for all $\zeta \in [0, \overline{\zeta}]$
(ii) in any equilibrium, $U(\cdot)$ has a unique maximizer in $[0, \frac{q^j\underline{u}^{-J}}{q^{-j}}]$.
(iii) $U(\cdot)$ is strictly decreasing in $\left(\frac{q^j}{q^{-j}-\underline{u}^{-J}}\underline{u}^{-J}, q^j\right]$.
(iv) in any equilibrium, any interior local maximizer of $U(\cdot)$ in $[0, \frac{q^j}{q^{-j}}\underline{u}^{-J}]$ is decreasing in q^{-j}.

Proof. (i) Differentiating in the relevant interval yields $U'(u) \propto \left[F\left(\frac{1}{\underline{u}^{-J}q^j}\right) - F(0)\right]\Phi > 0$ if $\Phi > 0$, which is equivalent to $\zeta < \frac{1}{q^{-j}}$.
(ii) and (iii) First, we show that any interior lenient optimum has to be strictly larger than K, then we argue that $U(\cdot)$ has to be decreasing in $\left[\frac{q^j\underline{u}^{-J}}{q^{-j}-\underline{u}^{-J}}, q^j\right]$. Finally, we argue that, in equilibrium, any interior lenient optimum has to be in $\left(\frac{q^j\underline{u}^{-J}}{q^{-j}+\underline{u}^{-J}}, \frac{q^j\underline{u}^{-J}}{q^{-j}}\right]$.
Step 1. We study the behavior of $U(u)$ in $\left(\frac{q^j\underline{u}^{-J}}{q^{-j}+\underline{u}^{-J}}, \frac{q^j\underline{u}^{-J}}{q^{-j}}\right]$. Proceeding as in the analysis of the baseline model, we can define the following function: $\hat{H}(z) = (z\Phi - \Psi)F(z^{-1}) - \Phi F(0)$. Differentiating it yields

$$\hat{H}'(z) \propto F(z^{-1}) - F(0) - \frac{f(z^{-1})}{z} + \frac{\Psi}{\Phi}\frac{f(z^{-1})}{z^2}$$
$$\hat{H}''(z) \propto f'(z^{-1})\left(1 - \frac{\Psi}{\Phi}z^{-1}\right) - 2\frac{\Psi}{\Phi}f(z^{-1})$$

First, whenever $z < \mu^{-1}$, $\hat{H}(z)$ is strictly quasi-concave. Second, $\hat{H}(z)$ is strictly quasi-convex above μ^{-1}. Suppose that $\hat{H}''(z) > 0$, then it must be that $\hat{H}''(z') > 0$ for all $z' > z$. To see that, notice that, after expressing

$f'(\cdot)$ as a function of $f(\cdot)$, we obtain

$$\hat{H}''(z) \propto \frac{e^{\mu/s} - e^{z^{-1}/s}}{e^{\mu/s} + e^{z^{-1}/s}} \left(1 - \frac{\Psi}{\Phi} z^{-1}\right) s^{-1} - 2\frac{\Psi}{\Phi}$$

Since $\frac{e^{\mu/s} - e^{x^{-1}/s}}{e^{\mu/s} + e^{x^{-1}/s}}$ and $\left(1 - \frac{\Psi}{\Phi} x^{-1}\right)$ are both increasing, $\hat{H}''$ crosses the zero only once, from below. We can then conclude that $U(u)$ is strictly quasi-concave in $\left(\frac{q^j}{q^{-j}} \underline{u}^{-J}, \frac{q^j}{q^{-j} - \underline{u}^{-J}} \underline{u}^{-J}\right]$. Moreover, we can also conclude that the optimal interior standard (when attainable) is strictly larger than K/q^{-j}, and depends on q^{-j} both directly and indirectly. We denote it by $M(q^{-j})/q^{-j}$, where M solves

$$F(z^{-1}) - F(0) - \frac{f(z^{-1})}{z} + \frac{\Psi}{\Phi} \frac{f(z^{-1})}{z^2} = 0 \tag{26}$$

Step 2. Notice that $U(u)$ in $\left[0, \frac{q^j \underline{u}^{-J}}{q^{-j} + \underline{u}^{-J}}\right]$ can be rewritten as

$$\zeta q^j q^{-j} + F(0)[q^j(1 - \zeta q^{-j}) + \Psi] + (1 - q^{-j}\zeta) u \left[F\left(\frac{1}{uq^{-j}}\right) - F(0)\right] + \zeta \underline{u}^{-J} \left[(u - q^j) F\left(\frac{1}{\underline{u}^{-J}(q^j - u)}\right) - uF(0)\right]$$

Since the second function is strictly increasing in u and the first is strictly increasing for $u \in [0, K/q^{-j}]$, by the analysis in the baseline model, we can conclude that any interior maximizer (when it exists), has to be strictly larger than K.

