

# Corruption and Power in Democracies

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Discussion Paper No. 12/624  
June 2012

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## Abstract

According to Acton: “Power corrupts and absolute power corrupts absolutely”. We study the implications of Acton’s dictum in models where citizens vote (for three parties) and governments then form in a series of elections. In each election, parties have fixed tastes for graft, which affect negotiations to form a government if parliament hangs; but incumbency changes tastes across elections. We argue that combinations of Acton’s dictum with various assumptions about citizen sophistication and inter-party commitments generate tight and testable predictions which describe plausible dynamics of government formation in an otherwise stationary environment.

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# 1 Introduction

President arap Moi’s administration was marked by political corruption. By 2002, Transparency International ranked only five countries as more corrupt than Kenya. Kibaki won the 2002 election after campaigning on an anti-corruption ticket. He started by appointing Githongo to investigate corruption, but sacked him as Githongo closed in on government ministers. Kibaki lost the 2007 parliamentary election and possibly the presidential election against the ODM, who again campaigned against corruption.

This story reminds us of two familiar lessons. The first is that citizens usually punish corrupt politicians, as evidenced more systematically by Ferraz and Finan (2008) and Krause and Mendez (2009). The second lesson is that good intentions can be forgotten once one obtains access to power: as Acton put it, “power corrupts [and absolute power corrupts absolutely]”. This familiar claim is consistent with Besley and Prat’s (2004) evidence of a significant positive correlation between corruption and political longevity, and with Ferraz and Finan’s (2009) evidence that second-term Brazilian mayors were more corrupt than first-term mayors.<sup>1</sup> However, these lessons do not necessarily imply repeated turnover: the Christian Democrat-led Italian governments also exemplify Acton’s dictum, and Italian citizens were clearly disaffected by the manifest corruption; yet the Christian Democrats shared power with essentially the same centrist partners for about forty years after WW2.

We follow conventional wisdom by assuming that (rather than explaining why) governing parties seek re-election in order to extract graft. We use this framework for two purposes. We first study the governments which form when ideologically divided parties have fixed tastes for corruption, which citizens know before voting. We then study the implications of Acton’s dictum on the dynamics of corruption and government composition. Our results may therefore explain why there has been repeated turnover in Kenya, and the identity of the parties in Italian coalitions.

We analyze several models of dynamic democracy. In all of these models, a given period starts with an election, after which a government forms and chooses its program (a scalar policy and its private consumption of graft). If some party secures a majority of votes then it is in power (alone), and can unilaterally choose the government’s program. If no party secures a majority of votes then the parties which secure some votes negotiate the composition and program of a coalition government: where we interpret negotiations over graft as bargaining over control of ministries. The twist on a standard median voter model is that citizens cannot control the outcome of negotiations in a hung parliament.

The electorate consists of three sorts of citizen. Each sort has (different) single-peaked preferences over scalar policy, and all citizens equally dislike corruption. Each of the three parties has the same ideal policy as one of the citizen sorts. In contrast to citizens, parties may also have a taste for graft. Specifically, parties are either corrupt, in the sense that they only care for graft, or pure, in the sense that they dislike any graft, and only care about policy.

We focus on the notion that power corrupts by considering an environment which is stationary except for the corrupting effect of power on governing parties. Specifically, we

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<sup>1</sup>Ferraz and Finan attribute this effect to a two-term limit. Our analysis suggests that Acton’s dictum may explain these results. Unfortunately, we are not aware of empirical work that could separate the relative importance of these two alternative explanations.

suppose that a party which was last in government is corrupt, and a party which was last in opposition is pure. (This is what we mean by Acton’s dictum.) We also suppose that citizens and parties each have a one-election horizon. These assumptions allow us to characterize ergodic sets in each model (a cycle of governments which, once reached, is never left) as a function of the salience of corruption and of the distribution of parties’ ideal policies. These ergodic sets provide a natural language to describe long periods with unchanged government composition (as in Italy and Austria), and cycles in which coalitions repeatedly replaced each other (as in Germany).

Our benchmark model is a special case of this set-up in which parties can freely bargain over the government’s program. We capture these negotiations axiomatically. Our conditions uncontroversially imply that the minimal winning coalition with the maximal possible surplus forms a government and splits this surplus equally whenever no party secures a majority of votes. In addition, citizens vote strategically in our benchmark model.

The ergodic set consists of the median party alone in power if corruption is non-salient enough and the other parties are sufficiently uncompetitive in the sense that their ideal policies are extreme enough. The government then always chooses some graft in the ergodic set. If corruption is more salient then the ergodic set can take two forms. If one party’s ideal policy is particularly extreme then the median party alternates in power with its less extreme rival; otherwise the median party alternates in power with a coalition of the other two parties. In both cases, the government never chooses any graft, and no government chooses an extreme policy. To set these results in context: the median party would always be in power alone and take no graft in a Downsian model where parties can commit to their programs before an election.

Some of the model’s implications seem empirically plausible: for example, only the median party can always be in power (when corruption is non-salient). Other implications are more difficult to square with the evidence: for example, policy-connected parties cannot share power; and a corrupt party cannot be in a coalition government. The former prediction seems inconsistent with the decades-long coalitions in Austria and Italy. The latter prediction seems difficult to square with the coalition government formed by the Progressive Democrats and Fianna Fail after the 1989 Irish election, when the former campaigned against the latter’s corruption. This episode was repeated in 1992, when Labour joined the coalition.

We address these problematic implications of the benchmark model by studying play in two empirically plausible variants on the model:

- Parties often commit to govern together if they jointly win enough votes.<sup>2</sup> We amend the benchmark model by allowing for such agreements. The median party may always commit to share power in circumstances when it would alternate in power in the benchmark model; and median citizens are worse off than in the benchmark model. On the other hand, the other two parties may form a coalition when the median party is corrupt; so the coalition alternates in power with the median party. In the benchmark model, the median party would always be in power in these circumstances, and median citizens are then better off.

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<sup>2</sup>About half of governments in Golder’s (2005) sample contained pre-election coalitions; and about a third of coalition governments are based on such agreements (cf. Strom and Miller (1999)).

- If citizens vote expressively (for the party they would most prefer in power) rather than strategically then other coalitions are, of course possible. We have a much stronger result: the only coalitions which can form in an ergodic set consist of a pure and a corrupt party. Citizens who vote expressively may vote in a government which chooses an extreme policy, and may replace one corrupt government with another one.

There are, of course, large literatures on elections, on government formation, and on corruption, with some papers studying their interactions. We focus below on the most closely related papers:

From a methodological point of view, our model is closest to Baron and Diermeier (2001): in both papers, citizens vote repeatedly for parties which cannot precommit to policy; coalitions are negotiated in a hung parliament; and players have a one-election horizon.<sup>3</sup> However, the models differ in various respects. First, Baron and Diermeier assume that a randomly chosen formateur makes a single offer, with the last policy as the status quo, which may therefore determine the equilibrium coalition. By contrast, the status quo is irrelevant in all of the models we analyze; and we show that introducing a formateur may eliminate all coalition governments. Second, our model implies that a minimal winning government forms, whereas a party which secures a majority of votes would typically negotiate a coalition government in their model. Single-party governments are therefore impossible in their model, but usual in our model. Third, preferences are constant in Baron and Diermeier: only the status quo evolves, whereas tastes for graft evolve in our model. Finally, in contrast to Baron and Diermeier and the subsequent literature, we can use our model to calculate ergodic sets.

From a substantive point of view, our model is related most closely to Myerson (2006) and Volden and Wiseman (2007), who also treat corruption as graft. Myerson supposes that citizens care (heterogeneously) about a binary policy, while candidates are exogenously endowed with a taste for graft. The binary structure precludes coalition formation, which is an essential aspect of our model. On the other hand, we fix an electoral system, whereas Myerson compares equilibrium corruption across electoral systems.

Volden and Wiseman (2007) use a standard noncooperative bargaining model to study coalition formation among any fixed number of legislators, who have the same preference ordering over policy, but may trade off policy and graft differently. This apparatus, in which agreements can be delayed, is inappropriate for our purposes because, unlike the previous literature, we also study sequences of elections. Accordingly, we model inter-party negotiations axiomatically. Like Volden and Wiseman, we find that a pure and a corrupt party may share power in a hung parliament; but we endogenize the distribution of votes, showing that such a hung parliament would never be elected in equilibrium in the benchmark model.

We model corruption as graft chosen by myopic parties whose preferences change over time; whereas the literature on pork studies corruption as a means for parties with fixed preferences to finance re-election. Pork necessarily results in an incumbency advantage; we show that graft may result in an incumbency advantage or disadvantage, as the Kenyan example suggests.

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<sup>3</sup>Baron, Diermeier and Fong (2007) drop the last assumption.

Corruption may vary over time in our model because power corrupts. A related literature attributes time-varying corruption to multiple equilibria (cf. Tirole (1996) and Hauk and Saez-Marti (2002)), and to the depletion of an incumbent’s resources in Bicchieri and Duffy (1997).

Our supposition that preferences vary endogenously connects our model to a large literature: particularly Fershtman and Heifetz (2006). They attribute political instability to the development of citizen preferences as government policy changes, and assume that citizens do not try to influence their future preferences. In contrast to Fershtman and Heifetz, we suppose that citizens always dislike corruption, but that the exercise of power corrupts their representatives. However, our assumption of myopic parties tracks their supposition that citizens treat their current preferences as fixed.

We define our benchmark model in Section 2. In Section 3, we characterize its ergodic sets and compare them with optimal cycles. We also derive the model’s testable implications, and discuss their relation with some stylized facts about government formation. In Section 4, we analyze two variants on the model which relax the benchmark assumptions about inter-party negotiations: in one, parties can pre-commit to coalition partners; in the other, a formateur chooses its partner. Section 5 analyzes the case of expressive voting. We summarize our results in Section 6, and discuss further extensions, such as to bicameral elections and to intermediate tastes for graft. We relegate longer proofs to an Appendix.

## 2 Benchmark model

We analyze a game played over an infinite number of periods. Each period starts with an election. A party which receives a majority of the votes cast chooses the government’s program, which consists of policy and the graft it enjoys. If none of the parties receive a majority of votes then they bargain to determine government composition and its program. These choices (plus payoffs) define a one-period game. We spell out and discuss details of a one-period game in Section 2.1, and then describe the full (multi-period) game in Section 2.2.

### 2.1 One-period game

**Programs** We identify a government’s program with a scalar policy (denoted  $x$ ) and with the (non-negative) scalar graft which each party  $i$  receives (denoted  $y_i$ : we write  $y$  for the vector of graft). Each citizen’s welfare depends on both policy and on graft; but while citizens differ as to the ideal policy, graft (aka corruption) can only benefit the recipient party, and represents a direct cost to all other players. Graft could therefore be thought of as private consumption. It is important to distinguish our model of corruption from pork, as studied by Baron (1991) *inter alia*, which represents the diversion of public resources to a subset of citizens. Pork is beneficial to some citizens in these settings; whereas graft is disliked by all citizens in our model. We also suppose that the aggregate quantity of graft is endogenous: an assumption shared by Myerson (2006) and Volden and Wiseman (2007). By contrast, Baron and Ferejohn (1989) and the related literature suppose that there is a fixed quantity of graft to be divided amongst parties in government; so its distribution does not affect citizens’ welfare.

**Citizens** A finite number of citizens is divided into three sorts, indexed by  $i \in \{L, M, R\}$ , according to their preferences over policy. Citizens of sort  $i$  have preferences over a program represented by

$$u_i(x, y) = -\beta|x - x_i| - \gamma \sum_j y_j$$

where  $\beta$  is positive, so  $x_i$  is the ideal policy for citizens of sort  $i$ . We will refer to  $\beta|x - x_i|$  as the ‘policy costs’ of a government. We suppose that  $\gamma$  is also positive; so, in contrast to pork, corruption is equally costly for all citizens, and may generate an incumbency disadvantage.

We suppose that  $x_L < x_M < x_R$ ; so we will refer to citizens of sort  $L$  as ‘leftists’, citizens of sort  $M$  as ‘moderates’, and citizens of sort  $R$  as ‘rightists’. It will prove convenient to normalize  $x_M$  at 0; to write  $x_R$  as  $d$  and  $x_L$  as  $-\theta - d$ ; and to assume that  $d$  and  $\theta$  are both positive, which implies that a leftist’s ideal policy is relatively more extreme than a rightist’s.

We focus on the interesting case, in which neither leftists nor rightists form a majority. It is easy to extend our results to the other cases.

A strategy for a citizen is a vote for a party in  $\{L, M, R\}$  or an abstention. It is convenient to interpret our model as a PR election in a single constituency, but our results may also apply to winner-take-all elections in several constituencies.

**Parties** We treat parties as citizens who may develop a taste for graft if and only if they have been in government. Consequently, there are three parties:  $L$ ,  $M$  and  $R$ . We will drop the qualifier ‘party’ whenever it can be inferred from context.

We suppose that, for every sort  $i$  of citizen, there is a party whose preferences over a program are represented by

$$v_i(x, y) = c_i(\alpha y_i)^{1/2} - (1 - c_i)\beta|x - x_i| - \gamma \sum_{l \in \{L, M, R\}} y_l - c_i^2 \frac{\alpha}{4\gamma} + n_i$$

where  $\alpha$  is positive and  $c_i \in \{0, 1\}$ . The last term,  $n_i$ , represents some transferable currency whose distribution between governing parties satisfies  $\sum n_i = N$ , where  $N$  is large. The availability of transferable utility will allow us to assume that inter-party agreements split the maximal surplus: see below. We include a normalization constant,  $-c_i^2\alpha/4\gamma$ , to ensure that party  $i$ ’s ideal policy, transfers and graft yield it a payoff of  $N$ , irrespective of  $c_i$ . We adopt these rather special payoff functions for expositional convenience: we will argue below that our main results are robust to alternative specifications.

We will refer to  $c_i$  as  $i$ ’s taste for graft, to any triple  $\{c_i\}$  as a ‘state’, and to  $c_i(\alpha y_i)^{1/2}$  as the ‘private benefits of graft’. We will say that  $i$  is pure if  $c_i = 0$ , and corrupt if  $c_i = 1$ . These assumptions capture the notion that corrupt parties care less about policy than pure parties. In this paper, we consider the extreme case where corrupt parties are not interested in policy, so that pure and corrupt parties respectively correspond to the good and bad types of politician in Besley and Smart (2007). It is certainly possible to conceive of a less extreme case, where corrupt parties care about both graft and policy as in Volden and Wiseman (2007). However, we focus on the consequences of Acton’s dictum, rather than develop a theory which justifies the dictum. Assuming that corrupt parties have no interest in policy allows us to do this in a straightforward way; less extreme assumptions would require such

a theory, which would make the rest of our analysis intractable. We will return to this issue in the Conclusion.

Our representation of parties is reminiscent of citizen-candidate models; but in contrast to that literature (cf. Besley and Coate (1997)), we fix the number of parties. In contrast to Myerson (2006), citizens who find that their party is corrupt cannot form a competing pure party.

**Government formation** We suppose that the government’s program is determined after an election.<sup>4</sup> Specifically, if any party secures more than half of the votes cast then it forms a government alone, choosing the program which maximizes its payoff. We say that the party is then ‘in power’. We assume that a corrupt party  $i$  incurs no policy cost; but we suppose that it would choose  $x_i$  when in power. This is the limit of chosen policies as  $c_i$  approaches 1 from below.

There are two cases in which no party secures a majority of votes:

In the first case, two parties each secure half of all votes cast. We assume that each party is then equally likely to be in power. This assumption is plausible if parties lose representatives by natural attrition - so such coalitions are unstable. We adopt the assumption because it precludes putative solutions which seem to require too much coordination among citizens.<sup>5</sup>

In the other case, all three parties secure some votes. We then say that there is a ‘hung parliament’. A government can then only be formed by two or more parties, which must negotiate the government’s program. We say that these parties ‘share power’. We also say that a party is ‘in government’ if it is either in or shares power, and that it is otherwise ‘in opposition’.

We think of negotiations over graft as the indirect consequence of bargaining over control of departments, whose ministers have some discretion over the budget and appointments: for example, aggregate opportunities to extract graft can change as ministries are subdivided or merged. Viewed this way, parties implicitly determine their respective opportunities for graft through negotiations over control of ministries. The assumption that graft is negotiated is substantive; but play in the benchmark model would not change if parties in government chose graft unilaterally.<sup>6</sup>

The literature on government formation has focused on hung parliaments, exploring play in particular extensive form bargaining models. In the literature inspired by Baron and Ferejohn (1989), parties continue to bargain - potentially indefinitely - until a winning coalition reaches agreement.<sup>7</sup> We eschew such models, despite their evident attractions, because we are interested in the dynamics of government formation across elections. On the other hand, we want to abstract away from the order in which parties move, which is crucial in finite bargaining models like Austen-Smith and Banks (1988). Accordingly, we

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<sup>4</sup>This is crucially different from Downsian models, where parties can commit to their programs before the election. If we allowed such commitments in our model then the elected government would commit to no graft and moderates’ ideal policy ( $x = 0$ ).

<sup>5</sup>Our results are (qualitatively) robust to alternative assumptions, such as that a specific party is in power when two parties get half of the votes each. They only change the conditions under which two pure parties can share power.

<sup>6</sup>We explain why after Proposition 3.1 in the next section.

<sup>7</sup>See, for example, Volden and Wiseman (2007).

adopt an axiomatic approach to inter-party bargaining, which easily delivers some simple and, we believe, robust properties of such negotiations when parties are unfettered by prior commitments, and are free to choose coalition partners.<sup>8</sup>

We start with a definition. We say that an agreement between parties  $i$  and  $j$  yields a ‘surplus’ of  $\max_{x,y} v_i(x, y) + v_j(x, y)$ .

We suppose that:

- A. The parties which form a government reach a mutually efficient agreement on a program which divides their surplus equally. If these parties are both pure or both corrupt then the agreed policy is half way between their ideal policies; and
- B. The coalition of at least two parties with the maximal surplus forms the government.

Condition A is in the spirit of Baron and Diermeier (2001), *inter alia*, who study nonco-operative models of efficient proto-coalitional bargaining. Efficiency implies that a corrupt and a pure party would agree to the pure party’s ideal policy: which is the basis for Lemma 3.3 below. If two pure parties reach an agreement then any policy compromise yields the same surplus because policy costs are linear. However, the surplus would be uniquely maximized by the policy midway between the two parties’ ideal policies if policy costs were strictly convex. We simplify exposition by assuming that policy costs are linear, but that two equally corrupt or pure parties split the difference between their ideal policies.

If Condition A holds then it is natural to suppose that the surplus-maximizing coalition shares power (Condition B). We have included transferable utility ( $N$ ) to ensure that some pair of parties both prefer to share power with each other: that is, to exclude voting cycles.

Conditions A and B may be satisfied by more than one pair of parties. We then allow citizens to believe that any such pair might share power.<sup>9</sup> The combination of Conditions will allow us to characterize the government’s composition and program in every state. In particular, it will allow us to treat citizens as the only active players in our benchmark model.<sup>10</sup>

**One-period game and solution concept** Formally, the game is played by the set of citizens, whose strategy is a vote for one of the parties or abstention. Our assumptions above characterize the government program after any electoral outcome for any state, and thereby each citizen’s payoff at any strategy combination.

The one-period game has many Nash equilibria because a citizen is indifferent across her strategies unless she is pivotal; so any single-party government or coalition which satisfies Conditions A and B can be elected at a Nash equilibrium strategy combination where no citizen is pivotal. Accordingly, we analyze the one-period game by characterizing its strong equilibria: strategy combinations in which no set of citizens have a profitable joint deviation.<sup>11</sup> This refinement selects the Condorcet winner amongst the three parties in power

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<sup>8</sup>We study extensions of the model in Section 4.1, where parties can commit to coalition partners; and in Section 4.2, where a formateur chooses its partner.

<sup>9</sup>This turns out to be relevant in proving Proposition 3.1d.

<sup>10</sup>This would of course be impossible in a Downsian model. We will treat parties as active players in Section 4.1.

<sup>11</sup>The median voter theorem, which is crucial in our context, may fail with weaker refinements, like coalition proofness: cf. Seidmann (2008).

and a hung parliament, and implies that moderates determine government composition. The equilibrium outcome coincides with the core of the voting game played by citizens, conditional on party behavior.<sup>12</sup>

We simplify exposition by referring to strong strategy combinations as ‘equilibria’.

Note that citizens of the same sort can vote differently in equilibrium. Indeed, various strategy combinations can support a given outcome. Thus, our solution concept pins down the governments that form (and therefore outcomes) rather than the voting pattern.

**Incumbency effects** A candidate of a given party has an incumbency advantage, in conventional terms, if she is more likely to be elected when she was last in government than when she was last in opposition. We can use the equilibrium correspondence (across states) to define incumbency effects for fixed parameters. We will say that party  $i$  has an incumbency advantage if it is in government at a state with  $c_i = 1$  (when it was last in government), and in opposition at a state with  $c_i = 0$ .<sup>13</sup> We define incumbency disadvantage analogously.

## 2.2 Multi-period game

Our analysis of the one-period game studies play at a given state. We extend this analysis to capture Acton’s dictum that power corrupts by considering play in a sequence of periods. We assume that a party is corrupt if it was in government in the last period, and that it is otherwise pure.

This assumption is consistent with various interpretations of Acton’s dictum. On the one hand, politicians’ direct preferences over policy and graft may change once in power.<sup>14</sup> On the other hand, politicians may have fixed preferences, but parties may need time in government to develop the skills needed to rob the public purse.<sup>15</sup> The corrupting effect of power would then be determined by institutional features such as the organization of the bureaucracy. Alternatively, parties which implement new policies may need ideologically neutral but self-interested experts, who eventually determine the government’s program.<sup>16</sup> della Porta and Pizzorno (1996) discuss Italian corruption accounting for many different factors: the breakdown of parties, the emergence of secret networks and the corrupting of individuals.

Acton’s dictum is usually invoked to explain the effects of exercising power; so its converse, the purifying effects of opposition, is rarely mentioned. Nevertheless, opposition might ‘purify’ if parties lose the requisite skills or networks.

As mentioned above, formalizing Acton’s dictum would obviously complement our analysis. However, we focus on the implications of the dictum which, to a first approximation, are independent of its microfoundations. We do not include a model of ‘changing tastes for graft’ because it would threaten the model’s tractability, which we fully exploit below. Instead, we follow conventional wisdom by assuming that Acton’s dictum is correct.

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<sup>12</sup>Preferences are structured such that the core is non-empty, even though the program is two-dimensional.

<sup>13</sup>Note that a given party may be in or may be excluded from several possible governments.

<sup>14</sup>Lammers et al (2010) provide experimental support for this hypothesis.

<sup>15</sup>Ferraz and Finan (2011) exploit various measures to empirically control for such learning-by-doing.

<sup>16</sup>Weinstein (2005) describes a similar effect on the composition of rebel groups.

We also suppose that the time which elapses between elections is long enough that citizens and parties only care about the incoming government's program.<sup>17</sup> Parties then have no incentive either to divert public resources to finance re-election campaigns or to control their greed; and citizens' payoffs are their returns,  $u_i(x, y)$ , from the next government's program. This assumption allows us to evade the time-consistency issues which models of changing tastes otherwise raise, and implies that citizens do not punish parties for their performance in past governments. We can therefore analyze play in each period by characterizing its equilibria.

We study the influence of successive elections in an environment where citizens' preferences over programs are fixed by characterizing the multi-period game's long-run cycles. Formally, a long-run cycle with periodicity  $T$  is a sequence of states which repeats every  $T$  periods, where the transition from state  $s_t$  to state  $s_{t+1}$  is determined by the government which forms in an equilibrium at state  $s_t$ , and by Acton's dictum (so a party in government in period  $t$  is corrupt in period  $t + 1$  while a party out of government in period  $t$  is pure in period  $t + 1$ ).

Our equilibrium notion for one-period games only pins down outcomes, so we will focus on the long-run pattern of governments, which is implicitly determined by a long-run cycle. We will call this an 'ergodic set'.

### 3 Benchmark results

In this section, we characterize equilibria and ergodic sets in the benchmark model. We provide our main results in Section 3.1. In Section 3.2, we demonstrate that there are nonergodic cycles in which moderates are better off than in the ergodic set. In Section 3.3, we collect and discuss some of the benchmark model's testable implications.

#### 3.1 Outcomes

Our first result in this subsection characterizes the program chosen and each citizen's payoff for every possible government.

##### Lemma 3.1

- a. *If party  $i$  is in power then it chooses a policy of  $x_i$  and graft of  $\alpha c_i^2/4\gamma^2$ ; and sort  $k$  citizens earn*

$$-\beta|x_i - x_k| - \frac{\alpha}{4\gamma}c_i^2.$$

- b. *If parties  $i$  and  $j$  share power then they agree to respective graft of  $\alpha c_i^2/16\gamma^2$  and  $\alpha c_j^2/16\gamma^2$ , and to policy  $(x_i + x_j)/2$  if  $c_i = c_j$ ; to policy  $x_i$  if  $c_i < c_j$ ; and to policy  $x_j$  otherwise. Their agreement yields a surplus of*

$$N - \beta(1 - \max\{c_i, c_j\})|x_j - x_i| - \frac{\alpha}{8\gamma}(c_i^2 + c_j^2).$$

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<sup>17</sup>In practice, a government cannot fully precommit to its program, which is adjusted throughout its term in office; and, close enough to the end of a term, it is chosen to ensure re-election. We will return to this issue in the Conclusion.

If parties  $i$  and  $j$  agree to policy  $x$  then sort  $k$  citizens earn

$$-\beta|x - x_k| - \frac{\alpha}{16\gamma}(c_i^2 + c_j^2).$$

c. Two parties share power in a hung parliament.

**Proof**

a. Obvious (given our assumption that party  $i$  chooses  $x_i$  even if it is corrupt).

b. The specified graft maximizes the surplus,  $v_i(x, y) + v_j(x, y)$ , with respect to  $y$ . Efficiency (Condition A in Section 2) implies that the agreed policy maximizes the surplus with respect to  $x$ . The remainder of this part follows by substituting the program into  $v_i(x, y) + v_j(x, y)$  and into  $u_k(x, y)$ .

c. The grand coalition's surplus is maximized when each party  $i$  agrees to graft of  $\alpha c_i^2/36\gamma^2$ ; so the maximized surplus, for fixed policy  $x$ , is

$$N - \frac{\alpha}{6\gamma} \sum c_l^2 - \sum (1 - c_l)\beta|x - x_l|,$$

which is less than the surplus of any two-party coalition. Condition B then implies that a minimal winning coalition always forms. ■

Lemma 3.1 implies that any government's graft is proportional to  $\alpha/\gamma^2$ : the proportion depending on the tastes of government members. Consequently, the cost of corruption to a citizen is proportional to  $\alpha/\gamma$ . The parameter  $\delta$ , which we define as  $\alpha/\beta\gamma$ , therefore measures a citizen's trade-off between policy and realized graft. We will refer to  $\delta$  as the 'salience' of corruption: an interpretation which seems to be consistent with the widespread use of salience in empirical studies.<sup>18</sup> Salience is a sufficient statistic for  $\{\alpha, \beta, \gamma\}$  in many of our results. We will ignore non-generic sets of parameters in which  $\delta$  satisfies some linear equations in  $d$  and  $\theta$ .

Lemma 3.1 implies that aggregate graft is higher when two corrupt parties share power than when a pure and a corrupt party share power. More strikingly, inter-party negotiations internalize the costs of corruption, in the sense that two corrupt parties which share power choose less graft in aggregate than a corrupt party in power. This property holds more generally: for example, if a corrupt party  $i$ 's payoff can be written as  $y_i^\alpha - (\sum y_l)^\gamma$  plus constants, where  $0 < \alpha < 1 < \gamma$ ; but it would obviously fail if parties which shared power chose their graft unilaterally. The property is immaterial in the benchmark model, for reasons which we will shortly explain; but it bites in Section 4.1, where we allow parties to commit to govern together if at all, as moderates may prefer two corrupt parties to share power over any party in power.

Lemma 3.1b implies that the agreed graft depends on the number (rather than the identity) of corrupt parties. Furthermore, an agreement between a pure and a corrupt party must delegate policy choice to the pure party, and yields a surplus which also only depends on the number of corrupt parties.

Our next result uses Lemma 3.1 to characterize equilibria of any one-period game: given Lemma 3.1c, at least one party is pure and at least one party is corrupt. While the

<sup>18</sup>See, for example, Epstein and Segal (2000) on empirical proxies for salience when surveys are unavailable.

governments specified in Proposition 3.1 only depend on salience ( $\delta$ ), equilibrium payoffs depend on  $\beta$  and on  $\alpha/\gamma$ .

**Proposition 3.1 (Equilibria)** *In generic one-period games:*

- a. *If  $M$  is pure then it is in power.*
- b. *If  $M$  and  $R$  are corrupt then  $M$  is in power if  $\delta < 4(d + \theta)$ ; and  $L$  is otherwise in power.*
- c. *If  $L$  and  $M$  are corrupt then  $M$  is in power if  $\delta < 4d$ ; and  $R$  is otherwise in power.*
- d. *If  $M$  is the only corrupt party then  $M$  is in power if  $\delta < 4d$ ;  $L$  and  $R$  share power if and only if  $\theta < 2d$  and  $8(2d + \theta) < \delta$ ; and  $R$  is otherwise in power.*

We prove Proposition 3.1 in the Appendix. The proof exploits four Lemmas, which will prove useful throughout the paper:

- Lemma 3.2 states that two parties cannot split all of the votes cast equally in any equilibrium. It follows from our supposition that each party is equally likely to be in power in such circumstances, and the fact that pivotal citizens have strict preferences over governments for generic parameters.
- Lemma 3.3 states that two corrupt parties do not share power in any equilibrium: an agreement between two corrupt parties yields a smaller surplus than an agreement between a pure and a corrupt party because of gains from trade. This property also holds in Volden and Wiseman’s (2007) noncooperative bargaining model of a heterogeneous legislature. It would also hold if parties which share power chose their graft unilaterally.
- Lemma 3.4 states that a corrupt and a pure party do not share power in any equilibrium: for such parties would agree to the pure party’s ideal policy and some graft (cf. Lemma 3.1b), so all citizens are better off if the pure party is in power. This argument, which relies on endogenizing the legislature’s composition, distinguishes Proposition 3.1 from Volden and Wiseman’s (2007) results.
- Lemma 3.5 states that the government which forms is top-ranked by moderates out of the three single-party governments and the coalition which would form were parliament hung; so the equilibrium government is unique. The proof constructs profitable joint deviations by citizens of various sorts to exclude any other putative government. It relies on the existence of a Condorcet winner, even though programs are multidimensional. We exclude Condorcet cycles by assuming not only that graft is a public bad but also that  $\{\alpha, \beta, \gamma\}$  are common across citizens.<sup>19</sup>

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<sup>19</sup>Let  $M$  alone be corrupt. Suppose, contrary to our model, that the unit cost of graft to sort- $k$  citizens ( $\gamma_k$ ) may differ across  $k$ . If

$$(d + \theta) \frac{\gamma_M}{\gamma_R} < \frac{\alpha}{4\beta\gamma_M} < \min \left\{ (2d + \theta) \frac{\gamma_M + \gamma_R}{\gamma_R}, d, d \frac{\gamma_M}{\gamma_L} \right\}$$

then there is no Condorcet winner amongst the three parties in power and a hung parliament, where  $M$  would share power with a pure party.

Proposition 3.1 exploits our strong equilibrium solution concept, which pins down the government which forms, but does not allow us to uniquely identify the party that secures a given citizen's vote.

Inspection of Proposition 3.1 reveals that no party has an incumbency advantage in the benchmark model:  $M$  is never in opposition in successive periods, while the other two parties are never in government in successive periods. On the other hand, each party has an incumbency disadvantage for some parameters.

We have used a specific functional form to prove Proposition 3.1, but we only rely on this functional form to establish that policy is delegated away from a corrupt party (cf. Lemma 3.4); and that two corrupt parties cannot maximize the surplus in a hung parliament (cf. Lemma 3.3). Both of these properties would also hold if a corrupt party cared a little about policy (that is, if  $c_i$  were close to 1).

Our next result, which we prove in the Appendix, shows that Lemma 3.3 also holds if preferences satisfy

**Condition P** *Party  $i$ 's preferences can be represented by either*

$$v_i^A = c_i f(y_i) - g\left(\sum y_l\right) - (1 - c_i)h_i(x) - K_i(c_i) + n_i,$$

or

$$v_i^B = [f(y_i)]^{c_i} [h_i(x)]^{1-c_i} - g\left(\sum y_l\right) - K_i(c_i) + n_i$$

where  $f$  is differentiable, strictly increasing and strictly concave;  $g$  is differentiable, strictly increasing and strictly convex;  $\max_y f(y) - g(y)$  has an interior solution;  $h$  is single-peaked; and  $\max_{x,y} v_i^A = \max_{x,y} v_i^B = n_i$  for  $c_i \in \{0, 1\}$ .

**Observation 3.1** *If each party's preferences satisfy Condition P then a coalition of two corrupt parties yields a smaller surplus than a coalition of a pure and a corrupt party.*

Condition P is sufficient rather than necessary: Observation 3.1 would still hold if either  $f$  or  $g$  were linear.

Proposition 3.1 specifies unique equilibrium governments in each state. We now use this result for one-period games to construct ergodic sets in multi-period games. The proof of Proposition 3.2 below follows easily from Proposition 3.1, exploiting our assumption that citizens have a one-election horizon. We report moderates' payoffs for use in the next subsection.

**Proposition 3.2 (Ergodic sets)** *There is a unique ergodic set:*

- a. *If  $\delta < 4d$  then  $M$  is always in power, and always chooses some graft. Moderates earn  $-\alpha/4\gamma$  each period.*
- b. *If  $\theta < 2d$  and  $8(2d + \theta) < \delta$  then  $M$  is in power in alternate periods, and  $L$  and  $R$  share power in the other periods. No government chooses any graft. Moderates earn 0 and  $-\beta\theta/2$  in alternate periods.*
- c. *If  $4d < \delta$  and if  $2d < \theta$  or  $\delta < 8(2d + \theta)$  then  $M$  and  $R$  alternate in power, and neither government chooses any graft. Moderates earn 0 and  $-\beta d$  in alternate periods.*

The logic behind the result is easy to understand. If corruption is sufficiently non-salient relative to the policy differences between  $M$  and its nearest rival ( $R$ ) then moderates don't mind having  $M$  in power. If corruption is salient enough then moderates' main priority is to change government each period to prevent corruption.<sup>20</sup>  $M$  must be in power whenever it is pure because it would then choose moderates' ideal program. If  $M$  is corrupt then it must alternate in power either with  $R$  or with a coalition of  $L$  and  $R$ ; and these latter two parties can only share power if an agreement between them yields more surplus than an agreement between one of them and (corrupt)  $M$ . Neither of these putative governments would choose any graft; so moderates rank them on the basis of their policies. If  $\theta < 2d$  then moderates' ideal policy is closer to the coalition policy ( $-\theta/2$ ) than to rightists' ideal policy; so  $M$  then alternates in power with the coalition.

A few points are worth emphasizing:

- In this context, policy is never both positive and negative in any ergodic set: either it is constant (when there is no turnover) or it switches between 0 and  $d$  (when  $M$  alternates in power with  $R$ ) or it switches between 0 and  $-\theta/2$  (when  $M$  alternates with a coalition of  $L$  and  $R$ ). Overall, policy does not change by more than  $d$  across periods. This is a property of the ergodic set: for corrupt  $M$  and  $R$  would agree to policy  $d/2$  if they shared power.  $L$  would then be in power if  $\delta > 4(d + \theta)$  and choose policy  $-d - \theta$ .
- Electoral competition eliminates any corruption in an ergodic set unless  $L$  and  $R$  are both extreme enough that moderates prefer the graft chosen by  $M$  over the policies chosen by a government which excludes it. In other cases, government composition turns over to ensure that it chooses no graft. Thus, the amount of corruption only depends on how competitive  $R$  is for the votes of moderates. Measures of citizen heterogeneity like polarization (cf. Esteban and Ray (1994)) also depend on  $\theta$ , and therefore do not track corruption in this model.
- The ergodic set has periodicity of no more than two elections because  $M$  cannot be in opposition for two or more successive periods.
- We can use Propositions 3.1 and 3.2 to show that the ergodic set is reached after at most two elections.

**Remark 3.1 (Two parties)** The literature has compared the effects of increasing the number of parties on observed corruption. There are arguments which cut both ways: on the one hand, Anderson (2000) argues that, with more parties contesting an election, citizens face a greater coordination problem in punishing corrupt incumbents and more uncertainty about the composition of the next coalition government. An increase in the number of parties therefore makes governing parties less accountable, and raises corruption. As a counterargument, citizens have heterogeneous ideal policies in Myerson (1993) and (2006), so they could replace a corrupt party with an almost identical pure party if there were enough parties. An increase in the number of parties therefore makes governing parties more accountable, and reduces corruption.

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<sup>20</sup>The critical level of salience trades off reduced corruption against worse policy (for moderates) when  $M$  is turned out of power, as Rundquist et al (1977) argue.

Adding another party has an ambiguous effect on corruption in the context of our model. To see this, consider a variant of the model in which the only parties are  $L$  and  $R$ . This game has a unique ergodic set:  $R$  is always in power if  $\delta < 4\theta$ ; otherwise, (pure)  $L$  and  $R$  alternate in power. By contrast, Proposition 3.2 states that there is graft in the benchmark model if and only if  $\delta < 4d$ , when  $M$  is always in power. Consequently, introduction of a party which represents moderates increases graft if and only if  $4\theta < \delta < 4d$ , when  $M$  is so attractive to moderates that it is always in power.<sup>21</sup> The effect of adding a party now depends on polarization (cf. the bullet point above): if  $\theta > d$  then the arrival of a new moderate party cannot increase graft.<sup>22</sup>

### 3.2 Optimality

In our set-up, moderates effectively choose the equilibrium government from the quadruple of the three parties in power and the coalition which emerges from a hung parliament. The composition of the coalition is determined by inter-party negotiations, which citizens cannot influence once they have voted. This suggests that moderates may sometimes top-rank a coalition government which does not emerge from a hung parliament. Accordingly, it is natural to ask whether there are cycles which would be better for moderates than the ergodic set?

In this subsection, we show that the ergodic set may indeed be suboptimal in the sense that there is another cycle in which the taste for graft evolves as in the benchmark model, and moderates are at least as well off in every period and sometimes better off than in the ergodic set.<sup>23</sup> We describe any such cycle as ‘improving’. The optimality criterion respects citizens’ myopia (their one-election horizon). It amounts to allowing moderates to choose which parties share power in a hung parliament.

Proposition 3.1 implies that  $M$  either alternates in power or is always in power in every ergodic set. We consider these ergodic sets in sequence, starting with those parameters for which  $M$  alternates in power.

A government of pure  $M$  chooses moderates’ ideal program; so any improving cycle must contain a period when  $M$  is in power followed by a period when  $M$  alone is corrupt.

Whenever  $M$  is not in power in the ergodic set: either  $L$  and  $R$  share power or  $R$  alone is in power, depending on parameter values. If  $L$  and  $R$  share power in the ergodic set then Lemma 3.5 implies that moderates cannot be better off that period with any other government; so in this case, there is no improving cycle. On the other hand, there are parameter values for which  $M$  alternates in power with  $R$  in the ergodic set if  $4d < \delta < 8(2d + \theta)$ ; and moderates then prefer pure  $L$  and  $R$  to share power over  $R$  alone in power if  $\theta < 2d$ . This coalition could not occur in the ergodic set because it yields a smaller surplus than a coalition which includes  $M$ . Consequently, a cycle in which  $M$  alternates in power with a coalition of  $L$  and  $R$  improves on the ergodic set for these parameter values.

Now consider parameter values at which  $M$  is always in power in the ergodic set. A cycle in which another corrupt party is in power can obviously not improve on this ergodic set.

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<sup>21</sup>Note that despite the extra graft, moderates are always better off when  $M$  stands for election.

<sup>22</sup>Tavits (2007) reports that an increase in the number of effective parties raises corruption; but the independent variable depends on vote shares, which are not only endogenous in our model, but are also not uniquely pinned down in equilibrium.

<sup>23</sup>In light of Lemma 3.5, leftists and rightists can obviously do better than in the ergodic set.

Furthermore,  $\delta < 4d$  implies that moderates prefer a corrupt  $M$  in power over it sharing power with another corrupt party and over any other pure party in power. Now Lemma 3.4 implies that moderates prefer a pure party to be in power than to share power with a corrupt party. Consequently, this ergodic set is suboptimal if and only if a cycle in which  $M$  alternates in power with a coalition of  $L$  and  $R$  is improving: that is, if  $\delta > 2\theta$ . As before, this coalition could not occur in the ergodic set because it yields a smaller surplus than a coalition which includes  $M$ .

In sum,

**Proposition 3.3 (Optimality)** *The ergodic set is suboptimal if and only if either  $2\theta < 4d < \delta < 8(2d + \theta)$  or  $2\theta < \delta < 4d$ . In both cases,  $M$  alternates in power with a coalition of  $L$  and  $R$  in the only improving cycle.*

In Section 4.1, we will argue that pre-electoral commitments to govern together must result in an improving cycle when  $2\theta < \delta < 4d$ , and may result in an improving cycle when  $\theta < 2d$  and  $4(2d + \theta) < \delta < 8(2d + \theta)$ .

### 3.3 Testable implications

Proposition 3.2 entails various implications, which we group into four categories:

1. The composition of government:
  - (a) The only party which can always be in power is  $M$ ; and  $M$  is always in power if the other parties are extreme enough ( $d$  is large) and corruption is non-salient enough;
  - (b) The most extreme party is only in government when it shares power;
  - (c) No coalition or set of coalitions can always be in power;
  - (d) Only policy-disconnected parties can share power;
  - (e) Only pure parties can share power.
2. Realignment theory:
  - (a) Policy does not vary greatly (change sign or by more than  $d$ ) across elections;
  - (b) Long-run cycles have a periodicity of no more than two elections.
3. Governments choose some graft if and only if the government is never voted out of office.

In the remainder of this subsection, we discuss the empirical plausibility of (rather than test) these implications.

Some of the implications about government composition appear to be consistent with the evidence: for example, Implication 1(a) seems to square with the prolonged periods of one-party rule in Japan and Sweden; while 1(b) tracks the Haider-led FPÖ in Austria. The rotation of power between parties which rapidly become corrupt is reminiscent of Kenya.

Other implications are more difficult to square with the evidence. First, the Christian Democrats shared power with essentially the same parties in Italy from 1948 till 1992; the OVP and the SPO shared power in Austria from 1945 to 1966 and from 1986 to 1999. This seems inconsistent with Implication 1(c).

Implication 1(d), which follows from Proposition 3.1, contrasts with the related literature: one-dimensional spatial models following Axelrod (1970) and de Swaan (1973) typically imply that any coalitions must be policy-connected; while Warwick (1994) argues that policy-disconnected coalitions are less stable.<sup>24</sup> The associated empirical literature demonstrates that policy-disconnected coalitions are unusual, especially those excluding the median party, as exemplified by the breakdown of the FPO-SPO coalition after Haider's takeover of the FPO in 1986.<sup>25</sup> Note that excluding policy-disconnected coalitions by assumption would not lead to the formation of policy-connected coalitions in equilibrium: the arguments used to prove Lemmas 3.4 and 3.5 do not rely on the possible formation of a policy-disconnected coalition.

Implication 1(e) also seems empirically problematic: the centrist Fianna Fail party has shared power in Ireland with the anti-corruption Progressive Democrats since 1989, and with the Greens since 2007; and the notoriously corrupt Christian Democrats and Socialists shared power in Italy.

Implication 2 captures two aspects of Mayhew's (2002) stylized version of realignment theory. Both parts follow from the benchmark assumption that  $M$  is pure after a period in opposition. Mayhew contests the realignment theory's explanatory power for the US, but it may be more plausible for other countries: for example, the 1945 and 1979 UK elections seem to violate both parts of Implication 2.

Note that Implication 2 does not include any claims about electoral support, which are important to realignment theory: our model pins down equilibrium outcomes rather than equilibrium voting patterns.

Empirical studies of corruption have been predominantly cross-sectional; so there is little formal evidence on governmental corruption cycles within a given country.<sup>26</sup> However, Implication 3 is consistent with Besley and Prat's (2004) cross-sectional evidence of a significant positive correlation between corruption and longevity. Besley and Prat attribute the relationship to variations in press freedom in a model where party preferences are fixed; we attribute it to variations in the salience of corruption.<sup>27</sup> Nevertheless, Implication 3 seems too stark: turning out a government may reduce, but does not eliminate corruption, allowing corruption to be cyclical (cf. Gillespie and Okruhlik (1991) and Bicchieri and Duffy (1997)). Conversely, parties which are turned out do not immediately become pure; so a recent incumbent may continue to benefit from its predecessor's poor reputation. Such examples are inconsistent with Implication 2(b).

The benchmark model also implies that no party has an incumbency advantage. Our definition of incumbency advantage compares equilibria across states, some of which might

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<sup>24</sup>See also Brams et al (2002) on disconnected coalitions when policy is multi-dimensional.

<sup>25</sup>See Martin and Stevenson (2001) Table 1. Iceland, where rents from office seem relatively important to parties, is an exception on both counts: less than half of coalitions were connected between 1944 and 1999 were connected, and coalitions were more likely not to contain the median party: cf. Indridason (2005).

<sup>26</sup>See Pellegrini and Gerlagh (2008).

<sup>27</sup>Besley and Prat (2006) Table 1 reports the reduced form rather than the structural relation between corruption and turnover.

not be reached in any ergodic set. Our stronger prediction is clearly false, both in the US and elsewhere. The literature has explored various reasons for an incumbency advantage, including informational issues and the ability to direct public resources to constituents.

In the remainder of the paper, we demonstrate that a combination of Acton’s dictum with other suppositions can address empirically problematic implications of the benchmark model.

## 4 Relaxing the rules for sharing power

Two corrupt parties cannot share power in the benchmark model: for Condition B in Section 2 requires the surplus-maximizing coalition to form in a hung parliament; and a coalition of corrupt parties yields less surplus than a coalition of a pure and a corrupt party (Lemma 3.3). We noted in Section 3.3 that this implication of the benchmark model is empirically problematic. In this section, we consider two natural variants on the benchmark model, which both drop Condition B. In Section 4.1, we characterize the ergodic set when parties can pre-commit to sharing power with another party; in Section 4.2, we characterize the ergodic set when a formateur chooses its coalition partner in a hung parliament.

### 4.1 Commitments to coalition partners

In this subsection, we demonstrate that two corrupt parties may share power if, contrary to our previous supposition, parties can precommit to govern with another party or run on a joint platform. Such commitments are quite common: for example, Fianna Fail and the Progressive Democrats shared power after the 1997 and 2002 Irish elections, having run on a joint platform in 2002;<sup>28</sup> and a center-left coalition won the 2006 Italian election after running together as The Union.<sup>29</sup> Golder (2005) reports that about half of the governments in her sample of 23 countries between 1946 and 2002 contained pre-election coalitions; while more than a third of the coalition governments in Strom and Muller’s (1999) sample were based on pre-electoral agreements.

Parties usually claim that their precommitments allow citizens to predict their behavior in negotiations to form a government. Golder (2005) suggests that a coalition may secure more votes from risk-averse citizens who cannot anticipate the coalition which will form in a hung parliament, or that a coalition may obtain more seats for a given number of votes.<sup>30</sup> Neither of these arguments work in our model: in particular, the equilibrium-based solution concept precludes any strategic uncertainty. Golder (2006) tests further hypotheses derived from an informal discussion of pre-electoral negotiations. We provide a completely different rationale. We use a model of pre- and post-electoral bargaining to show that two pure parties or two corrupt parties may precommit: in the former case, to allow them to alternate in power with  $M$ ; in the latter case, to allow them to always share power.

Specifically, we study a simple variant on the benchmark model in which parties are active players. Every period starts with each party  $i$  simultaneously announcing a party

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<sup>28</sup>Indeed, they were the first coalition government returned to power since 1969.

<sup>29</sup>The respective platforms tied parties together rather more than dictating government choices. Laver and Schofield (1990) discuss earlier international instances.

<sup>30</sup>Goodin et al (2007) provide experimental evidence for the former effect.

in the triple  $\{i, j, k\}$ , with the following interpretation. Announcing another party states willingness to share power with that party after the next elections whenever they jointly receive a majority of votes; if a party announces itself then it makes no commitments.

Parties jointly commit to share power if and only if they announce each other. We then say that they ‘form a coalition’. We suppose that commitments only pertain to sharing power: the government program always splits the maximal surplus equally. This model therefore retains Condition A, but replaces Condition B.<sup>31</sup> It will be convenient to suppose that each party which forms a coalition incurs a small cost, implying that coalitions are only formed if they win the subsequent election.<sup>32</sup>

Citizens observe whether any coalition has formed and then vote, as in previous sections.<sup>33</sup> Specifically, the benchmark three-party game corresponds to subgames which follow no coalition formation; and subgames which follow coalition formation are related to the two-party games considered in Remark 3.1.

The simultaneous move structure in the first stage may again generate multiple Nash equilibria. Accordingly, we analyze each one-period game by focusing on pure strategy equilibria in which no pair of parties has a profitable joint deviation.<sup>34</sup> We again abuse terminology by referring to such strategy combinations as equilibria.

We prove our next result in the Appendix.

**Proposition 4.1 (Equilibria)** *If parties can commit to coalition partners then the game has a unique equilibrium.*

- a. *If  $M$  is pure then it is in power.*
- b. *If  $M$  and  $R$  are corrupt then*
  - *$M$  is in power if  $\delta < 4(d + \theta)$ ;*
  - *$M$  and  $R$  share power after forming a coalition if  $4(d + \theta) < \delta < 4(d + 2\theta)$ ;*
  - *$L$  is in power if  $4(d + 2\theta) < \delta$ .*
- c. *If  $L$  and  $M$  are corrupt then  $M$  is in power if  $\delta < 4d$ ; and  $R$  is otherwise in power.*
- d. *If  $M$  alone is corrupt then*
  - *$M$  is in power if  $\delta < \min\{4d, 2\theta\}$ ;*
  - *$L$  and  $R$  form a coalition and share power if  $2\theta < \delta < 4d$ ;*
  - *$L$  and  $R$  share power if  $\theta < 2d$  and  $4(2d + \theta) < \delta$ ;*
  - *Otherwise,  $R$  is in power.*

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<sup>31</sup>By contrast, Carroll and Cox (2007) suppose that parties bargain over a joint platform. Our solution concept does not pin down vote shares, and can therefore not address their concern: Gamson’s Law.

<sup>32</sup>Consequently, solutions of our model necessarily satisfy Martin and Stevenson’s (2001) evidence that pre-election coalitions are more likely to share power (their Table 3).

<sup>33</sup>Our results would also hold if parties which formed a coalition ran a single slate of candidates.

<sup>34</sup>This is equivalent to a strong equilibrium, except that we preclude joint deviations of citizens and parties.

Part a is trivial:  $M$  would win the election irrespective of which coalitions form, and therefore has no incentive to form a coalition. The rest of the argument exploits the observation that a party which would be in power in the benchmark game would not commit to share power in any equilibrium in this model.

Various aspects of Proposition 4.1 are worth emphasizing:

- Coalitions only form when  $M$  and  $R$  are both corrupt and when  $M$  alone is corrupt:  $M$  and  $R$  form a coalition in the former case,  $L$  and  $R$  in the latter case. However, if  $L$  and  $R$  are both pure, they may still share power without committing, as in the benchmark model.
- Policy-connected parties ( $M$  and  $R$ ) can form a coalition, whereas coalition governments which form in the benchmark model are policy-disconnected.<sup>35</sup>
- A pure party never shares power with a corrupt party in the benchmark model (cf. Lemma 3.4). This result relies on Lemma 3.1b, which states that such a coalition would agree to the pure party's ideal policy and some graft. All citizens then prefer that the pure party be in power than that it share power with a corrupt party. This logic still holds here: a pure and a corrupt party never commit to share power because the pure party would win alone if the coalition would win the election.
- Two corrupt parties never share power in the benchmark model (cf. Lemma 3.3) because a corrupt party prefers to share power with a pure party in a hung parliament. Now things are different: two corrupt parties which would otherwise be excluded from power might commit to sharing power, and thereby prevent such a coalition from unravelling during inter-party negotiations. This coalition wins the election if it internalizes the cost of graft sufficiently that moderates prefer these parties to share power over either being in power.<sup>36</sup>
- We argued in Section 3.1 that no party has an incumbency advantage in the benchmark model. In this section's model,  $M$  and  $R$  may share power when both are corrupt (part b), but  $M$  would be in power if  $L$  alone were corrupt (part a). Consequently,  $R$  has an incumbency advantage for these parameters, contrary to an implication of the benchmark model (cf. Section 3.3).<sup>37</sup>

Proposition 4.1 immediately implies

**Proposition 4.2 (Ergodic sets)** *If parties can commit to coalition partners then every game has an ergodic set.*

- a. *If  $\delta < \min\{4d, 2\theta\}$  then there is an ergodic set in which  $M$  is always in power. The government always chooses some graft and moderates earn  $-\alpha/4\gamma$  each period.*

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<sup>35</sup>This result is essentially Hypothesis 2 in Goodin et al (2007). They motivate the Hypothesis by claiming that parties are uncertain of the voting pattern, and provide experimental evidence in its favor. Of course, our rationale is very different.

<sup>36</sup>Two corrupt parties could therefore not share power if, contrary to our model, parties in government chose their graft unilaterally.

<sup>37</sup> $L$  and  $M$  only have an incumbency disadvantage.

- b. If  $2\theta < \delta < 4d$  then there is an ergodic set in which  $M$  alternates in power with  $L$  and  $R$ , who form a coalition. The government never chooses any graft and moderates earn 0 and  $-\beta\theta/2$  in alternate periods.
- c. If  $\theta < 2d$  and  $4(2d + \theta) < \delta$  then there is an ergodic set in which  $M$  alternates in power with  $L$  and  $R$ , who do not form a coalition. The government never chooses any graft and moderates earn 0 and  $-\beta\theta/2$  in alternate periods.
- d. If  $4d < \delta < 4(2d + \theta)$  or  $\theta > 2d$  and  $4(2d + \theta) < \delta$  then there is an ergodic set in which  $M$  alternates in power with  $R$ . The government never chooses any graft, and moderates earn 0 and  $-\beta d$  in alternate periods.
- e. If  $4(d + \theta) < \delta < 4(d + 2\theta)$  then there is an ergodic set in which  $M$  and  $R$  always commit to share power. The government always chooses some graft and moderates earn  $-\beta d/2 - \alpha/8\gamma$  each period.

There are no other ergodic sets.

Proposition 4.2 implies that generic games with commitment may not have a unique ergodic set, in contrast to the benchmark game.

A particularly interesting phenomenon arises here: corruption in the ergodic set may be a non-monotone function of salience. To see this, fix  $\{d, \theta\}$  and consider the effects of increasing salience. Proposition 4.2 implies that the government extracts some graft in an ergodic set if and only if  $\delta < \min\{4d, 2\theta\}$  or  $4(d + \theta) < \delta < 4(d + 2\theta)$ .  $M$  and  $R$  cannot share power for intermediate salience because a corrupt  $M$  would be in power, absent a prior agreement; so  $M$  would not form a coalition with  $R$ . This effect cannot occur in the benchmark model.

Proposition 4.2 implies that the commitment model relaxes various implications of the benchmark model. In particular, policy-connected parties may not only share power, but may always be in power, contrary to Implications 1(c) and 1(d) of the benchmark model. We also noted in Section 3.2 that there are cycles which improve on the benchmark model's ergodic set. Moderates are worse off than in the benchmark game when  $M$  and  $R$  commit. By contrast, this model has an ergodic set in which pure  $L$  and  $R$  commit when such a cycle improves on the ergodic set of the benchmark model, so moderates are better off.

## 4.2 Formateurs

In the last subsection, we studied the implications of allowing parties to commit to coalition partners before each election. In this subsection, we consider another empirically interesting alternative to Condition B: a formateur chooses a coalition in a hung parliament. In particular we follow Diermeier et al (2003) by supposing that the formateur negotiates with, rather than makes exclusive proposals to, a chosen proto-coalition. Specifically, the formateur shares power with that party whose agreed program with the formateur yields the larger joint surplus.

We consider two variants, which are based on the empirical finding that the first formateur is usually either the last prime minister or the leader of the largest party.<sup>38</sup>

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<sup>38</sup>See, for example, Ansolabehere et al (2005).

If the formateur is corrupt then Lemma 3.3 implies that it must match with a pure party. Lemma 3.4 then implies that a single party must be in power. Consequently,  $M$  is always in power if corruption is sufficiently non-salient, and otherwise alternates in power with  $R$  if the formateur was in government before the election.

We will now argue that equilibrium play coincides with the benchmark model if the plurality-vote party is sure to be selected as formateur.<sup>39</sup> The result is obvious if  $M$  is pure; so suppose otherwise. If two parties are corrupt then Lemma 3.3 implies that the pure party agrees with a corrupt party in a hung parliament, irrespective of the formateur's identity; so the same government must be elected as in the benchmark model. Suppose, finally, that  $M$  alone is corrupt. There are two cases to consider. If a coalition of the other parties yields most surplus then moderates also top-rank this coalition, so a pure party must secure a plurality of votes if parliament hangs; and if this pure coalition yields the smallest surplus then  $M$  again agrees with a pure party, irrespective of the formateur's identity.

In sum,

**Proposition 4.3 (Ergodic set)**

- a. *If a previous incumbent is the formateur then  $M$  either alternates in power with  $R$  or is always in power in the unique ergodic set.*
- b. *If the party which secures most votes is the formateur then the ergodic set coincides with that in the benchmark model.*

Proposition 4.3 implies that replacing Condition B with a formateur model either has no effect on equilibrium play or precludes coalition governments which would form in the benchmark model. Consequently, moderates can only be harmed by introduction of a formateur mechanism.

## 5 Expressive voting

In Section 3, we demonstrated that a pure and a corrupt party never share power if citizens recognize that such a government would agree to the pure party's ideal policy and some graft, and would therefore be better off with the pure party in power. In this section, we amend the benchmark model by supposing that citizens vote for the party which they would most like in power. Downs (1957) famously supports this assumption in his Proposition 25, arguing that citizens cannot anticipate the outcome of inter-party negotiations. Given this assumption and our further supposition that moderates are not a majority of citizens, it is not surprising that a corrupt and a pure party can share power. Our main result in this section is much stronger: the unique ergodic set either consists of  $M$  and  $R$  alternating in power or of a pure and a corrupt party sharing power every period.

Formally, we suppose that each citizen compares the program that each party would choose in power (as described in Lemma 3.1a), and votes for the party which she most

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<sup>39</sup>We adopt Austen-Smith and Banks' (1988) assumption for expositional convenience. Diermeier and Merlo (2004) show that the largest party is most likely (but not sure) to be the formateur.

prefers: behavior which we describe as ‘expressive voting’.<sup>40</sup> By contrast, we say that citizens in the benchmark model vote ‘strategically’.

We simplify exposition by ignoring cases in which a majority of citizens are moderates.<sup>41</sup>

This combination of conditions implies that voting often generates hung parliaments: a possibility that citizens do not factor into their voting. Accordingly, the solution concept which we use in this section requires that inter-party negotiations satisfy Conditions A and B and Lemma 3.1, and that citizens vote expressively. In contrast to our earlier models with strategic citizens, this solution concept pins down the voting pattern. We will abuse terminology by again referring to these strategy combinations as ‘equilibria’, and will use these strategy combinations to construct long-run cycles which we refer to as ‘ergodic sets’.

Note that Lemma 3.5 may fail in this model: citizens may elect a hung parliament even though moderates prefer a single party to be in power.

We start with some simple properties of this model:

**Lemma 5.1** *If citizens vote expressively then all citizens of the same sort vote for the same party: each citizen of sort  $i$  votes for party  $i$  if that party is pure; and if a sort  $i$  citizen votes for party  $j \neq i$  then that party must be pure.*

We omit this and subsequent proofs in this section.

We can now use Lemmas 3.1, 3.4 and 5.1 to characterize equilibria. We organize Proposition 5.1 in terms of the number of corrupt parties because, in contrast to the benchmark model, a pure party  $M$  need not be in power.

**Proposition 5.1 (Equilibria)** *Suppose that citizens vote expressively and that in any given period there is exactly*

**a.** *One corrupt party.*

- *If  $L$  is the only corrupt party then it shares power with one of the pure parties if  $\delta < \min\{4(d + \theta), 8d\}$ ;  $M$  and  $R$  share power if  $8d < \delta < 4(d + \theta)$ ; and  $M$  is in power otherwise.*
- *If  $M$  [resp.  $R$ ] is the only corrupt party then it shares power with one of the pure parties if  $\delta < 4d$ , and  $R$  [resp.  $M$ ] is in power otherwise.*

**b.** *One pure party.*

- *If  $L$  is the only pure party then it shares power with one of the corrupt parties if  $\delta < 4(d + \theta)$ , and  $L$  is in power otherwise.*
- *If some party  $j$  other than  $L$  is the only pure party then it shares power with one of the corrupt parties if  $\delta < 4d$ , and  $j$  is in power otherwise.*

This result has some interesting features:

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<sup>40</sup>Citizens  $i$  may most prefer party  $j \neq i$  in power if  $i$  is corrupt,  $j$  is not and corruption is salient enough. Thus, ‘expressive’ citizens need not vote sincerely.

<sup>41</sup>If moderates were in a majority then  $M$  is either always in power or always alternates in power with  $R$ .

- Lemmas 3.3 and 3.4 imply that only pure parties can share power in the benchmark model. Lemma 3.3, whose proof relies on inter-party negotiations, still holds in this model; so corrupt parties cannot share power when citizens vote expressively. However, this is no longer true for coalitions of pure and corrupt parties because Lemma 3.4 (which precludes such governments in the benchmark model) relies on strategic voting. Indeed, Proposition 5.1 implies that any coalition government must consist of a pure and a corrupt party.
- Proposition 5.1a implies that incumbency may be advantageous if corruption is sufficiently non-salient: a party may then share power if and only if it (rather than another party) is alone corrupt, contrary to an implication of the benchmark model (cf. Section 3.3).
- Lemma 3.1b implies that agreements between a pure and a corrupt party yield a surplus which is independent of their identities. Consequently, one-period games may have multiple equilibrium outcomes if citizens vote expressively.

We now use Proposition 5.1 to characterize ergodic sets:

**Proposition 5.2 (Ergodic sets)** *Suppose that citizens vote expressively.*

- If  $\delta < 4d$  then a pure party shares power with a corrupt party each period in every ergodic set, and the government always takes some graft.*
- If  $\delta > 4d$  then there is a unique ergodic set in which  $M$  alternates in power with  $R$ , and no government takes any graft.*

The proof of Proposition 5.2a exploits the possible multiplicity of equilibrium outcomes to construct multiple ergodic sets when  $\delta < 4d$ . In particular, there is an ergodic set in which  $L$  is always in government, whereas  $L$  can only alternate in government in the benchmark model. The multiplicity of equilibria also allows us to construct ergodic sets with a periodicity of three when  $\delta < 4d$ , contrary to previous models.

If  $\delta < 4d$  then moderates are always better off when citizens vote strategically than in the ergodic set where  $M$  is always in government; but moderates are better off in alternate periods with expressive voting when  $L$  or  $R$  is always in government. If  $\delta > 4d$  then moderates are at least as well off when citizens vote strategically as when they vote expressively.

Various more general considerations follow from this result:

- If citizens vote strategically then moderates must top-rank the equilibrium government, else some citizens have a profitable joint deviation; so  $M$  must be in power if  $d$  is large enough. Proposition 5.2 implies that these properties do not hold in an ergodic set with expressive voting: if  $\delta < 4d$  then every citizen  $i$  votes for party  $i$ ; so no party can always be in power. Furthermore, the equilibrium government chooses the pure party's policy, no matter how extreme that might be. If  $M$  is always in government then elections are critical, contrary to Implication 2(a) of the benchmark model.

- If citizens vote strategically and parties are either pure or corrupt then governments only lose elections when they are corrupt and the opposition is pure. This turnover then ensures that governing parties are always pure (cf. Propositions 3.2 and 4.2). By contrast, Proposition 5.2a implies that expressive voters may replace governments without reducing graft, contrary to Implication 3.
- Proposition 3.1 implies that only policy-disconnected parties can share power: viz. Implication 1(d); Proposition 3.2 implies that there is no ergodic set in which the government consists of a coalition or some coalitions: viz. Implication 1(c). Proposition 5.2a implies that neither property holds in a model with expressive voting.

## 6 Conclusions and extensions

We have presented and analyzed some simple models of a dynamic democracy in an environment which is stationary except for the corrupting effect of power, arguing that our results may shed light on some stylized facts about government composition. Specifically, we have characterized long-run government cycles in a benchmark model, focusing on the composition of coalition governments: viz. whether policy-connected parties or parties with different tastes for graft can share power. We have also derived testable implications, and argued that some of these implications are inconsistent with the evidence. Accordingly, we have developed empirically plausible extensions of the benchmark model whose ergodic sets are consistent with these implications.

All of our models yield some intuitive predictions: every government must be pure if corruption is salient enough, whereas governing parties are corrupt if graft is sufficiently non-salient. The latter prediction seems to be consistent with the anecdotal evidence (Israel comes to mind); and, more generally, our various models imply that corruption is negatively correlated with turnover, consistently with the evidence (e.g. Treisman (2000)). Our models also predict that, the more extreme is party  $i$ 's ideal policy, the more salient must corruption be for party  $i$  to be in government.

We have focused on the implications of inter-party negotiations for citizens' ability to turn out a corrupt government. In our unicameral model, parties only negotiate if parliament is hung: which is impossible with two parties. However, inter-party negotiations are pertinent in a bicameral variant on our model, where moderates may split their votes because parties in control of different chambers would have to negotiate a program. Divided government may then be less corrupt: a prediction which is consistent with Alt and Lassen's (2008) evidence. The corrupting effect of power may also provide a more plausible explanation of mid-term losses (such as in the 2006 Congressional elections) than Alesina and Rosenthal's (1996) argument that citizens are surprised by the results of simultaneous elections. (See also Mebane and Sekhon (2002).)

Our analysis uses the assumption of a one-election horizon to draw a sharp line between graft and pork. This distinction allows us to trace the implications of Acton's dictum in a model where corruption is costly to all other players. Incumbency is typically not advantageous in this model - though we show that it may be when parties can pre-commit. In practice, graft and pork are more difficult to distinguish; and our model implicitly excludes diverting public funds to finance re-election. It would be particularly interesting (albeit

challenging) to extend our model in this direction because corruption of this sort could yield an incumbency advantage.

We have assumed that parties either only care policy or about graft. Some of the benchmark model's implications carry over to cases where parties may care about both, provided that a party always in government [resp. opposition] eventually only cares about graft [resp. policy]: for example, no coalition can always be in power; and the median party alone can always be in power. On the other hand, we can reconcile our approach with some stylized facts by constructing examples with intermediate tastes where corruption is cyclical, and policy-connected parties can share power in the ergodic set. The difficulty is that, absent an adequate theory of how quickly power corrupts, there is too much scope for constructing examples. This is one obvious drawback of not microfounding Acton's dictum. On the other hand, our approach fully exploits the ensuing tractability.

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## APPENDIX

**Proposition 3.1 (Equilibria)** *In generic one-period games:*

- a. *If  $M$  is pure then it is in power.*
- b. *If  $M$  and  $R$  are corrupt then  $M$  is in power if  $\delta < 4(d + \theta)$ ; and  $L$  is otherwise in power.*
- c. *If  $L$  and  $M$  are corrupt then  $M$  is in power if  $\delta < 4d$ ; and  $R$  is otherwise in power.*
- d. *If  $M$  is the only corrupt party then  $M$  is in power if  $\delta < 4d$ ;  $L$  and  $R$  share power if and only if  $\theta < 2d$  and  $4(2d + \theta) < \delta$ ; and  $R$  is otherwise in power.*

**Proof**

There are four possible governments in any one-period game: each of the parties in power, and the coalition which would form in a hung parliament. We start with some useful preliminary results, which pin down the possible coalition governments.

**Lemma 3.2** *Two parties cannot equally split the number of votes cast in any equilibrium.*

**Proof** If  $i$  and  $j$  received the same number of votes then every citizen would be pivotal. For generic parameters, citizens  $k \notin \{i, j\}$  strictly prefer one of the two parties (say,  $i$ ) to be in power, and must therefore all vote for that party. Some citizens  $i$  must then have a profitable deviation to voting for party  $i$ . ■

Lemma 3.2 implies that each party must secure some votes in a hung parliament.

**Lemma 3.3** *Two corrupt parties do not share power in any equilibrium.*

**Proof** Lemma 3.1b implies that an agreement between the two corrupt parties yields a lower surplus than the other two possible agreements; so Condition B in Section 2 implies that the corrupt parties would not share power in a hung parliament. ■

**Lemma 3.4** *A corrupt and a pure party do not share power in any equilibrium.*

**Proof** Denote the pure party by  $i$ . Lemma 3.1b implies that the two parties would agree to policy  $x_i$  and to some graft. All citizens must then prefer that  $i$  be in power. ■

We will now use the Lemmas above to characterize all equilibria:

**Lemma 3.5** *There is a unique equilibrium outcome. The government which forms is top-ranked by moderates out of the three single-party governments and the coalition which would form were parliament to hang.*

**Proof** The result is obvious if a majority of citizens are moderates; so suppose otherwise.

We first argue that moderates must top-rank the government which forms in any equilibrium. