Factions and Political Competition[*]

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Abstract

This paper presents a new model of political competition where candidates belong to factions. Before elections, factions compete to direct local public goods to their local constituencies. The model of factional competition delivers a rich set of implications relating the internal organization of the party to the allocation of resources. In doing so, the model provides a unified explanation of two prominent features of public resource allocations: the persistence of (possibly inefficient) policies, and the tendency of public spending to favor incumbent party strongholds over swing constituencies.

1 Introduction

This paper presents a new model of political competition where candidates belong to intra-party factions. Before elections, hierarchical networks of party officials (factions) compete to direct local public goods to their constituencies and thereby win votes and advance their careers within the party. The model delivers a rich set of implications linking the allocation of public resources to the internal organization of the party. In doing so, the model provides a new and unified explanation of two prominent features of public resource allocations: the persistence of (possibly inefficient) policies, and the tendency of public spending to favor incumbent party strongholds over swing constituencies.

A vast formal literature has investigated the connection between elections and the allocation of public spending.[1] Virtually all of this literature treats competing political agents as singletons, be they candidates or parties, vested with the power to deliver or promise resources. This view is often oversimplified. In reality, the power to deliver public resources to a constituency is often *dispersed* among (networks of) party and government officials. To illustrate, consider the well-documented case of Lyndon Johnson and his successful efforts as a first-term U.S. Congressman to bring a massive New Deal dam project to his district in Texas.[2] Johnson needed to secure land rights, mobilize local support, obtain Congressional and regulatory approvals, and ensure both the appropriation of funds and their timely disbursement. Each of these processes was complex and fraught with political and legal obstacles. To achieve all this, Johnson tapped a network of contacts in the Democratic party to help with each step. This network ranged from the party rank and file in Texas, to Congressional leaders, to White House officials, each with an incentive to assist Johnson and his constituents. By this account, and others like it (see Section 2, below), the political allocation of resources results from a team effort: it depends on the size and power of the party faction available to each local representative.

This paper formalizes the notion that power is dispersed across a party hierarchy. We model the distribution of power across networks of party members (factions) and study the effects of this power pattern on the allocation of public resources. We begin our investigation with an exceedingly simple model, treating the faction as a team of fellow party offices. In the model each of many districts holds an election in which a party officer competes against a challenger. To win, it helps the office-holder to deliver local public goods before the election; and this delivery requires the assistance of fellow party officers. If it is in their self-interest,

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[1] This literature includes models where candidates can commit to policies—in one dimension (median voter, see Black 1948) or many dimensions (distributive politics, see Lindbeck and Weibull 1987)—and models where candidates cannot commit (citizen candidates, see Osborne and Slivinski 1996, Besley and Coate 1997). There are also agency models (Barro 1973, Persson, Roland and Tabellini 1997) and signaling models (the political cycle, Rogoff 1990), just to name a few.

[2] A vivid account is provided in Caro (1983, pp. 370-385 and 459-468).

these fellow officers can work to help bring public resources to a district. (This team of party officers corresponds to the network that helped Lyndon Johnson with the dam.) The party's promotion policy incentivizes faction members to help out at election time; this is because factions are aggregates, or networks, of politicians who share the same career fate: when intra-party reshufflings occur and posts are assigned, either (all) faction members are promoted or they are (all) passed over. At election time, then, all faction members have an interest in working to direct pork to the constituents of their faction's candidate. The size of a faction, and hence its power, evolves over time: a faction expands only if it wins elections—otherwise, it becomes marginalized within the party. Larger factions are better able to deliver pork.

The model is simple, but delivers a rich set of novel implications for resource allocation. First, **persistence**. Over time, a faction that survives becomes more powerful and more able to deliver pork. As this happens, voters become less likely to vote it (and the party) out of office. Thus the model offers a novel, joint explanation for persistence of policies and incumbency advantage. Leading models of policy persistence emphasize forces outside of parties—either vested interests facing switching costs (Coate and Morris 1999), or voters who are uncertain of the gains from reform (Fernandez and Rodrik 1991).[3] The factional model identifies an additional source of persistence—the persistence of factions within the party hierarchy. Powerful factions take time to build, but once built, they are resilient—they become durable reservoirs of power for special interests (geographic or otherwise). Importantly, the model predicts persistence even if the individuals that compose factions or hold offices turn over.[4] Thus, the model offers an explanation for incumbency advantage in the absence of either seniority rules for legislators or selection of incumbents based on political talent.

A second implication of the model is a **stronghold premium**. In the standard, static models of distributive politics (Lindbeck and Weibull 1987, for example), a monolithic party allocates a given public budget across localities to maximize the sum of the probabilities of winning. In these models, "swing" districts are the focus of pork spending as their votes are the most responsive to public largesse; localities (or groups) that are loyal to the party, or "party strongholds," are predicted to receive relatively little. Tests of the standard models have produced mixed results. A number of studies, of many different countries, either find little evidence that spending is directed to swing constituencies or that ruling party strongholds benefit disproportionately from public expenditures.[5] The factional model accounts for this "stronghold premium." In the model, the premium arises because party strongholds tend to

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[3] See, also, Hassler et al (2003), and Mitchell and Moro (2006).

[4] Such is the case in Mexico, for example, where by law office-holders cannot be re-elected and yet those districts blessed with powerful factions enjoy durable largesse (Camp, 2003). In another example, Lyndon Johnson's faction, discussed above, was also persistent despite turnover. Johnson largely inheirited it from James P. Buchanan, the 12-term Congressman whose death in 1937 left open the seat that Johnson then won.

[5] This literature is discussed in Section 1.1. Motivated in part by evidence of stronghold spending, Cox

elect the party's candidate, and so over time their factions become powerful and thus more successful at procuring public resources.[6]

Finally, the model also links public spending to **political careers**; patterns of party promotions are predictive of the allocation of funds. The exact nature of these predictions will depend somewhat on the details of each party's internal rules.

Our main contribution is to study the effect of factions on public spending, *assuming that factions exist*. In Section 6 we offer an account of *why* factions form and persist by providing an expanded model of endogenous faction formation and dissolution. A primitive of this expanded model is the party charter that regulates promotions. The expanded model shows how promotion policies create incentives for officers to band into factions; and it yields as its equilibrium an *endogenous* factional structure that takes the form that was *exogenously assumed* in the main model.

The expanded model provides a micro foundation for the structure we assumed in the main model, and in doing so illuminates the mechanisms that sustain stable factions and their power. In Section 7, we examine these mechanisms further and investigate the roles played by party dominance and faction control over candidate nominations. This section is organized around the question of why intra-party factions are a prominent feature politics in many settings (Mexico, Italy, Japan, Chicago) but not at the national level of U.S. politics where there is no one dominant party and candidate nominations are driven by a primary process.

The analysis in this paper isolates the instrumental incentives (career concerns) for faction formation. In reality, ideology and personal affinities are undoubtedly important in forming and sustaining factional links. Our hope is that future research will investigate the effects of these forces, and their interaction with instrumental motives for faction formation, on political competition and the allocation of public resources.

1.1 Related literature

There is a large descriptive literature in political science on party factions. Much of that literature addresses themes that are central to our model—the effect of factions on the allocation of public spending, and the forces that produce and maintain factions. General theories of party factions are discussed in Belloni and Beller (1978) and Kato and Mershon (2006). See our section 2 below for more from the political science literature.

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and McCubbins (1986) offer a prominent alternative to the "swing-voter" models, in which incumbent strong holds or "core-voters" are favored by pork spending because they are more responsive than opposition voters and not as risky as swing voters.

[6]We do not contend that factions are the only source of the "stronghold premium." There may be other features of party organization that confer special advantage to strongholds.

Study	Form of Spending	Country	Years	Findings
Stromberg (2004)	New Deal unemployment relief	U.S.	1933-1935	neither
Fleck (2008)	New Deal spending	U.S.	1933-1939	neither
Ansolabehere and Snyder (2006)	State transfers to counties	U.S.	1957-1997	stronghold
Khemani (2007)	Fed. transfers to states	India	1972-1995	both
Arulampalam et al. (2008)	Fed. grants to states	India	1974-1997	both
Larcinese et al. (2008)	Fed. outlays to states	U.S.	1978-2002	stronghold
Barkan and Chege (1989)	Fed. road and health funds to provinces	Kenya	1979-1988	stronghold
Larcinese et al. (2006)	Fed. outlays to states	U.S.	1982-2000	stronghold
Joanis (2008)	Provincial road spending	Canada	1986-1996	stronghold
Calvo and Murillo (2004)	Fed. transfers to provinces	Argentina	1987-2000	stronghold
Estevez, et al. (2006)	Fed. anti-poverty funds to municipalities	Mexico	1989-1994	both
Schady (1999)	Fed. anti-poverty funds to communities	Peru	1991-1993	both
Case (2001)	Fed. block grants	Albania	1994-1996	both
Mobarak, et al. (2006)	County public health services	Brazil	1998-1999	stronghold
Leigh (2008)	Fed. funding roads and social services	Australia	2001-2004	stronghold

Table 1: Selection of emprical studies that find spending favors party strongholds, or no evidence that spending favors swing districts.

NOTE: Findings are coded as significant evidence of stronghold district spending (stronghold), swing district spending, neither or both

Our paper also relates to a literature in economics on collusion in hierarchies. See e.g. Tirole (1986), or Carrillo (2000). Strictly speaking, ours is not a model of corruption or even collusion; indeed, the patron-client relationship has benefits for the party because it motivates patrons to exert effort on behalf of clients. Nevertheless, our paper can be seen as a first effort to apply some themes from that literature to political parties. Dal Bó *et al.* (2009) on familial legacies in the U.S. Congress is a related paper with an empirical focus.

Our model opens the black box of internal party organization. There is a small literature on platform competition in a non-unitary party, and on the effect of party charters on platforms. See Roemer (1999), Caillaud and Tirole (2002), Testa (2003), Castanheira *et al.* (2010).

1.1.1 Empirics on Distributive Politics

Finally, our paper relates to an empirical literature, dating at least to Wright's (1974) study of New Deal spending, that evaluates standard models of distributive politics. Larcinese, et al. (2006), and Larcinese et al. (2008) are recent examples and provide reviews.

The results in this literature are mixed. Important for our paper, this literature often finds little evidence that public spending favors swing districts. In many contexts, indeed, it finds

that spending favors party *strongholds*. In the U.S. context, for example, Ansolabehere and Snyder (2006) find that counties with the highest vote shares for the governing party of a state receive the most state transfers. Stronghold spending has been found in a number of non-U.S. contexts as well. Examples include Joanis (2008) on Canada, Arulampalam *et al.* (2008) on India, Leigh (2008) on Australia, and Estevez, *et al.* (2002) on Mexico. Table 1 summarizes some of the more recent studies that either find no evidence that public spending favors swing districts, or instead that find evidence that spending favors party strongholds.

1.2 Plan of the paper

The paper proceeds as follows. In Section 2 we describe several examples of factions from a variety political systems and identify key features they share. In Section 3 we set up the model. Section 4 shows that our model nests the familiar model of distributive politics as a special case, the case where the power to deliver public expenditure is *not* distributed across the party hierarchy. In Section 5 we study the resource allocation in a factional equilibrium. In Section 6 we study equilibrium network formation, and provide conditions under which persistent networks will form despite the incentives for some faction members to defect to other factions. In Section 7 we further discuss and extend the model. Section 8 concludes.

2 Facts About Factions

In this section we briefly discuss factions as they arise in several political systems. The goal is to familiarize the reader with this phenomenon, and to show that factions share common traits. We will cover factions in Italy's Christian Democratic Party (DC), Japan's Liberal Democratic Party (LDP), Mexico's Institutional Revolutionary Party (PRI), China's Communist Party (CCP), and politics in Chicago's "Daley machine." In each of these cases, we will highlight certain key features: first, the hierarchical nature of relationships inside a faction; second, the nature of the exchange between patrons and clients; and third, the effects of factions on public expenditures.

2.1 What are Factions?

We begin with a broad definition taken from Zuckerman's (1975) study of Italian factions.

> I define a political party faction as a structured group within a political party which seeks, at a minimum, to control authoritative decision-making positions of the party. It is a "structured group" in that there are established patterns of

behavior and interaction for the faction members over time. Thus, party factions are to be distinguished from groups that coalesce around a specific or temporarily limited issue and then dissolve [...] (Zuckerman, 1975, p. 20).

This definition highlights the durability of factions and refers to what we will call "factions of interest." Zuckerman distinguishes these groups from "factions of principle," i.e., (intra-party) lobbies organized around particular policy agendas.[7] Factions of interest, like those studied by Zuckerman, are less idealistic aggregations that pursue their own power, more than general-interest policies. Bettcher (2005 pp. 343-4) offers a more precise definition of factions of interest, though he calls them clienteles.

Clienteles have a pyramidal structure built up from patron–client relationships . In a political party, clienteles organize vertical relations among elected politicians and party officers, and these relations may extend outward and downward into different levels of government and party organization. The relationships – and thus the overall structure – are maintained through exchanges among individuals at different levels. Lower members (clients) deliver votes to their superiors (patrons), and in exchange receive selective incentives such as money, jobs, and services. In other words, members join and remain in the clientele for particularistic, self-interested reasons. Continued membership in the clientele also depends on an ongoing relationship with a particular patron. Consequently, clienteles are not firmly organized and become vulnerable to collapse if key patrons are lost.

Our paper is concerned with factions of interest.

2.2   Factions in Italy's DC

The DC Party dominated Italian government from the post-war period until the mid 1990s and its factions, called *correnti*, were quite formal organizations. Bettcher (2005, p. 351) reports:

Each faction acquired a common identity and common resources. The factions possessed well-developed organizational features, including: 'formalized faction names, more or less distinct memberships, leadership cadres and chains of command, faction headquarters, communications networks including press organs,

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[7]The terms "factions of interest" and "factions of principle" are borrowed from Bettcher (2005). Factions of principle appear prominently in U.K. and U.S. parties, for example.

and faction finances' (Belloni, 1978: 93). As of 1986, the factions all had offices clustered in historic Rome (Panorama, 15 June 1986: 49–50). Meetings and conventions were held regularly at various levels at least through the 1980s (L'Espresso, 19 February 1989: 8).

Faction members are described by Zuckerman (1975, p. 40) as following three rules:

1) Seek to control cabinet positions. Strive to occupy more and "better" positions than previously held and to defend those already controlled.

2) Seek to further the career of the leader. Support him in his effort to achieve "better" positions.

3) Seek to obtain goods of value to those who are not faction members only when the persistence of the faction or the strength of the Christian Democrat Party is at stake.

DC factions were typical in that they were not organized around ideology or broad-based policy goals. One longtime factional leader and cabinet minister contended:

"The number of factions has now grown to nine. This is due to personal power games within the party. When a new faction forms, such as the Tavianei, or the Morotei, it must justify itself in ideological terms, but this is artificial. The factions are power groups." (Quoted in Zuckerman, 1975, p. 26.)

While not primarily motivated by policy, DC factions had a substantial impact on the distribution of public resources. Bettcher (2005, pp. 351-2) reports that

Christian Democratic factions competed vigorously on behalf of their members for seats in the cabinet and the party's National Council. [...] The factions also procured and distributed a much broader range of patronage, including public jobs at all levels. They colonized the state thoroughly and diverted its resources for their purposes [...]. The Italian regime was infamous for partitocrazia, a system in which political parties held preponderance over all aspects of government and society. The DC received the lion's share of ministries, especially the most coveted ones (for example, Agriculture, Post and Telecommunications, and State Holdings) (Leonardi and Wertman, 1989: 225–36). [...] At the local level, from Palermo and Naples to Genoa and the Veneto, DC factions divided up and governed hospitals, welfare agencies, public utilities, credit agencies, housing and construction agencies, chambers of commerce, cooperatives, industrial associations, and professional associations (Caciagli, 1977: Ch. 6; Tamburrano, 1974: 111–16). Public entities proliferated to meet the expanding needs of the DC and its factions.

2.3 Factions in Japan's LDP

The LDP has led the Japanese national government almost continuously since the party's formation in 1955. The great majority of LDP politicians have been long-term members of factions.[8] These factions were called shidan (divisions) or gundan (army corps). Like Italian factions, they were formal, hierarchical organizations. Bettcher (2005, p. 346) writes:

> Offices proliferated within the largest factions as they matured. These offices had regular functions and procedures, which became standardized across the different factions (Ishikawa and Hirose, 1989: 212). The first of these was the faction secretary-general (jimu socho), analogous to the secretary-general of the party (in both the faction and the party the secretary-general was a different person from the leader). The secretary-general of each faction was entrusted with the daily business of his faction, including keeping order in the faction and handling relations with other factions. [...] Next was the standing secretariat (jonin kanjikai), which determined a faction's management policies. It met prior to weekly faction meetings and then obtained approval of its decisions from the full faction (Iseri, 1988: 30–2, 34–5; Ishikawa and Hirose, 1989: 213). Under the standing secretariat were one or more bureaus (kyoku), charged with executing its internal policies. Some factions had specialized bureaus for handling policy issues or elections. The secretariats and the bureaus were specialized, permanent, hierarchical structures within the faction, governed by a set of written faction rules. They curtailed the influence of the leader and diminished the impact of his individual characteristics on the faction (Iseri, 1988: 32–5).

As in Italy, Japanese factions were based on mutual dependence between patrons and clients. This is illustrated by Cox *et al.* (2000, p. 116).

> [F]action bosses [...] helped members get three crucial aids to re-election: the party endorsement, financial backing, and party and governmental posts. In return, the bosses received his follower's support in the LDP presidential election, which he could use either to pursue the party presidency himself or to trade for other positions.

Japanese factions, like their Italian counterparts, have also had an important influence on the distribution of public expenditures. According to Scheiner (2005), p. 807-8, pork barrel spending is targeted to the constituents of strong LDP factions.

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[8]Turnover in factional membership decreased from the 1960s to the 1980s as the vast majority of the LDP's lower-house politicians became identified with a single faction. Defections from factions almost ceased after 1972. Once a politician was elected and joined a faction, his fate was usually tied to the same faction until he died or retired. Bettcher (2005 p. 345)

[...] funding for local projects is often clearly targeted to LDP Diet members' financial and political supporters, especially local politicians who deliver the vote for the Diet members (Curtis, 1971; Mulgan, 2000, p. 81; Park, 1998a, 1998b).

2.4 Factions in Mexico's PRI

Factions in Mexico are called *camarillas*. They are less formal than Italian or Japanese factions, but they have been extremely influential in the PRI, the party that dominated Mexican politics from 1930-2000. Camarillas are based on personal ties of trust across a hierarchy, and members often share some element of their formative or professional life.[9] Camp (2003, p. 104) enumerates "Fifteen characteristics of Mexican Camarillas;" we select the seven most relevant to our analysis.

1. The structural basis of the camarilla system is a mentor-disciple relationship

2. Successful politicians initiate their own camarillas simultaneously with membership in mentor's camarillas

3. Every major national figure is the "political child," "grandchild," or "great grandchild" of an earlier, nationally known figure.

4. Politicians with kinship camarillas have advantages over peers without them.

5. The larger the camarilla, the more influential its leader and, likewise, his disciples.

6. Personal qualities generally determine disciples' ties to a mentor.

7. It is acceptable to shift loyalties when the upward ascendancy of the political mentor is frozen.

The two-way ties between patrons and clients in a camarilla are well-illustrated in the following description of the activities at CONASUPO, a public agricultural support agency.[10] Grindle (1977) writes:

Through a number of high-level appointments, the director of CONASUPO made friends among the leadership of the peasant and middle-class sectors of the party, obligated a number of state governors, developed a following among university students, and established friendships with officials in key government agencies.

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[9] They might share a university advisor, or have been colleagues in a previous position, etc. See Smith (1979) for a wonderfully detailed study of *camarillas*.

[10] CONASUPO had a broad mandate. See Yunez-Naude (2007, pp. 4-6).

The extent of the political support he accumulated in this manner made him a valuable member of a political faction whose importance increased as it attempted to influence the selection of the presidential candidate for 1976. If successful in this maneuver, the director could expect to become a close collaborator of the new president. His subordinates were aware of the advantages of "winning" for their own careers. "If he becomes a minister," commented one respondent, "then his entire equipito [inner circle] will follow him and we'll all have positions in the Ministry."

2.5 Factions in China's CCP

The preceding examples are taken from long-established, at least formal, democracies. Intra-party factions also operate in systems with less-developed democratic institutions. For example, in China's CCP where party politics is largely informal,[11] factions play an important role. The Shanghai faction, for example, associated with former president Jang Zemin, was (in)famous for its ability to secure state resources and party posts.[12] A large literature in Chinese politics studies factions.[13] This literature invariably identifies factions as key for understanding political power. Huang (2000, p. 77) writes:

> A leader's power is essentially based on the strength of his factional networks. The leaders who have the most access to factional networks dominate

Chinese factions share many traits with their counterparts in Italy, Japan and Mexico. Huang (2000, p. 76), identifies the following five characteristics of factional links in the CCP, many of which resemble those of DC, LDP and PRI factions.

1. The crux of a factional linkage is the exchange of political obligations that concern the well-being of both participants in a hierarchic context.

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[11] "Unlike most Western countries, where formal politics is clearly dominant over informal politics [...] the Chinese informal sector has been historically dominant, with formal politics often providing no more than a facade. Informal politics plays an important part in every organization at every level, but the higher the organization the more important it becomes. [...] This informal sphere is distinguished from relations within the host organization as a whole by its more frequent contacts, greater degree of goal consensus, loyalty to the informal group, and ability to work together." Cited from Dittmer (1995, pp. 16-17).

[12] "A joke circulating throughout China since the late 1990s also reflects public resentment of favoritism in elite promotion. Whenever a line formed to get on a train or bus, people often teased: 'Let comrades from Shanghai aboard first'." Li (2002).

[13] Cf. Huang (2000, p.1) who writes "Factionalism, a politics in which informal groups, formed on personal ties, compete for dominance within their parent organization, is a well-observed phenomenon in Chinese politics."

2. It is equally coercive on both participants. Abrogation by either of them can bring about damage or even disaster to both participants.

3. Each participant holds a position of authority at a given level. But direct relations usually exist only between the superior and his immediate inferiors.

4. A factional linkage is not inclusive. Although a leader can develop such linkages with other followers so as to maximize his support, it will be disastrous for a follower to seek multiple linkages with more than one leader. This would give a leader enough reason to suspect his loyalty and hence to withdraw his protection.

5. It can be extended: both ends can be linked to the next higher or lower level of authority in the same fashion.

The goods exchanged across CCP factional linkages are also similar to those in the preceding examples. The superior (patron) rewards the inferior (client) with security/advancement, and is repaid with support.

> The prime basis for factions among cadres is the search for career security and the protection of power ... Thus the strength of the Chinese faction is the personal relationship of individuals who, operating in a hierarchical context, create linkage networks that extend upwards in support of particular leaders who are, in turn, looking to their followers to ensure their power. Pye (1981, pp. 7-8)

Like factions of interest elsewhere, CCP factions seek rents from the central state administration and are thought to affect the distribution of public expenditures. Shanghai, for example, is widely believed to have received a disproportionate share of central government spending during the 1990's as a result of factional imperatives. While systematic evidence is difficult to obtain, at least one study documents this effect. Shih (2004) collected proxies for the factional ties among Chinese politicians and tested for the impact of factional ties on the distribution of distribution of bank loans in reform-era China and finds that factional ties have an effect on the distribution of bank loans.

2.6   Factions in Chicago's "Daley Machine"

The Democratic Party in Chicago under mayor and party chairman Richard J. Daley (1955-1976) is a well-studied example of factions operating inside a U.S. party "machine." During the Daley era, the Chicago Democrats were organized along the administrative lines of the city in hierarchical networks of clients and patrons. Chicago was divided into 50 wards, each consisting of 50-60 voting precincts, with each precinct containing 400-600 registered

voters. Daley was the party's chief executive. Beneath him were party committeemen, and beneath them, with some overlap, were alderman – each representing a ward of the city. Committeemen were party, not government, officials and each appointed a cadre of precinct captains who reported to him. In addition, factional networks extended into the city government bureaucracy through a vast number of patronage jobs tightly controlled by the party. (Guterbock, 1980)

As in the previous examples, party members in Chicago engaged in exchange across patron-client links; clients at lower ranks delivered votes for their patrons in exchange for personal promotion and jobs for themselves and their constituents. Ultimately, a faction's power depended on its vote-getting ability and its influence with the highest echelons of the party:

> "In the heyday of the machine during the Daley years ... jobs were allocated to ward and township committeemen in proportion to the individual committeeman's influence and the number of votes his ward delivered for machine candidates. [...]Generally, the committeemen parceled out the jobs they "owned" to their precinct captains on the basis of the captains' ability to garner votes. If a captain failed to deliver his precinct, he could be "viced" or fired from his job. If his failure were less serious, he might only lose some of the jobs under his control." Cited from Freedman (1994, p. 39).

In another example, Guterbock (1980, p. 27) describes the intra-party competition this way:

> "The ward committeeman has control over some 150 patronage jobs, and if he continues to produce favorable election results, his patronage power will rise. However, the ethnic identification of the [local party organization] limits its power. The committeeman, alderman, ... and most of the leading precinct captains are Jewish. Their ethnicity prevents their wholehearted acceptance into the inner circle of citywide party leaders, almost all of whom are Irish."

In addition to patronage jobs, party factions directed public resources to themselves and their constituents by means of their control over city and county bureaucracies. One alderman described the services offered by his network as follows:

> "Anybody in the 25th [ward] needs something, needs help with his garbage, needs his street fixed, needs a lawyer for his kid who's in trouble, he goes first to the precinct captain... If the captain can't deliver, that man can come to me. My house is open every day to him.[14]"

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[14]25th Ward Alderman Vito Marzullo, quoted in "Ald. Vito Marzullo: Dispenser of Jobs," *Chicago Daily News*, February 7, 1967.

In another example, a City attorney and precinct captain explained how, in exchange for votes, he worked to provide better public services, and indeed lower taxes for his constituents.

> "I consider myself a social worker for my precinct. I help my people get relief and driveway permits. I help them on unfair parking fines and property assessments. The last is most effective in my neighborhood [middle class]. "The only return I ask is that they register and vote. ... I never take leaflets or mention issues or conduct rallies in my precinct. After all, this is a question of personal friendship between me and my neighbors...[15]"

Overall, the party and its internal politics, more than the formal offices of government, determined public spending:

> "It was through [Daley's] control of the party, not his elective office, that he gained complete control of the city council ... Thus the mayor, not the council, decided the budget; the mayor, not the council, really decided on the legislation that ran the city." Allswang (1986, p. 143).

2.7 Summary: Defining Traits of Factions of Interest

These examples of factions present several common traits upon which our model is based:

1. Factions of interest are hierarchical networks of party members.

2. A faction member transacts mostly with his direct hierarchical superior (patron-client relationship). The patron expects to be supported in his ascent to power. In return, the patron gives the client resources that help advance (or at least secure) the client's position in the hierarchy.

3. Factions of interest do not typically coalesce around ideological or policy positions. Instead, they are devoted primarily to the capture of public resources.

4. The existence of factions results in an allocation of resources that follows a factional logic, not necessarily the welfare of the party as a whole, or any efficiency criterion.

Along some dimensions, we see variation across the examples. The formality of the faction, for example, ranges from high (Italy, Japan) to low (China). The system of factional competition may be operated centrally almost as an incentive scheme (Chicago, by Daley), or it may be the result of informal self-organization of competing groups (Mexico). The model in the following sections is sufficiently general that it need not take a stand on these dimensions.

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[15]Quoted in Allswang (1986), page 141.

3   Model

We are primarily interested in the effect of factions on the allocation of public resources. To study these effects we propose, as a starting point, an exceedingly simple view of the faction: a faction is a team of politicians who are mutually dependent on each other for career advancement. This simple model generates number of implications for the allocation of public resources, which are derived in Section 5. Because the model has some non-standard elements, we devote the final subsection to discussing its assumptions.

In this section, the existence of factions is taken as given, and each politician is permanently attached to the same faction. In Section 6 we will explore the question of endogenous faction formation and persistence.

3.1   Setup

Time is discrete and indexed by t. There are S states (localities), indexed by s; in each of them an election takes place in every period. Two national parties compete in each election. For expositional ease we will focus our analysis on the factions of one of these two parties. In Section 7.6 we show how to extend our analysis to the case of two or more factionalized parties competing with each other.

3.2   The Party and Its Officers

A party is a series of positions that party officers wish to hold. Positions are characterized by their rank. Rank $r + 1$ is senior to rank r, and $r = 0$ denotes the lowest possible rank. A party's candidate in the state s election holds rank 0 in the party. There is no maximum rank, and the number of positions of each rank is implicitly determined by the promotion policy, modeled below.

These positions may be thought of as posts in the party bureaucracy, or they could be administrative positions in ministries or state enterprises if the party has power of patronage. The different ranks need not be formal, with distinct titles and authorities. Rather, the ranking is meant to capture, more broadly, the path by which an officer's career advances.

Party officers belong to different states. An officers from state s can exert effort $e \in [0, 1]$ which increases the probability that a public project is provided to state s. You can imagine that officers were born in that state, and their special knowledge of that state makes their effort specialized. Exerting effort e costs the faction member $c(e)$. The cost function $c(\cdot)$ is assumed to be convex, and $c(0) = c'(0) = 0$. The assumption that an officer who belongs to a state cannot exert effort in favor of another state will be removed in Section 6.

Effort has several interpretations, not mutually exclusive. First, effort may represent invest-ment in a lobbying process by which faction members compete to divert public resources toward their state. Second, effort may represent fund raising activity on the part of faction members. Finally, effort may capture the degree to which the officer resists the temptation to skim public funds allocated to state s.

The party officers' objective function is myopic: they simply derive a given amount of utility (which we normalize to 1) from being promoted to the next rank at the end of each period.

3.3   Factions, Recruiting, and Promotions

Party officers of all ranks are partitioned into factions, according to the state they belong to. State s at time t has a *faction* of size $S_t \geq 0$, which is composed of all party members who belong to state s.

Promotions are made at the end of period t. In the promotion process, all members of the state-s faction share the same fate: either the party won election in state s, and then each faction member is promoted up one rank in period $t+1$; or the party loses the election, and then all members of that faction are out of the party from $t+1$ onward. If the party wins the state-s election at time t then a new rank-0 member joins the faction and runs for election at time $t+1$. Thus the promotion system is up-or-out. In Section 3.6.5 we point out which features of this promotion process are essential for our analysis.

We can interpret this promotion rule as a reduced form capturing internal party politics in a "bottom up," or representative democracy system. Suppose that, in order to be promoted in internal party elections, every party members needs the support of at least one member in the next lower echelon. Suppose further that faction members vote for each other. Now, if the lowest members of a faction fails because he loses the election then there is no-one to support the rank-1 member of the faction, who then also fails, and so on. Thus the advancement of the entire faction turns on the outcome of the election. This "internal democracy" interpretation is developed formally in Section 6, where we present an explicit model of party charter with these features.

Notice that this promotion rule links the evolution of a state's faction to the outcome of the election in that state. If the party wins the state-s election in t, then $S_{t+1} = S_t + 1$ (the increase in the size of the faction reflects the fact that a new rank-0 officer has joined the faction). If the party is defeated then $S_{t+1} = 0$. If the party wins a state s which was previously controlled by the opposition, then $S_{t+1} = 1$.

3.4 Elections and Public Projects

In each state and in every period there is an election in which the party candidate (the rank-0 officer) runs. We abstract from the details of this election for the moment and simply assume that the party candidate is more likely to win the election if his state receives an indivisible unit of public project before the election.[16] In state s the probability of electing the party candidate increases from b_s to $b_s + \Delta_s$ when the public project is provided.

The probability that the public project is provided to state s depends on the sum of efforts devoted by party officers to that state. Let $\mathbf{e}_r$ denote the sum of all efforts directed by officers of rank r to region s. Then region s receives a public project with probability

$$\Pr\left(g = 1\right) = \left(1 - \alpha\right) \sum_{r=0}^{\infty} \left(\alpha\right)^r \mathbf{e}_r \tag{1}$$

or 1, whichever is smaller. The scalar α is assumed to be smaller than 1.

The assumption that $\alpha < 1$ is made for technical convenience, to ensure that summation (1) converges. The assumption implies that the effort of higher-ranking officers has less impact on the provision of public resources. In Section 7.3 we discuss how to extend the analysis to the case where $\alpha > 1$. In addition, as we explain in Section 3.6, we need not take a stand here on whether the effort exerted in favor of state s is *rival* to that exerted for other states.

We will call states with high b_s party "strongholds," because they are likely to vote for the party regardless of whether they receive the public good. States with high Δ_s are called "swing" states because there is a high probability that providing the public good will change the election outcome in these states. We assume for convenience that $b_s + \Delta_s < 1$; that is, the party can never be 100% sure of winning the election in any state.

3.5 Timeline

At time t,

- the S_t members of the state s faction choose effort e_{it}
- the public good g_t is realized according to the probability distribution (1)
- the election takes place and the party either wins or loses in state s
- promotions are made and S_{t+1} is determined.

---

[16]Behind this assumption is a model, sketched in Section 7.5 and detailed in Appendix C, of rational voters who interpret the pre-electoral receipt of the public project as a signal.

3.6 Discussion of Modeling Assumptions

In this section we try to give a feel for what assumptions play an essential role in our model. Because the model is novel some of its assumptions are, inevitably, unconventional. Many of these modeling assumptions are made for tractability and could easily be modified. In general, the plausibility/appeal of the assumptions should be judged in light of the model's primary purpose: to build on the qualitative evidence provided in Section 2 and describe a plausible and testable causal mechanism for certain patterns in public goods allocation.

3.6.1 The Faction

Since the per-period survival probability of a state-s faction is bounded above by $b_s + \Delta_s < 1$, every faction will die in finite time. The promotion process described in Section 3.3 guarantees that all factions born after time 0 will share the following properties: (a) all factions will have exactly 1 member per rank between rank 0 and rank S_t; (b) in every period, a faction will either grow by one member or else collapse. Figure 1 depicts an example of the evolution of factions between period t and $t+1$. In this example, the faction in state 3 collapses, while the others grow by 1 member.
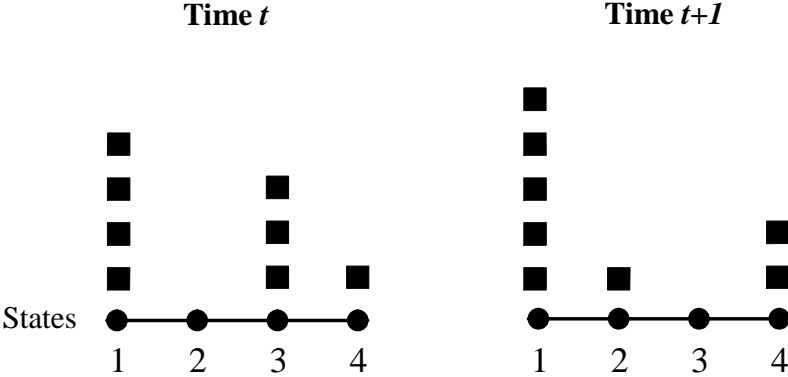

Figure 1: Evolution of factions between periods.

We made several stark assumptions about the nature of factions. First, we tied each faction to a state. Second, we made the faction a purely vertical (and exclusive) network; only past rank-0 members can be part of the faction. Third, factions do not overlap — an officer cannot belong to more than one faction. Fourth, there is no maximum rank in the party.

Fifth, there is no *fixed* number of positions in the party, and thus no explicit contest among factions for positions. Each of these assumptions was made for simplicity of exposition and they could be relaxed considerably without much affecting what we are interested in, that is, the implications for public spending (Proposition 3, particularly a.-c.). What will be crucial for our analysis is that faction members behave as a team, mutually dependent on each other for career advancement. In Section 6 we develop a micro-foundation for why and when such teams may form and persist over time. There we will present a stylized account of the faction as an endogenously formed web of allegiances. We will also allow politicians to "defect" from one faction and join another at any time.

3.6.2   Conceptual Distinction Between Faction and Party

What is the conceptual difference in our model between a faction and a party? Is a faction functionally equivalent to a party? Put differently, why don't factions split off and form separate parties?

Our answer to these questions is that a faction competes under importantly different rules from a party. While the party faces competition (from other parties) in the state-s election, in our model the state-s faction does not face internal competition to field a candidate in the state-s election. This is because in our baseline model there are no primaries where different factions can contest the nomination—we assume that the rank-0 candidate is automatically a faction member. In this sense, the faction benefits from staying within a party, at least to the extent that internal party rules protect its power to nominate (and correspondingly constrains that of other factions). Were the faction to split off from the party, its candidate would lose that protection and would have to compete in a three-way race instead of a two-way race. In Section 7.1 we will discuss the effect of primaries and argue that the ability to control nominations is crucial to the existence of intra-party factions.

3.6.3   Competition Among Factions

We need not take a stand here on whether the effort exerted in favor of state s is *rival* to that exerted in favor of other states. The relevant public resources may come from a fixed pool that could be allocated to any state (effort is rival), or they may come from a pool that is only available to state s (effort is non-rival). One might be concerned that the interpretation of rival effort is not proper here, because the probability (1) does not depend on the effort for states other than s; but the rivalry interpretation *is* proper. Expression (1) can be recovered as the limit probability of winning a prize in a tournament in which N factions compete for qN prizes ($q < 1$), when the number of competing factions N becomes large. So expression (1) does not preclude the interpretation of factions competing for a fixed amount of public spending. For the details of this argument see Appendix A.

3.6.4   Voters

Voter behavior enters the model in reduced form. In Section 7.5 and Appendix C we show that this reduced-form model can in fact be derived from a model of rational voters who interpret the pre-electoral receipt of the public project as a signal of the power of their faction.

3.6.5   Promotion Policy

We make two distinctive assumptions about the party's promotion policy: It is both "up or out" and "bottom up;" either the faction's lowest rank member gets elected and the entire faction is promoted one rank, or else the entire faction fails. The up-or-out assumption is not essential to the results; the key property we need is that the faction grows less powerful when it loses elections. That said, there are real-world cases, such as Mexico, in which political careers are effectively up-or-out.

The "bottom up" feature may appear more important for our results, but this is misleading. For example, we could have developed a model in which the faction is "pulled from above," say by its chief, rather than pushed from below. The mechanics would be somewhat different, but our model's key feature would be maintained; even in this "pull from above" model all faction members would exert effort for the common good of the faction (in this case the good of the chief). As long as this effort increases local public goods provision, the kinds of correlations collected in Proposition 3, particularly a.-c., would obtain in this "pull from above" model too. So, what is key is not the bottom-up structure of promotions, but rather the "common enterprise" nature of incentives. We view these incentives as deriving from internal party rules which promote faction-building by providing career benefits to individuals who band together in informal groups. That said, even though the "bottom up" assumption is not critical for our results, it is not at all a bad assumption: in many parties promotions require a strong element of support from below, owing partly to a formal process of representative democracy within the party, where officers are selected for assemblies of different ranks, and the selectorate of the rank r assembly is rank $r-1$ assembly.

4   A Special Case: Unitary Party Benchmark

In the standard, unitary-party model, a given budget is allocated across localities to maximize the sum of the probabilities of winning.[17] (See e.g. Lindbeck and Weibull 1987). Our analysis nests as a special case the allocation implemented in that model.

---

[17]Considering other objectives for the party, such as winning a majority of the districts, would not qualitatively change the results.

We obtain the standard allocation by restricting $\alpha = 0$. Under this assumption, power is not distributed across the party hierarchy: only the effort exerted by rank-0 officers matters for procuring public resources. Let us therefore focus on the behavior of these officers. The rank-0 officer in state s chooses e to maximize the probability of winning the election minus the cost of effort,

$$\max_e \; b_s + \Delta_s \cdot e - c\left(e\right).$$

The optimal effort level e_s^* therefore solves

$$c'\left(e_s^*\right) = \Delta_s.$$

In this allocation, swing localities receive resources in proportion to their responsiveness (Δ_s); and the baseline level of support for the party (b_s) does not affect the allocation. These properties of the resource allocation are the hallmarks of the standard models of distributive politics.

In our specific setup, the unitary party paradigm has even stronger predictions, because the return to allocating resources to a locality is linear (with slope Δ_s). This implies that, in a unitary party, resources would be allocated maximally $(e = 1)$ to all localities with Δ_s larger than a threshold, and no resources would go to the other localities. This allocation, too, can be achieved in our model by restricting the cost function $c\left(\cdot\right)$ to be linear.[18]

Thus we see that our analysis nests as a special case the allocation that is implemented in the conventional unitary-party models of distributive politics. In this special case $\alpha = 0$; that is, power is not distributed in the party organization. In what follows we study the case when power is distributed, that is, $\alpha > 0$.

5   Resource Allocation in the Presence of Factions

We now turn to characterizing the allocation of resources that emerges when power is distributed across the party hierarchy. Towards this end, we first establish some properties of the equilibrium size and effort of factions. In what follows we omit the state index s when no confusion can arise.

5.1   Definition of Equilibrium

Since we assume that party officers have myopic objectives, their equilibrium behavior is given by a sequence of Nash equilibria of the stage game outlined in Section 3.5.

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[18]The slope of the linear function $c\left(\cdot\right)$ corresponds to the shadow price of resources in the optimal allocation for the unitary party model.

Some care must be taken with initial conditions. At time 0, we can allow factions with more than one member at any rank. But, no matter what the time-0 structure is, all factions born after time 0 will have exactly 1 member per rank between rank 0 and rank S_t (see the discussion at the beginning of Section 3.6.1). Moreover, since per-period survival probabilities are always strictly less than one, in finite time all factions will be born after time 0. Therefore, in the long run initial conditions do not matter. We therefore focus on equilibria where at all times all factions have exactly 1 member per rank between rank 0 and rank S_t. We call this a **long-run** (Nash) equilibrium.

5.2 Faction Effort For Given Faction Size

Because within each state s at time t the party has a faction with exactly one member per rank, we may identify a faction member with his rank r. Let $R \geq 0$ denote the number of faction members. Member r solves

$$
\max_{e_r} b + \Delta \Pr(g_t = 1) - c(e_r)
$$

$$
= \max_{e_r} b + \Delta \left[(1 - \alpha) \sum_{r=0}^{R} \alpha^r e_r \right] - c(e_r). \tag{2}
$$

The equilibrium level of effort e_r^* solves

$$
c'(e_r^*) = \Delta (1 - \alpha) \alpha^r. \tag{3}
$$

The effort of a faction member is therefore increasing in Δ and does not depend on b. Also, equation (3) does not depend on R, so member r will put in e_r^* independent of his faction's size. Therefore, the total effort put forth by a faction is increasing in the faction's size. We summarize these observations in the following proposition.

Proposition 1 *In a long-run Nash equilibrium the effort of a faction member is increasing in Δ and does not depend on b. The total effort of a faction, and thus its probability of survival, is increasing in its size.*

5.3 Steady State Distribution of Faction Size

Some aspects of the equilibrium of our game will depend on the size of factions at time zero. However, the effect of these initial conditions dissipates with time. Over time, then, one could ignore the effect of initial conditions and focus on the steady-state properties of the equilibrium. In this section we characterize the steady-state distribution of faction size. In

a long-run Nash equilibrium the probability of a faction being of size $R+1$ in period $t+1$ equals the probability of being size R in period t times the transition probability. Formally,

$$\pi_{t+1}\left(R+1\right)=\pi_t\left(R\right)\cdot\left[b+\Delta\left(1-\alpha\right)\sum_{r=0}^{R}\left(\alpha\right)^r e_r^*\right].$$

At a stationary equilibrium $\pi_t\left(\cdot\right)=\pi\left(\cdot\right)$, so the stationary distribution can be characterized by the following difference equation:

$$\pi\left(R+1\right) \;=\; \pi\left(R\right)\cdot\left[b+\Delta\left(1-\alpha\right)\sum_{r=0}^{R}\left(\alpha\right)^r e_r^*\right] \tag{4}$$

$$\pi\left(0\right) \;=\; 1-\sum_{k=1}^{\infty}\pi\left(k\right).$$

Since by assumption $b+\Delta<1$, we have that $\pi\left(R\right)<\pi\left(R+1\right)$ for all R. Figure 2 provides a qualitative picture of the stationary distribution of faction size for a given pair Δ,b.
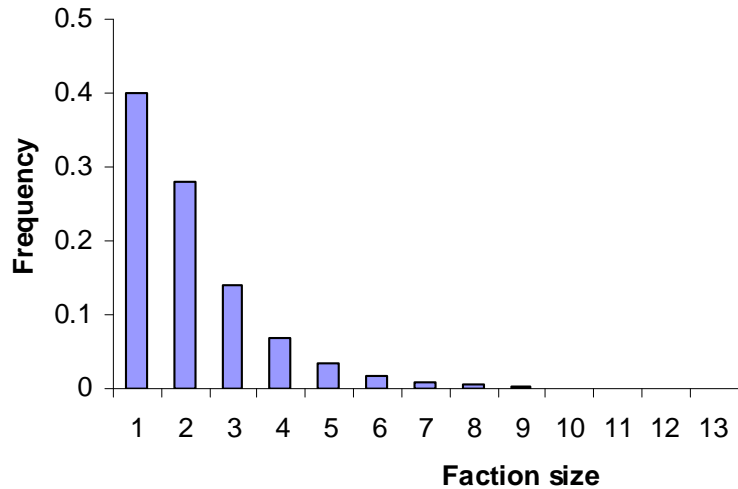

Figure 2: Steady-state distribution π of faction size in state s.

We now show that swing states, and states with a large base of support for the party, are more likely to have large factions.

Proposition 2 *Increasing Δ and/or b results in a first-order stochastically dominant shift of the steady-state distribution of faction size.*

Proof.   Suppose Δ increases. Then by equation (3), e_r^* increases for all r. From equation (4), then, the new steady-state size distribution π' has the property that

$$\frac{\pi'\left(R+1\right)}{\pi'\left(R\right)}>\frac{\pi\left(R+1\right)}{\pi\left(R\right)}. \tag{5}$$

It cannot be that $\pi'(0) \geq \pi(0)$, because then we would have $\pi'(R) > \pi(R)$ for all $R > 0$ and then both distributions π and π' could not sum to 1. So it must be $\pi'(0) < \pi(0)$, and then equation (5) implies that there is a unique value $\overline{R}$ such that $\pi'(R) < \pi(R)$ if and only if $R < \overline{R}$. This establishes that π' first-order stochastically dominates π.

If b increases, e_r^* does not change for any r, and equation (5) again holds. The previous reasoning then proves the result. ∎

5.4 Resource Allocation

This section establishes three main points. First, in equilibrium *the allocation of resources reflects the power of the faction*. Second, and related, there is a systematic *bias in favor of party strongholds*. Third, factions generate *persistence* in the resource allocation. The next proposition makes these points and moreover, in points c.-e., it draws out several additional implications for the allocation of public resources.

Proposition 3 *(Allocation of resources) The steady-state probability that a state receives public resources depends on the size of its faction. Through this channel the following results arise in our model:*

a. In steady state, swing states (higher Δ) and party strongholds (higher b) are more likely to receive public resources from the party.

b. In steady state, given two states with the same b and Δ, the state with a longer spell of uninterrupted electoral success for the party is more likely to receive public resources from the party.

c. The probability that a state receives public resources from the party at time t is predicted by the future success within the party of the officer who holds rank 0 at time t.

d. Conditional on winning election at time t, the vote-getting ability of a rank-0 officer is uncorrelated with the probability that his constituents receive public resources from the party in the future.

e. Conditioning on faction size at time t eliminates all the effects described in parts a.-d., except for the effect of Δ in part a. States that are dominated by the opposition (faction size at time t is equal zero) receive no resources from the party at time t.

Proof. According to Proposition 1, the probability that a state receives the public project given faction size R is an increasing function of R. This proves the introductory statement.

Proving of part a. requires averaging out faction size. The probability that a state receives the public project conditional on faction size R is an increasing function of R. Taking an

average of this function using the steady-state distribution of R yields the probability that a state receives the public project. By Proposition 2, that distribution is stochastically increasing in b. Thus states with higher b have a higher probability of receiving the public project. The same argument applies to states with larger Δ, and in addition factions in those states will exert more effort (Proposition 1), which establishes the result for those states.

Proof of part b. is immediate.

To prove part c., let $B = b + \Delta$ and

$$P_\tau = (\text{party wins at } t+1, ..., \tau | \text{party wins at } t).$$

Then we can write

$$
\begin{aligned}
&\Pr\left(g_t = 1 | \text{outgoing rank-0 officer at } t \text{ promoted through } \tau\right) \\
=\ &\Pr\left(g_t = 1 | \text{party wins at } t, t+1, ..., \tau\right) \\
=\ &\frac{\Pr\left(\text{party wins at } t, t+1, ..., \tau | g_t = 1\right) \cdot \Pr\left(g_t = 1\right)}{\Pr\left(\text{party wins at } t, t+1, ..., \tau\right)} \\
=\ &\frac{P_\tau \cdot \Pr\left(\text{party wins at } t | g_t = 1\right) \cdot \Pr\left(g_t = 1\right)}{P_\tau \cdot \Pr\left(\text{party wins at } t\right)} \\
=\ &\frac{B\Pr\left(g_t = 1\right)}{B\Pr\left(g_t = 1\right) + b\Pr\left(g_t = 0\right)} \\
>\ &\frac{\left[(1-B) + B(1-P_\tau)\right]\Pr\left(g_t = 1\right)}{\left[(1-B) + B(1-P_\tau)\right]\Pr\left(g_t = 1\right) + \left[(1-b) + b(1-P_\tau)\right]\Pr\left(g_t = 0\right)} \\
=\ &\Pr\left(g_t = 1 | \text{outgoing rank-0 officer at } t \text{ not promoted through } \tau\right) \qquad (6)
\end{aligned}
$$

The inequality follows from algebraic manipulation.

Part d. Regardless of whether the politician was an effective vote-getter when running for office, conditional on having been elected, in our model his vote-getting ability is irrelevant for his future role in the life of the faction. In particular, the state of a rank-0 officer that barely managed to get elected is just as likely to receive public goods as one with an officer that was elected by a large margin.

Part e. Immediate.　■

Part b. of the above proposition indicates that resource allocation is persistent. States with a longer spell of uninterrupted electoral success for the party are more likely to receive public resources. This is because such states have larger factions. By the same token, failure to receive resources is also persistent, because it makes it more likely that the faction is eliminated.

The stark no-correlation result obtained in Part d. is a consequence of the assumption that party members run for office only once. Were we to allow an outgoing rank-0 officer to run for office again, we would likely observe some correlation.

6   Endogenous Faction Formation and Stability

The model presented in Section 3 took the structure of factions as exogenously given. The goal of this section is to sketch a tractable model of endogenous faction formation and dissolution. This extended model yields as its equilibrium an *endogenous* factional structure, which happens to take the form that was *exogenously assumed* in the main model. Thus, one contribution of this section is to provide a micro foundation for the factional structure assumed in Section 3.2. Another contribution is to highlight the forces that may play a role in faction formation: why party officers would choose to belong to factions, and under what conditions factions may persist over time. Highlighting these forces is helpful because it provides a sense of what the resource allocation would like if factions are unstable, or if they fail to take the structure assumed in Section 3.2.

To allow for endogenous faction formation we first amend the model of Section 3. Then we proceed to characterize the factional structure which arises in the equilibrium of the faction-formation game. What follows is just a sketch; the complete theory is presented in Appendix B.

6.1   Introducing Faction Formation (Sketch)

Now party officers no longer belong to states, which means that at any point in time an officer has the ability to choose the faction and state for which he exerts effort. This allows for the possibility of "defection," and the potential for faction instability.

The following components are added to the model; they replace Section 3.3.

Allegiances: The Patron-Client Link   At the beginning of the period, before officers choose their effort level, they declare their allegiance to patrons and to a state. Formally, each party officer i of every rank $r \geq 0$ declares a state s for which he will work, and each announces a distribution p_i^j, where $\sum_j p_i^j \leq 1$, which represents the probability that i will *support* officer j for promotion. All officers supported with positive probability by i must (a) have rank $r + 1$, and (b) have declared the same state as i.

We call officer i the "client," and "patrons" the officers he commits to support with positive probability. Conditions (a) and (b) make analysis of the strategic formation of patron-client networks tractable. Condition (a) says that clients can only support patrons one rank above them; condition (b) requires clients to devote their effort to the state chosen by their patrons.

Later, we will be interested in the networks of allegiances that officers create. We will interpret these networks as factions. Note that, since links of allegiance cannot be refused in our formalization, factions cannot commit to reject the allegiance of new members, including

defectors from other factions. However, factions are not required to support those members (or indeed any member).

Party Charter   The party charter regulates recruitment of the rank-0 candidate, promotions, and exit from party cadres. We will ignore recruitment for now, and focus instead on promotions and exit.

- Promotions are made at the end of each period, sequentially by rank starting from the lowest. An officer who holds rank 0 is promoted to rank 1 if he won the election in his state. An officer who held rank $r > 0$ in period t is promoted to rank $r + 1$ if he is *supported* by at least one officer who held rank $r - 1$ during t and who was himself promoted at the end of period t.

- Officers who are not promoted lose their officer status forever (up or out).

The promotion rules imply, for example, that officer i of rank 2 can be promoted only if a rank-0 officer is elected who supported an officer of rank 1 who, in turn, supports officer i. Note that the party as a whole necessarily has a pyramidal structure: there are fewer officers at higher ranks, because every officer who gets promoted can propel up at most one other officer of rank immediately superior. The charter can thus be seen as a rough approximation of a process of *representative democracy* within the party, where officers are selected for assemblies of different ranks, and the selectorate of the rank r assembly is rank $r - 1$ assembly.[19]

This charter is extremely stylized. It is meant capture, in a tractable way, two central themes from the qualitative literature discussed in section 2: 1) Promotion within the party requires support from below and 2) factional success depends critically on electoral success.

Timeline   At time t:

- Sequentially, starting from the highest rank, party officers declare the state that they will work for and whom they support for promotion

- A candidate (rank-0 member of the faction) is recruited in each state

- Party officers simultaneously choose the effort devoted to procuring public resources

---

[19]Alternatively, the promotion rule can capture an informal process in which officers require the support of the other officers (in our case, the cadres just below them) in order to maintain or increase their position within the party. We view this assumption as factually uncontroversial, since in reality promotions are typically determined by party assemblies and/or simply by informal support within party ranks.

- The public project is realized in each state according to the distribution (1)

- In every state, elections take place

- Promotions are made sequentially in order of rank, starting from the lowest.

6.2 Equilibrium Faction Formation and Stability

We are interested in the networks of allegiances (factions) that officers create. Under what conditions will a network of officers i and j who are linked by positive p_i^j's look like the structure we assumed in the main model and depicted in Figure 1? That is, under what conditions will we be able to rule out an equilibrium network of allegiance like the left-hand panel of Figure 3, and guarantee one like the right-hand panel?
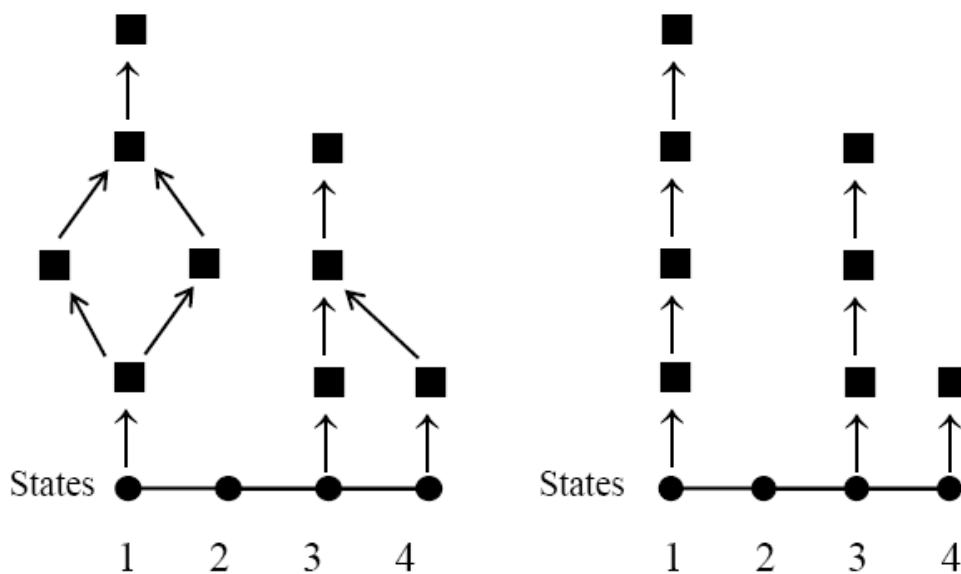
Figure 3: Endogenous faction structures. The arrows represent support from a rank-r officer to rank-$r + 1$ officer(s).

Figure 3 represents possible networks of allegiance that could arise in any period t. Two features of the left panel of Figure 3 make it appear more complex. First, the factions of states 3 and 4 are not "disjoint:" a member of faction 4 is supporting a member of faction 3. We show that this phenomenon is not possible in equilibrium (Lemma B1 proves this

result). Intuitively, the configuration would require the rank-1 member of faction 4 to exert effort in favor of state 3 (this is because we require any two officers supporting each other to make effort for the same state); but that officer gains no benefit from such effort, since he is not supported by any state-3 member.

The second complex feature of the left panel of Figure 3 is in the structure of state-1 faction. The rank-1 member of that faction splits his supports between two rank-2 members. Why would the rank-1 member split his support between two patrons? He might *if* the combined effort of two partially supported members exceeds the effort put forth by one fully supported member. Proposition B1 shows that, if $c'''(\cdot) < 0$, this cannot happen. Under this condition, then, support would never be split.

The left panel of Figure 3 is of interest because that is precisely the factional structure we might expect to arise when factions 1 and 3 *accept defectors* from other factions. That is, the left panel of Figure 3 might represent the degeneration of the right panel, after officers have rationally chosen to defect. When can we guarantee the intertemporal stability of a configuration like the right panel of Figure 3? The temptation to defect is stronger for members of small factions, who face a relatively low probability of winning the election. By defecting to a large faction, a member of a small faction can increase his probability of promotion. In addition, members will be tempted to defect to particularly "safe" states, if they exist, that is, high b_s, high Δ_s states. Under certain conditions, these defections are not profitable, and so the configuration in the right panel of Figure 3 is a Nash equilibrium of the network formation game. Proposition B2 gives sufficient conditions that ensure that such an equilibrium exists.

Proposition 4 *Under either of the following conditions, an equilibrium of the faction-formation game exists in which factions look like the right-hand panel of Figure 3, faction members never defect from their faction, and factions evolve over time as in Figure 1:*

condition a. if $c''' < 0$; because then defectors will not be accepted.

condition b. if α is sufficiently small, all the b_s are sufficiently similar, and all the Δ_s are sufficiently similar; because then no faction member will wish to defect to another faction.

These sufficient conditions are somewhat restrictive. One reason that they need to be stringent is that we have assumed no barriers to entry into a new faction, save the possibility that the defector may not be supported. In reality, the faction may have the power to commit to screen defectors from other factions. A social choice problem then arises, because faction members might have conflicting views about whether to accept defectors; indeed Lemma B4 establishes that there is always some member who is against accepting a defector. So, if all faction members have veto power over whether to accept defectors, then no defector will ever be accepted and a factional equilibrium exists.

Proposition 5 *If faction members have veto power over the acceptance of defectors, then an equilibrium exists in which factions behave as in Proposition 4.*

Consistent with the view that factions face a collective decision problem concerning defectors, Cox *et al.* (1999) observe that an informal norm against accepting defectors prevailed in Japan's LDP, precisely to protect the interest of those faction members who would be displaced by the defector.[20] This norm effectively functions as a veto power.

Appendix B provides a sufficient condition under which the equilibrium in which factions behave as in Proposition 4, is unique.

6.3   Discussion

One interpretation of the results presented above is as a micro foundation for the factional structure assumed in Section 3.2. Another contribution is to highlight the forces that affect the stability of factions. The analysis shows that the temptation to defect is stronger for members of small factions, and for members of "unsafe" states (states with low b_s, Δ_s). The conditions in Proposition 4 rule out such defections, but these conditions may be restrictive.

If factions are unstable, then our conclusions regarding resource allocations (Section 5) are *strengthened*, not weakened. This is because then defections will be towards swing states, stronghold states, and states who happen to have large factions. Factions in such states will be larger and more durable relative to the analysis of Section 5. This means that the effects in Proposition 3 will be reinforced.

7   Discussion and Extensions

7.1   Obstacles to Factional Politics and the U.S. Case

As we consider the importance of factions for public spending, it is important to note that national parties in the U.S. do not have notable factions of interest.[21] Why is that? And more generally, what determines the degree to which a party is divided into factions of interest? We shall attempt to answer these questions next.

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[20] "[S]ince the mid 1960s each faction's posts have been allocated largely on the basis of seniority. Thus, a prospective faction-jumper would want to ensure that his new faction would honour his seniority. But honouring a new member's seniority would be a delicate matter, because those further back in the seniority queue might complain." Cited from Cox *et al.* (1999), p. 38.

[21] Factions of principle are, however, common within national parties. The Republican Party, for example, is divided into Reagan Republicans, Rockefeller Republicans, the Religious Right, etc.

Party Dominance   Electorally dominant parties are more likely to develop factions. It is no coincidence that all the parties mentioned in Section 2 have been in power for long spells—many decades. Dominance is likely to breed factions for several related reasons. First, from the point of view of a party officer, holding rank r is more valuable if a party is now in power, is likely to be in power soon, and is likely to be in power in the future. In this sense, the rewards that induce factional behavior are more powerful in dominant parties. Second, and related, a party that is in office for an extended period is able to penetrate government bureaucracies. In this way, non-political positions in state enterprises, public administration, regulated businesses, etc., become part of the party reward system—ranks, in our terminology. Third, the negative consequences of factional organization on the resource allocation (as spending is diverted from swing states) are less important if a dominant party has less fear of electoral competition.

These observations may partly explain why factions of interest are relatively rare in U.S. national parties, which tend to alternate in power. In contrast, factions can be found in the state Democratic parties in the post-civil-war South (see Key 1949) and in urban political machines, both of which continuously held power for extended periods of time.

Control over Nominations   A key determinant of whether factions are strong or weak is the control that the factions have over nominations. Are factions able to choose new party officers? That depends on both party and legal rules. In this section we introduce the concept of loyalty to the faction, and use it to show the importance of nomination control for faction strength.

Definition 1 *The **loyalty** of a party officer is the probability λ that the client will keep the commitment to support his patron.*

Until now we have assumed perfect loyalty. When we allow imperfect loyalty, aggregate factional effort becomes a function of loyalty.

Proposition 6 *Aggregate factional effort is monotonic in loyalty: when the loyalty of a rank-r member decreases, equilibrium effort of faction members with rank $R > r$ decreases.*

Proof.   Let $\lambda_r \leq 1$ denote the loyalty of the rank-r officer. Then the support σ^R that the faction member of rank R receives, i.e., the probability that the member is promoted conditional on the election in his state being won, is given by:

$$\sigma^R = \prod_{r=0}^{R-1} \lambda_r.$$

Expression (3) characterizing equilibrium effort is then amended to

$$c'\left(e_r^{**}\right) = \sigma^r \Delta \left(1 - \alpha\right) \alpha^r.$$

Clearly, the lower σ^r, the lower e_r^{**}. ∎

Loyalty of 0-rank candidates is highly valued by fellow faction members, because disloyal candidates reduce their likelihood of being promoted. If recruitment is controlled by the faction, then, we should expect high-loyalty candidates to be picked. By the same token, the long-term viability of factions also depends on their ability to control nominations.[22] Consistent with this view, in Italy's DC and Japan's LDP, factions effectively had control over nominations and jealously guarded it.[23] Conversely in the U.S., where due to legal constraints nominations are usually decided in primaries, factions are not overly strong.[24]

The U.S. Case As we consider U.S. party politics, it is important to distinguish between national parties and state and local party organizations. We mentioned above that neither national party is dominant in the U.S., which makes it is less likely that factions would develop in national party organizations. There are other reasons, too. From the perspective of career concerns, national parties are numerically small and relatively uninfluential in the U.S. compared to state parties.[25] This makes them less appealing as a target for politicians intent on building networks. In addition, U.S. national parties have peculiar institutions at the national level whereby committee chairmanships, which confer great power of patronage,

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[22]If some other entity—the president, or the public—nominates candidates, those candidate are likely to be loyal to those entities. On this point, see Cox et al. (1999).

[23]Regarding Italy's DC, Zuckerman (1975, p. 33) writes:

> It would seem that in regions where a national faction leader is present other political patrons or aspiring patrons will associate with his faction. [...] In regions where there are two patrons seeking national prominence, each will associate with a different national faction.

In Japan, particularly before the 1994 reform, nominations were decided in national-level negotiations in Tokyo. Cox et al. (1999, p. 40) write:

> The factions competed just as fiercely over endorsements as they did over posts, seeking both to secure nominations for their own non-incumbents and to protect their incumbents from the appearance of endorsed non-incumbents in their districts.

[24]In the US system, due largely to legal constraints, national parties have relatively little say in the nomination for congress. Instead, primaries typically devolve that power to the mass of party members. For all major offices, candidate selection is by primary, with the right to participate as a candidate or as a voter beyond the control of party organization. (Katz and Kolodny 1994, p. 31). Concerning the weakening effect of primaries on party discipline, see generally V. O. Key (1958), Ch. 14.

[25]In part this may be due to the federal organization of the U.S government.—for example, elected positions at the federal level, while often very important, are only 600, compared to more than 500,000 elected positions at the state and local level (Katz and Kolodny (1994), p. 27.).

are assigned by seniority. Thus, access to these powerful posts does not require politicians to marshal the support of other party members. For all these reasons, factional politics does not develop at the national party level. If we are looking for factions of interest, therefore, we must look in the state parties and at the local level. Again, this is indeed where factions are found, for example in local party machines, or in the state parties of the U.S. south.

7.2   Benefits of Factional Politics: Incentivizing Effort

In our model, the party charter conditions promotion on the support of other party members. In a long-run equilibrium, this promotion rule gives rise to an incentive system which links the fate of *all* officers to the outcome of elections, including those who are not directly involved. This link has the virtue for the party of incentivizing these officers. To make this point sharply, we now analyze the case of a party charter in which promotions do not depend at all on the support of the lower rungs of the faction. We will find that factions collapse and the party is worse off for that. In this sense, then, factional politics is beneficial for the party.

Suppose the promotion of faction member r does not depend on $r-1$'s backing, because the party charter does not require internal support for promotions.[26]   Then there is no reason why a member of rank $r > 0$ should exert effort and thus $e_r^* = 0$. Then the probability that the party wins the election in state s is simply b_s.

Proposition 7 *(**Value of the faction**). If the promotion of faction member r does not depend on $r-1$'s support or, equivalently, if promotions are independent of electoral outcomes, then faction members will exert no effort and the party will be less successful in elections.*

This proposition does not imply that factions are the *optimal* incentive scheme. If promotions could be conditioned explicitly on effort, for example, then the party could achieve better results. Some element of factional behavior, however, must be part of the optimal incentive scheme, in the sense that even party members who are not personally running for election need to be induced to exert effort on behalf of the party.

7.3   Power Throughout the Hierarchy

We have assumed that the effort of members of higher rank has less effect on the provision of public projects. In this section we show that this is merely a technical assumption and explain how to do without it.

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[26]The promotion and enlargement of a faction might depend, say, on the whim of a president who may value personal favors, or practice nepotism, rather than rewarding electoral success.

The assumption we want to relax is that $\alpha < 1$ in expression (1). The role of that assumption is to ensure that the expression sums to less than 1, and thus can be interpreted as a probability. This assumption can be avoided, at the cost of some slight complication. To see how, suppose we replace expression (1) with the following expression:

$$\Pr\left(g = 1\right) = \min\left\{1, \frac{1}{T \cdot \left(\alpha\right)^T} \sum_{r=0}^{T} \left(\alpha\right)^r \mathbf{e}_r\right\}, \tag{7}$$

where $\alpha > 1$ and T is a positive integer of our choice. This expression meets our *desideratum*: the effort exerted by officers of a higher rank counts for more.

This expression is almost as tractable as expression (1) because it is linear in the $\mathbf{e}_r$ when it is below 1. And, for factions with less than T members, expression (7) is definitely smaller than 1 (remember that, in a faction, $\mathbf{e}_r < 1$). So the behavior of members of factions with rank smaller than T is very similar to that described in our model: larger factions exert more aggregate effort and are more likely to survive. Notice that T can be chosen very large, so that for all of the factions most of the time all our analysis goes through. When the size of the faction exceeds T it is possible that $\Pr\left(g = 1\right) = 1$. In that case many combinations of effort among faction members can be an equilibrium, and then the analysis becomes somewhat more cumbersome. But, from the point of view of the evolution of factions, it is not that difficult: factions that exceed a certain number of members get the public project for sure, and so they survive with probability $b + \Delta$. Thus, nothing substantial in our analysis hinges on the assumption that $\alpha < 1$.

7.4   Global Public Goods

If a party is forced by its factions to distribute many local public goods to influence local elections, fewer resources may remain to woo voters with promises of public goods in nation-wide elections. Thus, we expect parties with strong factions to promise fewer global public goods; their appeal will be based mostly on their ability to procure local public goods.

To see this point clearly, denote by $\mathbf{E}$ the total amount of effort put forth by all the party's factions. Imagine that a fraction v of this effort results in local public expenditure that could otherwise go toward promising global public goods in national elections (appropriations from a federal budget, say), with the balance $(1 - v)$ representing resources that could not be used for that purpose (the creation of patronage posts in a local hospital, say). Consider the problem of a party president running for nation-wide office. Let us assume that the party president balances the goals of winning local elections with that of winning national office. From the party president's point of view, increasing the portion $(1 - v)\mathbf{E}$ of resources is unambiguously good: these resources help win local elections and do not interfere with

nationwide elections. The portion $v\mathbf{E}$, on the other hand, has the disadvantage of limiting the party president's ability to promise global public goods in the national election. If we denote by Z the size of the federal budget, only

$$\max\left\{0, Z - v\mathbf{E}\right\}$$

is available for the party's president to promise global public good. When the median voter's ideal point in the nation-wide election exceeds that level, the party president is constrained in his ability to promise enough global public good. When factions are strong, $\mathbf{E}$ is large and the president is more constrained.

This argument does not necessarily favor parties with weak factions: when v is small, the incentive effect of factions dominates over the flexibility-reducing effect, and factions play a useful role on balance. Nevertheless, to the extent that electing the party president in the nationwide election is a public good for party officers, this argument indicates that factions exert a negative externality on each other. This is analogous to a common-pool problem, where the common pool of resources is Z, the size of the federal budget.

7.5   Rational Voters and the Political Budget Cycle

Our model represents voter behavior in reduced form; it is captured by the two numbers Δ and b. Here our principal goal is provide a rational-voter model where Δ is endogenous *and positive*. This does not seem a stringent requirement—it is natural that the party should be more likely to be elected if it is successful at providing public projects. The model we offer is a "political budget cycle" model along the lines of Rogoff (1990), in which the public projects are provided *before* the election. We choose this model because we want our results to speak to the allocation of the political budget cycle across municipalities, which is the subject of the empirically literature cited in the introduction.

A detailed description and analysis of the model with strategic voters is deferred to Appendix C. Here we offer just a sketch.

Sketch of the model   Voters live for two periods in an overlapping generation model. When young, voters are uncertain about the size of the party faction in their state, and so they start out with a prior which, in steady state, is given by equation (4). If they do not receive the public project, voters believe that their faction is not that powerful and thus re-elect the party with probability of only b. If voters receive the public project, they update positively on the size of their faction, and thus they become more willing to vote for it because they realize that a strong faction is valuable in the future (it will continue to bring in pork). In this case, they re-elect the party with probability $b + \Delta$.

Brief discussion of the model   The key element of the model is that voters are not perfectly informed about the power of their candidate's faction. This seems reasonable, since in reality the power of a faction is impermanent and it is determined by opaque intra-party patron-client relationships. Voters are unlikely to know much about this. Anecdotal evidence supports the view that voters are imperfectly informed of the power of the candidate to deliver pork spending. Curtis (1992, p. 228),[27] for example, writes:

"[T]he stress [of the electoral candidate] is on constituency service to convince voters that the candidate has the clout in Tokyo to bring the district new roads and bridges, industrial development, and higher living standards."

7.6   Multiple Factional Parties

Up to now we have focussed on the internal workings of one party (call it party 1) and treated its opposition (party 2), asymmetrically, in reduced form. It is, however, straightforward to adjust the model to allow a symmetric treatment of two (or more) competing factional parties. The adjustment merely requires altering the probability that a party wins an election when it is out of office.

Recall that, in the equilibrium of our current model, party 1's probability of winning is increasing in the length of its spell of continuous incumbency in state s (see Propositions 1, 3). In a symmetric, multi-party model, this must be true for any party h which is continuously in power in state s. During such a spell, the probability that party $k \neq h$ wins must therefore decrease (as the probabilities of winning must sum to 1). Our current assumptions do not allow this. In our current model, when party 1 is out of office the probability that it wins the election in state s is a constant

$$b_s + \Delta_s \cdot e_s^*,$$

(see Section 4), regardless of how many elections it has lost in a row.

Suppose, instead, we amend the probability of winning when out of office to equal

$$1 - \left[b_{2,s} + \Delta_{2,s} \left(1 - \alpha \right) \sum_{r=0}^{R_2} \alpha^r e_r^* \right],$$

where the term in brackets captures the probability that party 2 gets re-elected. The term in brackets resembles expression (2), except that here the voter variables are indexed by 2, to allow for the possibility that voters will treat party 2 different from party 1 when in office. Here R_2 represents the size of party 2's state-s faction, which also equals the length of that party's spell of continuous incumbency. A key feature of this expression is that party 1's

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[27]Cited from Scheiner (2005), p. 807.

probability of being elected when out of office declines as R_2 increases, that is, as party 1's out-of-office spell increases. Note that this probability can never be zero if we assume that $b_{2s} + \Delta_{2s} < 1$.

The preceding discussion shows that our analysis can be applied to "any party in office" provided we amend the probability of returning to office for the party which out of power. Note that this modification does not affect the parameters of the problem for the incumbent party in state s. Since in our model the public good is generated by the *incumbent* party, the effects described in Proposition 3 should be maintained. Therefore, we expect our conclusions regarding resource allocations (Section 5) not to change. An extension to the case in which *more than two parties* compete for office should be similarly straightforward.

8   Conclusion

We presented a new model of factional political competition, where the allocation of resources is driven by coordinated intra-party effort. Despite its simplicity, the model delivers a rich set of implications, both static and dynamic, about the allocation of local and global public goods.

A distinctive feature of the factional model is that the actual power to procure public goods is not vested in elected office: instead, that power is dispersed broadly across the party. When power is *not* dispersed, our model is equivalent to existing models of distributive politics. In contrast, allowing for the possibility of dispersed power takes us in new directions in the study of political resource allocation, where we need to understand the incentives for, and consequences of, coordinated effort. We suggest that, due to intra-party career incentives, those who hold power coalesce into party factions, which then become the sources of *actual*, as opposed to *formal*, power to procure public resources.

The allocation of resources in a factional equilibrium is different from that obtained in other models of distributive politics. Of particular note is the factional model's predicted bias in favor of party strongholds, a bias which has been reported in many empirical studies of cross-sectional resource allocations. We do not claim that factions are the only source of a stronghold premium. Rather, our point is that factions will accentuate that bias, and generally distort the allocation of resources above and beyond the formal rules of the party and the political system.

We view this paper as a first cut at modeling the incentivization and coordination of intra-party effort. A central premise of this paper is that, much like workers within a firm, party officers need to be motivated to exert cooperative effort. If this is right, then to understand the resource allocation it becomes crucial to study factions and the intra-party career incentives that generate them. Just as personnel economics has delivered important

new insights by looking at intra-firm incentive schemes, we expect that the rules of party organization, and the careers of individual political personnel, will prove to be important factors in predicting the allocation of public resources. We hope much work will be done along those lines.

Given the scope of such an agenda, this paper is not, and is not meant to be, the last word on the subject. To the extent that this paper is successful in arguing for the importance of party factions for the allocation of public resources, the paper raises several questions. If parties truly are aggregations of factions, as we make them out to be, then what are the boundaries of parties? And, indeed, what are the boundaries of factions? How does ideology affect the incentives to form and stick to factions? Questions such as these are important, but they are beyond the scope of this paper. The goal of this paper is to make the case that, when the power to procure public resources is distributed within the party, power networks such as factions become important determinants of the allocation of public resources. To the extent that successfully making this case raises more questions, we view this as pointing a way forward.

Appendices (FOR ONLINE PUBLICATION)

A Competition among large number of factions

We model the within-party competition for resources as a tournament among a large number of factions. N factions compete for qN prizes (units of the public good) where $q < 1$. We allow a faction to be as small as a single member. Whether a faction i receives the public good depends on both effort and luck; specifically, the qN factions with the greatest influence r_i receive the public good, where

$$r_i = u_i + (1 - \alpha) \sum_{r=0}^{S} (\alpha)^r e_r.$$

Here u_i is the luck element, the realization from a uniform distribution U with support $[-1, +1]$. The effort element is represented by the discounted sum of the e_r. The element $e_r \geq 0$ represents the effort put in by state-i faction member r. S is the size of the faction at time t.

Faction i wins the public good if and only if r_i exceeds the q-th quantile of the empirical distribution of the equilibrium r's. The q-th quantile is a random variable. However, since the realizations u_i are uncorrelated across factions, as $N \to \infty$ this quantile converges in probability to a number which we denote by $\underline{I}$. In the limit when the number of factions grows, faction i wins a public good if and only if $r_i \geq \underline{I}$. Now,

$$
\begin{aligned}
\Pr\left(r_i \geq \underline{I}\right) &= \Pr\left(U \geq \underline{I} - (1 - \alpha) \sum_{r=0}^{S} (\alpha)^r e_r\right) \\
&= \frac{3}{2} - \frac{\underline{I} - (1 - \alpha) \sum_{r=0}^{S} (\alpha)^r e_r}{2}.
\end{aligned}
$$

To be exact, the second equality holds only when the numerator of the fraction is within the support of U, which must necessarily be the case in equilibrium since no faction would want to exert more effort than it takes to win for sure. Then, in equilibrium the probability that the public good is provided to state i is given by

$$\Pr\left(g_t = 1\right) = i + \frac{1 - \alpha}{2} \sum_{r=0}^{S} (\alpha)^r e_r, \tag{A1}$$

where $i = (3 - \underline{I})/2$. We see that a large faction finds it easier to provide the public good to its constituents.

B Endogenous Faction Formation and Dissolution

The goal of this section is to, with a minimal amount of complexity, provide a framework to study the endogenous dynamics of faction formation: why party officers choose to belong to them, and under what conditions factions may persist over time. So, instead of having factions exogenously sticking together over time, we now allow party officers to choose their factional partners. To study persistence, we have this choice repeated in every period. To model these choices, we amend the model presented in Section 3.

B.1 Adding to the Model of Section 3

Now party officers no longer belong to states, which means that at any point in time a party officers has the ability to exert effort for the benefit of any state. In addition, the following components are added to the model. They replace Section 3.3.

B.1.1 Allegiances: The Patron-Client Link

At the beginning of the period, before officers choose their effort level, officers declare their allegiance to patron and to state.

The declaration process takes place sequentially in order of rank, starting from the highest. When it is their turn, each party officer i of rank $r \geq 0$ simultaneously declares a state s for whom he will work, and each announces a distribution p_i^j, where $\sum_j p_i^j \leq 1$, which represents the probability that i will *support* officer j for promotion. All officers supported with positive probability by i must (a) have rank $r+1$, and (b) have declared the same state as i.

After allegiances have been declared, each party officer simultaneously picks the effort level e as described in Section 3.2.

B.1.2 Party Charter: Recruitment, Promotions, and Exit

The party charter regulates recruitment, promotions, and exit from party cadres. Recruitment occurs early in the period, promotions and exit at the end. We now offer a simple model of a charter.

Recruitment　　Recruitment takes place after allegiances are being declared. In each state, the power to recruit in state s is granted to the highest-ranked officer who declared for

state s, provided that this officer won election in s at some point in the past. In this case, the officer submits a new recruit, a rank-0 candidate that will represent the office-holder's party in an election against the opposition in state s. If the highest-ranking officer never won election in state s then he is not allowed to recruit and the election is lost by default. If there is no officer who declared for that state then a rank-0 candidate is selected by the central party.

Promotions   Promotions are made at the end of each period, sequentially by rank starting from the lowest. An officer who holds rank 0 is promoted to rank 1 if he won the election in his state. An officer who held rank $r > 0$ in period t is promoted to rank $r + 1$ if he is *supported* by at least one officer who held rank $r - 1$ during t and who was himself promoted at the end of period t.

Exit   Officers who are not promoted lose their officer status forever (up or out).

B.1.3   Timeline

At time t:

- Sequentially, starting from the highest rank, party officers declare the state that they will work for and whom they support for promotion.

- A (rank-0) candidate is recruited in each state.

- Party officers simultaneously choose the effort devoted to procuring public resources.

- The public project is realized in each state according to the distribution (1).

- In every state, elections take place between the ruling party and the opposition.

- Promotions are made sequentially in order of rank, starting from the lowest.

B.2   Equilibrium Faction Formation and Stability

The model described above is a dynamic network formation game. In this section we characterize the equilibrium of this game. In equilibrium, support is proffered between officers of adjacent ranks, giving rise to *networks* of mutual support. When these networks of support hold fast across periods we call them *factions*. The results of this section provide formal answers to some of the questions we raised in the introduction: What are party factions, how do they form, and how do they persist despite the incentives for officers from weaker factions to defect into more powerful ones?

B.3 Networks: Preliminaries

We start by defining a network. A network is a group of officers linked by bonds of support.

Definition B1 *Two officers i and j are **linked** if $p_i^j > 0$. A **network** is a set of party officers (network members) each of whom is linked to another member, none of whom is linked to a non-member, and which does not contain any other network.*

This definition partitions the set of party officers into distinct networks.[28] We now characterize certain features of equilibrium networks.

Lemma B1 *(Characterization of networks)*

a. A network contains officers of every rank between the minimum and the maximum rank in the network.

b. All members of a network must exert effort for the same state.

c. In equilibrium, a network will contain at most one rank-0 member of that state; only members of the network including the rank-0 member have a positive probability of being promoted.

d. If the network survives into the next period, in equilibrium at most one network member of each rank is actually promoted.

Proof. Part a. Suppose the network had members of rank greater and smaller than r, but no members of rank r. Then we could partition it into two smaller networks, a violation of the definition that a network may not contain another network.

Part b. follows because all members in a network are linked.

To prove the first statement in c., suppose a network comprised two rank-0 members. Then one of the two rank-0 members is not able to work for his state (by definition no two network members can work for different states), which means his chance of being promoted is b_s. But then he would be better off by splitting off and forming a single-member network, because then he would be able to work and increase his probability of promotion. To prove the second statement in c., observe that in equilibrium the rank-0 officer for state s can only belong to one network φ. Consider any other network φ' that works for state s. At promotion time in period t, the lowest ranked officer(s) in network φ' have rank greater than zero and will not be supported by anyone, so by party charter they cannot be promoted. But then nobody above them in network φ' can be promoted.

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[28]In the network literature, what we call network is usually called a *component*.

Part d. follows from c. and the rules in the party charter. ■

By Lemma B1, any network that has a positive probability of survival can be uniquely identified by the state for which its members work. Conversely, every state has a network, albeit possibly a very small one (of size 1).

We now introduce a result that, while straightforward, offers insight as it highlights the force that drives the formation of patron-client links, and thus of networks. The result roughly says that if a client supports a set of patrons at all, he will offer his support completely.

Lemma B2 *(Power of clientele fully expended) If there is at least one officer of a rank one above i's who works for the same state as i, then in any equilibrium $\sum_j p_i^j = 1$.*

Proof. Consider rank-1 officer i in a network which includes a rank-0 member. If officer i is supported in equilibrium by the rank-0 member, that is in part because the rank-0 member values the support that member i provides to rank-2 members. So officer i cannot decrease the support he receives from the rank-0 member by scaling up his p_i^j's proportionally until their sum equals 1. At the same time, by scaling up the p_i^j's, officer i increases the effort exerted by rank-2 members and thus increases the probability that the whole network survives. For both reasons, then, scaling up the p_i^j's is a dominant strategy. The same reasoning applies to every officer of rank $i > 1$. ■

The intuition for this result is straightforward: by offering his support to a patron, the client makes himself valuable both to the patron and to his own clients. This increases the patron's incentives to exert effort on his behalf, and leads his own clients to support him more strongly. This result suggests that the incentive to create patron-client networks is pervasive in our model.[29]

B.4   Patterns of Allegiance and Effort Maximization

Now, with a basic understanding of the characteristics of equilibrium networks, we turn to investigate further questions of network structure. In this subsection, we are concerned with the network structure that maximizes effort by its members, and the payoffs to current network members from adding a new member. The answers to these questions will, ultimately, explain the stability of various networks and thus how factions form and persist.

If a network has more than one officer per rank, allegiance could be distributed in many ways among these officers. All members of that rank could be supported equally, for example,

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[29]This result does not mean that all officers need be clients of some patron, because the putative client may wish to exert effort on behalf of a state for which a patron is not available. In that case, the putative client may opt instead to start his own network.

or only one could be supported. How support is distributed obviously influences effort; if, for example, officer j is not supported by any network member, then he has no chance of promotion and so will exert no effort. In this section we ask how to allocate the available support in order to maximize the total effort produced by the network.

Lemma B3 *Consider a network and vary only the distribution of support among its rank-r members. If $c''' < 0$, then total effort produced by all its rank-r members is maximal when just one rank-r member is supported. If $c''' > 0$, then total effort produced by all its rank-r members is maximal when all rank-r members are supported with the equal probability.*

Proof. Suppose there are J network members of rank r, and let e^j denote the effort put forth by the j-th network member (we omit the index r because it is constant throughout the proof). Let σ^j denote the support that the j-th network member receives, i.e., the probability that the member is promoted conditional on the election in his state being won. We are looking for the constellation of σ^j's that maximizes total effort $\sum_j e^j$ under the constraint that $\sum_j \sigma^j = 1$. The constraint reflects the total amount of support that emanates from rank $r - 1$. Start by observing that e^j solves

$$\max_{e^j} \sigma^j \left[b + \Delta Pr\left(g = 1\right) \right] - c\left(e^j\right).$$

Substituting from (1) and taking first order conditions, e^j solves

$$\Delta\left(1 - \alpha\right)\left(\alpha\right)^r \sigma^j = c'\left(e^j\right). \tag{B2}$$

Summing over all j's yields

$$\Delta\left(1 - \alpha\right)\left(\alpha\right)^r = \sum_j c'\left(e^j\right),$$

where we have used the fact that $\sum_j \sigma^j = 1$. Write

$$h\left(e^1, ..., e^J\right) = \frac{1}{\Delta\left(1 - \alpha\right)\left(\alpha\right)^r} \sum_j c'\left(e^j\right).$$

We can then write an ancillary version of our problem as follows.

$$\max_{\{e^j\}} \sum_j e^j \quad \text{s.t.} \quad \begin{matrix} h\left(e^1, ..., e^J\right) = 1 \\ e^j \geq 0 \end{matrix}$$

The function h is symmetric and so is the objective function, thus the solution depends on the Hessian of h. If its Hessian is negative definite then the function h is concave; since h is an increasing function, the solutions to our problem are extremal points, i.e., all but one e^j are zero. This allocation can be achieved by setting all σ^j's to zero but one; that is, by supporting only one network member. The Hessian is negative definite when $c''' < 0$.

If instead $c''' > 0$ then the Hessian of h is positive definite, and the function h is convex. In this case, the objective function is maximized when all e^j's are positive and equal. This allocation can be achieved by setting all σ^j's equal to $1/J$, that is, by supporting all network members equally. ■

This result suggests that within-rank competition increases total effort only when $c''' > 0$. If instead $c''' < 0$, then job security is more effective. Although the previous result is a "partial equilibrium" result because it characterizes only the effort produced within a given rank, the result helps characterize the effort-maximizing structure for the entire network.

Proposition B1 *(Effort-maximizing network structure).* *If $c''' < 0$, then among all networks covering the same ranks, total effort is maximal in the network with one member per rank. If $c''' > 0$, then total effort is increasing in the number of members per rank.*

Proof. Due to the linearity of expression (1), the equilibrium effort of network members of rank r does not depend on the effort of network members of different rank. Thus, the incentive design problem can be solved rank by rank. The result then follows from the previous Lemma. ■

While within-rank competition is sometimes effort-maximizing, not all network members will appreciate the competition. Indeed, we now show that network members always dislike competition *within their own rank.*

Lemma B4 *Consider a network and vary only the number J of its rank-r members. Assume all rank r members are supported with equal probability. Then the payoff of a rank r member is decreasing in J.*

Proof. Since the two networks are identical at ranks different from r, the total effort put forth by ranks different from r is unchanged as J varies. We can therefore restrict attention to that portion of payoffs that reflects the effort put forth by rank r members. For a member of rank r, that portion is given by

$$R^J\left(e, e^{J*}\right) = (1-\alpha)\left(\alpha\right)^r \Delta \frac{1}{J}\left[e + (J-1)e^{J*}\right] - c\left(e\right),$$

where $1/J$ is the support enjoyed by each rank-r member, and e^{J*} denotes the equilibrium effort put forth by every other member of rank r,

$$e^{J*} = \arg\max_e R^J\left(e, e^{J*}\right).$$

Observe for future reference that $e^{J+1*} < e^{J*}$. The equilibrium payoff of the j-th member is given by

$$R^J\left(e^{J*}, e^{J*}\right).$$

Note that, by construction, for any e we have $R^J(e,e) = R^{J+1}(e,e)$. Note further that for any $e \neq e^{1*}$ we have

$$R^1(e^{1*}) > R^1(e) = R^J(e,e).$$

Since $R^J(e,e)$ is concave in e, and is maximized at e^{1*}, it follows from $e^{J+1*} < e^{J*}$ that

$$R^J\left(e^{J+1*}, e^{J+1*}\right) < R^J\left(e^{J*}, e^{J*}\right).$$

∎

This results suggests that no member would want to enlarge his network by admitting a new member at his own rank. When $c''' > 0$, however, members would like to enlarge the network by admitting new members at all ranks *but their own.*

B.5   Permanent Allegiances: Factions and Factional Equilibrium

Networks need not be stable over time. For example, one network might offer so high a survival prospect that in every period members from all other networks would like to defect into it. In this subsection we introduce a notion of stable networks, factions. Factions are cohesive networks of officers that support each other period after period, until their network's demise. When all networks are stable, we call it a factional equilibrium. In the results that follow we provide conditions for the existence and uniqueness of a factional equilibrium. In this way, we provide a formal answer to the question: why do factions persist despite the incentives for officers from weaker factions to defect?

Definition B2 *A **faction** is a network in which officers always exert effort for the same state and no officer ever alters his links. A **factional equilibrium** is an equilibrium in which all networks are factions.*

The structure of factions can be immediately characterized as a corollary of Lemmas B1 and B2.

Corollary 1 *In any factional equilibrium, after the first period:*

a. all factions will have exactly 1 member per rank.

b. in every faction and in every period each client fully supports the same patron.

c. in each period all factions either grow by one member or else they collapse.

To ensure that a factional equilibrium exists, we need to check that there are no incentives for officers to defect from their faction.

Definition B3 *A **defector** is an officer who, in a given period, switches the faction for which he works.*

Obviously, a factional equilibrium admits no defectors. The temptation to defect is stronger for members of small factions, who face a relatively low probability of winning the election. A member of a small faction may wish to increase his probability of promotion by defecting to a larger one. In addition, members will be tempted to defect to particularly "safe" states, if they exist. When neither of these temptations is too strong, a factional equilibrium exists. Moreover, a defector may not necessarily be allowed into a different faction. Then again, a factional equilibrium exists.

Proposition B2 *A factional equilibrium exists under the following conditions:*

a. if $c''' < 0$; because then defectors will not be accepted.

b. if α is sufficiently small, all the b_s are sufficiently similar, and all the Δ_s are sufficiently similar; because then no faction member will wish to defect to another faction.

Proof. The effort choice in a factional equilibrium is pinned down by equation (B2), since each client only has one patron and $\sigma^j = 1$. What remains to be determined is the pattern of allegiance; that is, we need to check if there is incentive for faction members to defect from faction φ of state s to faction φ' of state s'. Say faction φ' has maximum rank K. Then no member of faction φ with rank greater than K will defect to φ', because then the highest-ranking member of the faction will not have been elected in state s and so, by assumption, will not be able to nominate a rank-0 candidate. We will check for incentives to deviate on the part of members of rank lower than K.

a. An officer of rank r in faction φ might consider defecting to faction φ' if he is guaranteed some positive probability of being supported by that faction's $r - 1$-rank member. His defection might trigger other defections, possibly all the way down to members of rank 1. Consider then the lowest rank member to defect in any given period. In order for his defection to be profitable, it must be rewarded by a positive probability of being supported by the $r - 1$ rank member of faction φ'. That faction member will not, however, divide his support between his former patron and the defector, because by Proposition B3 that would decrease the aggregate effort produced by rank r of the faction, without affecting the effort put forth by any other rank in the faction. Thus, $r - 1$ rank member's best response towards a defector is either to not support him at all or to fully support him. Let us select the equilibrium in which this indifference is resolved against the defector. Then the defection would be turned down and the potential defector does not defect. Thus there cannot be a lowest-ranked defector, which shows that there is a factional equilibrium.

b. When α is small, the effort of faction members of ranks 1 or higher has little effect on the probability of delivering the public good. Thus all factions, regardless of their rank, promote with approximately the same probability as a faction of rank 1. If all the b_s are sufficiently similar and all the Δ_s are sufficiently similar, then no officers in faction φ would want to defect to faction φ', as that would cut their probability of promotion in half. ∎

The reason for the conditions in part b. of the above proposition is straightforward. Members of small factions generally have an incentive to switch to large factions in order to free-ride on the effort of the larger group, unless α is sufficiently small, in which case the effort of ranks higher than 1 has a negligible impact and so faction size, beyond size 2, does not much affect the probability of promotion. The reason why we need the b_s to be similar is that if, for example, $b_1 > 2\left(b_2 + \Delta\right)$, the conditions in faction 1 are simply too attractive for a member of faction 2 to resist defecting.[30]

The sufficient conditions provided in Proposition B2 are somewhat restrictive. One reason that they need to be stringent is that we have assumed no barriers to entry into a new faction, save the possibility that the defector may not be supported. In reality, the faction may have the power to screen defectors from other factions. A social choice problem then arises, because faction members might have conflicting views as to whether to accept defectors; indeed Lemma B4 establishes that there is always some member who is against accepting a defector. So, if all faction members have veto power over whether to accept defectors, then no defector will ever be accepted and a factional equilibrium exists.

Proposition B3 *If faction members have veto power over the acceptance of defectors, then a factional equilibrium exists.*

Consistent with the view that factions face a collective decision problem concerning defectors, Cox *et al.* (1999) observe that an informal norm against accepting defectors prevailed in Japan's LDP, precisely to protect the interest of those faction members who would be displaced by the defector.[31] This norm effectively functions as a veto power.

B.6 Uniqueness of Factional Equilibrium

In this section we provide results about the uniqueness of factional equilibrium. In order to characterize the set of equilibria when network members have veto power (part b. in

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[30]We assume here that the defector to faction 1 will receive a utility of at least $b_1/2$, as would be the case if, for example, $c''' > 0$.

[31]"[S]ince the mid 1960s each faction's posts have been allocated largely on the basis of seniority. Thus, a prospective faction-jumper would want to ensure that his new faction would honour his seniority. But honouring a new member's seniority would be a delicate matter, because those further back in the seniority queue might complain." Cited from Cox *et al.* (1999), p. 38.

Proposition B4 below), we need to define formally how veto power is assigned in general networks which may not be factions. To this end, let us append an additional action to our game. We assume that, after party officers of rank k declare whom they support for promotion, if a member of a state-s network worked for the same state in the previous period, that member has the power to veto each of the other rank-k member(s) of the network (if any). Vetoed members cannot be supported by rank-$(k-1)$ members.

Under an additional assumption, the factional equilibrium is unique. The additional assumption needed to prove this result is the following.

A1 When indifferent between his patrons, the client will support most the one who worked for his current state in the previous period (if available).

This assumption captures mild intertemporal ties between a party officer and other officers who worked for his current state in the previous period. It may not be immediately clear what indifferences Assumption A1 resolves. To understand the content of the assumption, observe that when a client has two patrons, say, he may wish to support one patron with probability 2/3 and the other with probability 1/3; but, he is indifferent as to whom should get the 2/3. Assumption A1 says that the client will resolve this indifference in favor of the patron who worked for the same state in the previous period. In this sense, Assumption A1 resolves indifference on the client's part.

Proposition B4 *Suppose Assumption A1 holds, and that either of these conditions hold.*

a. $c''' < 0$

b. network members have the power to veto member(s) according to the mechanism described above.

Then the factional equilibrium is the unique equilibrium.

Proof.   **a.**   In equilibrium, no officer will switch from faction φ to faction φ' is he is going to be the highest ranking member in faction φ'. Consider a putative equilibrium where more than one member of a given rank is supported, and consider the decision problem of a rank-1 officer at the time when all ranks above 1 have pledged their allegiances. Let us compare all the possible networks under the assumption that exactly one rank-1 member joins each. Pick the one that has the highest probability of survival. No member could hope to have a higher level of utility than that afforded by that network. The officer who worked for that network in the previous period, if there is one, can guarantee himself that level of utility by declaring for that network (due to Lemma B3 and Assumption A1). In this case only one officer will declare for that network, and it will be the officer who worked for it

in the previous period. If there is no such officer, then that place cannot be occupied by someone who did not work in that state in the previous period because they would not be able to select a rank-0 officer. By induction, we can extend this argument to the second, third, etc. most desirable networks which have an officer of rank 1, and we have shown that in any equilibrium all rank-1 officer in equilibrium will declare for the state they chose in the previous period. By induction, this argument extends to all ranks above 1, and it shows that at every rank every officer will declare for the state they chose in the previous period.

b. Consider then the decision problem of a rank-1 officer at the time when all ranks above 1 have pledged their allegiances. In equilibrium, whatever the allocation of rank-1 officers across networks, if a member could veto all others in his network, by Lemma B4 he would do so. Let us compare all the possible networks under the best-case scenario that only one rank-1 member joins each. Pick the one that has the highest probability of survival. No member could hope to have a higher level of utility than that afforded by that network. The officer who worked for that network in the previous period can guarantee himself that level of utility by declaring for that network and vetoing all other members. So only one officer will declare for that network, and it will be the officer who worked for it in the previous period. The rest of the proof follows part a. ∎

C Rational Voters Model

Dominant party   The dominant party controls the federal bureaucracy, so only politicians belonging to the ruling party can choose to provide public goods to a state.

Citizens   Citizens live for two periods. Before voting in each period, citizens of a state may, or may not, receive a unit of local public good $g \in \{0, 1\}$. Because the public good is provided before the vote, when young citizens vote they are concerned only with the probability of receiving the public good when old. Insofar as they are influenced by the public good received when young, it is as a signal of the probability of receiving g when old. Young citizens also care about the appeal of the opposition candidate in period t, denoted by a_t (the appeal of the incumbent party's candidate in each period is normalized to zero). That appeal is unknown until just before the vote, and is assumed to be drawn from a continuous cdf F.

Old citizens are cynical and do not care about the candidates' appeal. They only enjoy the public good, if it is provided to them.

Information   Faction members know the size S_t of their faction. However, S_t is not known to voters who, at the beginning of period t, share a prior probability $\pi_t(s)$ that $S_t = s$.

We assume that young citizens (the only citizens who vote) have no information about their faction except that they can observe whether the party has an outgoing governor. That piece of information is the only state variable that voters can condition on. There will therefore be two sets of beliefs for young voters. When young voters see an outgoing governor from the opposition at t, then they know that $S_t = 0$. When young voters see an outgoing governor from the party, their prior beliefs at the beginning of time t are described by π_t.[32][33]

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[32] In our model voters have very limited knowledge of history: they only know whether the outgoing governor is from the ruling party. This assumption reduces the state space of the voter's decision problem. If we relaxed this assumption and allowed young voters to know the result of a given number of past elections, for example, then the decisions of all agents in the model would depend on a richer set of state variables. This would complicate the analysis, but it would not eliminate the basic force that generates the budget cycle. As long as voters do not perfectly know the power of their faction, politicians will signal by providing local public goods.

[33] It is natural ask whether a candidate might find other ways to signal the power of his faction, such as presidential visits to his state, public endorsements, etc. To this question we have two answers. First, candidates may well signal in multiple ways—we do not claim that the signal appears in only in the provision of public expenditure. Second, however, we point out that in order for the signaling to be sustained in equilibrium, at least part of the signaling must be by means of material benefit to voters. Otherwise, if signaling is only costly to candidates but is not materially beneficial to voters, there is no incentive for voters to support the candidate, since the future reward for the support would only be more materially useless signaling.

C.1   Voters' Behavior in a Stationary Equilibrium

In this section we look for a stationary (time invariant) equilibrium of the game. In such an equilibrium, young voters enter each period with a belief $\pi_t = \pi$ about their faction's strength. This belief is stationary and thus is not subscripted by t. We require that equilibrium beliefs be correct, in the sense that the probability distribution π_{t+1} must be consistent with π_t and the promotion probabilities induced by the equilibrium effort of party members. In such a stationary equilibrium, a faction member at position r exerts the same level of effort in every period (that level is not the same, of course, across faction members).

Until now, voter behavior has been summarized by B and b. We now explain how these two statistics are determined in equilibrium, with particular attention to the question of whether $B > b$, i.e., whether (and why) voters are swayed by the pre-electoral provision of public goods.

Old voters in period t have no reason to vote, so we will have them abstain.[34]

Young voters are responsive to g_t insofar as it portends the future realization of g_{t+1}. A young citizen votes as if he were pivotal. If he elects the party candidate then his future payoff is $E_{\pi_t}(g_{t+1}|g_t, \text{party gov. wins at } t)$. If he votes for the opposition he gets a_t.[35] At the stationary equilibrium $\pi_t = \pi$ and so a voter chooses the party if

$$
\begin{aligned}
a_t &\leq E_{\pi}(g_{t+1}|g_t, \text{party candidate wins at } t) \\
&= \Pr{}_{\pi}(g_{t+1} = 1|g_t, \text{party candidate wins at } t) \\
&= E_{\pi}\left((1-\alpha)\sum_{r=0}^{S_t+1}\alpha^r e_r^*|g_t\right)
\end{aligned}
$$

B represents the probability that voters vote for the party candidate after the realization $g_t = 1$ is known, but before a_t is known. Thus,

$$
\begin{aligned}
B &= \Pr\left[a_t \leq E_{\pi}(g_{t+1}|g_t = 1, \text{party candidate wins at } t)\right] && \text{(C3)} \\
&= F\left(E_{\pi}\left((1-\alpha)\sum_{r=0}^{S_t+1}\alpha^r e_r^*|g_t = 1\right)\right).
\end{aligned}
$$

Analogously,

$$
b = F\left(E_{\pi}\left((1-\alpha)\sum_{r=0}^{S_t+1}\alpha^r e_r^*|g_t = 0\right)\right). \tag{C4}
$$

---

[34] We could just as well have them vote in a fixed proportion for the party candidate. The important thing for our purposes is that they are not responsive to g_t.

[35] There is no public good in period $t+1$ because we have assumed that the opposition cannot provide the public good, and the party has no state s faction at $t+1$. Even if we allowed the opposition to provide some public good to state s, that state's faction *within the opposition party* is of size 1 in period $t+1$, and thus much smaller than the expected value of the party's faction. This would lead voters to discount heavily the monetary return from defeating the party candidate.

It is now intuitive that $B \geq b$: the event $g_t = 1$ is more likely when S_t is large, so conditioning on that event increases the likelihood that S_t is large. We now show formally that $B \geq b$.

Lemma C5 *for any* π, $B \geq b$

Denote the posterior distribution over S_t upon seeing the public good as $\pi(s|1) = \Pr(S_t = s|g_t = 1)$. We show that $\pi(s|1)$ first order stochastically dominates the prior $\pi(s)$. Let us start with the following expression

$$
\begin{aligned}
\pi(s|1) &= \Pr(S_t = s|g_t = 1) \\
&= \frac{\Pr(g_t = 1|S_t = s)\Pr(S_t = s)}{\sum_{j=1}^{\infty}\Pr(g_t = 1|S_t = j)\Pr(S_t = j)} \\
&= \frac{\left[\sum_{r=1}^{s}\alpha^r e_r^*\right]\pi(s)}{\sum_{j=1}^{\infty}\left[\sum_{r=1}^{j}\alpha^r e_r^*\right]\pi(j)}
\end{aligned}
$$

Suppose $\pi(s|1) > \pi(s)$, which from the above equation implies $\frac{\left[\sum_{r=1}^{s}\alpha^r e_r^*\right]}{\sum_{j=1}^{\infty}\left[\sum_{r=1}^{j}\alpha^r e_r^*\right]\pi(j)} > 1$. Then for any $s' > s$ we also have

$$
\begin{aligned}
\pi(s'|1) &= \frac{\left[\sum_{r=1}^{s'}\alpha^r e_r^*\right]\pi(s')}{\sum_{j=1}^{\infty}\left[\sum_{r=1}^{j}\alpha^r e_r^*\right]\pi(j)} \\
&> \frac{\left[\sum_{r=1}^{s}\alpha^r e_r^*\right]\pi(s')}{\sum_{j=1}^{N}je_r^*\pi(j)} > \pi(s').
\end{aligned}
$$

This means that the curve $\pi(s|1)$ lies below the curve $\pi(s)$ if and only if s is smaller than some $\bar{s}$. This means that the c.d.f. of $\pi(s|1)$ lies below that of $\pi(s)$, as we wished to show.

Now, let us show that $B > b$. Define the function

$$
\beta(S) = (1 - \alpha)\sum_{r=0}^{S+1}\alpha^r e_r^*.
$$

The function $\beta(S)$ is increasing, and so stochastic dominance implies

$$
E(\beta(S)|\pi, g_t = 1) > E(\beta(S)|\pi).
$$

Using the following identity

$$
E(\beta(S)|\pi) = \Pr(g_t = 1|\pi)\cdot E(\beta(S)|\pi, g_t = 1) + \Pr(g_t = 0|\pi)\cdot E(\beta(S)|\pi, g_t = 0),
$$

the previous inequality can be strengthened to yield

$$
E(\beta(S)|\pi, g_t = 1) > E(\beta(S)|\pi) > E(\beta(S)|\pi, g_t = 0).
$$

Then

$$
B = F(i + E(\beta(S)|\pi, g_t = 1)) > F(i + E(\beta(S)|\pi, g_t = 0)) = b.
$$

C.2 Existence of equilibrium

At any equilibrium of the rational voters game equations (3), (C3) and (C4) must hold. Putting them together yields

$$c'\left(e_r^*\right) = \left[\begin{array}{c} F\left(E\left((1-\alpha)\sum_{r=0}^{S_t+1}\alpha^r e_r^*|\pi, g_t = 1\right)\right) \\ -F\left(E\left((1-\alpha)\sum_{r=0}^{S_t+1}\alpha^r e_r^*|\pi, g_t = 0\right)\right) \end{array} \right] (1-\alpha)\,\alpha^r. \tag{C5}$$

We are interested in equilibria in which positive effort is exerted and the public good is provided with positive probability. In these equilibria the right hand side has to be nonzero, which requires that $\pi(s)$ be non-degenerate, i.e., it cannot put mass 1 on a particular s (otherwise conditioning on g_t has no effect). In order to construct such equilibria, for each r we need to find pairs (e_r^*, π) that solve the equation and such that $\{e_r^*\}$ generates π.

Let us start by showing that for any given vector $\{e_r\}$, there exists at least one pair of numbers $\bar{B}, \bar{b}$ such that the π generated by $\{e_r\}, \bar{B}, \bar{b}$ solves (C3) and (C4).

Start with arbitrarily chosen B_0, b_0. Let $G: [0,1]^2 \to \Delta^\infty$ denote the generating process, and denote $\pi_0 = G(B_0, b_0)$ the probability distribution generated by B_0, b_0. Now plug π_0 into expressions (C3) and (C4); to obtain the pair B_1, b_1. We can formalize this process as feeding π_0 into a function $H: \Delta^\infty \to [0,1]^2$. We are interested in the properties of the composition $H \circ G$ which takes as its argument a pair B_t, b_t and maps it into a pair B_{t+1}, b_{t+1}. Both G and H are continuous, so the composition is continuous. The composition also maps the square $[0,1]^2$ into itself. By Brouwer's theorem, then, the composition $H \circ G$ must have a fixed point $\bar{B}, \bar{b}$. Then we know that $\bar{\pi} = G(\bar{B}, \bar{b})$ solves (C3) and (C4).[36]

Let us call $\bar{B}(e_1), \bar{b}(e_1)$ the set of fixed points associated with $\{e_r\}$. Note that if the vector $\{e_r\}$ is an equilibrium then it is appropriate to use the first element of the vector only, since the entire vector $\{e_r\}$ is completely determined through equation(C5) once its first element e_1 is known. Equation (C5).can now be written as

$$c'\left(e_1^*\right) \in (1-\alpha)\left[F\left(\bar{B}\left(e_1^*\right)\right) - F\left(\bar{b}\left(e_1^*\right)\right)\right]$$

The RHS might be a correspondence – we have not proved that $\bar{B}(e_1), \bar{b}(e_1)$ is a singleton. Nevertheless, for each $e_1 > 0$ the lower bound of the RHS is positive (see C5). Thus, for $c(\cdot)$ sufficiently convex we are ensured that an equilibrium with positive effort exists.

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[36]Thanks to Ennio Stacchetti for pointing out the fixed point argument.

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