Step 3. Differentiating $U(u)$ in $u > \frac{q^j \underline{u}^{-J}}{q^{-j} - \underline{u}^{-J}}$ yields

$$U'(u) \propto \left(F\left(\frac{1}{u(q^{-j} - \underline{u}^{-J})}\right) - F(0) - f\left(\frac{1}{u(q^{-j} - \underline{u}^{-J})}\right) \frac{1}{u(q^{-j} - \underline{u}^{-J})}\right)$$

Since $u(q^{-j} - \underline{u}^{-J}) > q^j \underline{u}^{-J} > K$ (by the previous steps), we can conclude that the function is strictly decreasing in this subdomain. This proves part (iii). (iv) We return to the behavior of $U(u)$ in $\left(0, \frac{q^j \underline{u}^{-J}}{q^{-j}}\right]$. We claim in any equilibrium, $\arg\max_{\left(0, \frac{q^j \underline{u}^{-J}}{q^{-j}}\right]} U(u) \geq \frac{q^j \underline{u}^{-J}}{q^{-j} + \underline{u}^{-J}}$. Suppose not, that is the lenient voter chooses a standard in $\left[0, \frac{q^j \underline{u}^{-J}}{q^{-j} + \underline{u}^{-J}}\right]$. Then the other voter will find herself in the region where her objective function is strictly decreasing, by the previous step. As a consequence, she would reduce her standard at least up to the point where $u = \frac{q^j \underline{u}^{-J}}{q^{-j} + \underline{u}^{-J}}$. Notice that this process will continue until the optimal u is outside of the range $\left[0, \frac{q^j \underline{u}^{-J}}{q^{-j} + \underline{u}^{-J}}\right]$, and that this has to happen for strictly positive $\underline{u}^{-J}$. To see that, notice that, whenever $\underline{u}^{-J} \leq \frac{Kq^{-j}}{q^j q^{-j} - K}$, $U(u)$ is strictly increasing in $\left(0, \frac{q^j \underline{u}^{-J}}{q^{-j}}\right]$, by Step 3. Hence, there exists a strictly positive value of $\underline{u}^{-J}$ below which $\arg\max U(u) \geq \frac{q^j \underline{u}^{-J}}{q^{-j}+\underline{u}^{-J}}$. As a result, the optimal interior equilibrium choice of the more lenient voter has to be in the interval $\left(\frac{q^j \underline{u}^{-J}}{q^{-j}+\underline{u}^{-J}}, \frac{q^j}{q^{-j}}\underline{u}^{-J}\right]$. As a consequence, M/q^{-j} (characterized in the previous part of the proof) is the only possible interior standard.

(iv) To complete the proof, we show that when ζ is small enough

$$\frac{dM/q^{-j}}{dq^{-j}} \propto \frac{dM/M}{dq^{-j}/q^{-j}} - 1 < 0$$

Differentiating equation 26, and imposing ζ small enough yields

$$\frac{dM}{dq^{-j}} = \frac{f(M^{-1})}{M^3} \frac{\frac{d\Psi/\Phi}{dq^{-j}}}{-\hat{H}''} = \frac{\frac{d\Psi/\Phi}{dq^{-j}}}{2M^{-1}\Psi/\Phi - \frac{f'(M^{-1})}{f(M^{-1})}\frac{1}{M^3}\left(1 - \frac{\Psi}{\Phi}M^{-1}\right)} \geq \frac{\frac{d\Psi/\Phi}{dq^{-j}}}{2M^{-1}\Psi/\Phi}$$

since, as ζ approaches zero, $M^{-1} > \mu$, there exists $\overline{\zeta}$ below which the weak inequality above holds with equality. Finally, notice that, since $q^{-j}\frac{d\Psi/\Phi}{dq^{-j}} = \Psi/\Phi\frac{1+\zeta\underline{u}^{-J}}{\Phi}$, substituting this in the original condition yields

$$\Psi/\Phi\frac{1+\zeta\underline{u}^{-J}}{\Phi} < 2\Psi/\Phi\frac{M}{M} \Leftarrow 1 + \zeta q^{-j} < 2.$$

Since $\zeta q^{-j} < 2$, $\frac{dM/q^{-j}}{dq^{-j}} < 0$. As a consequence, the externality in electoral control still exists and goes in the same direction as in the baseline model. □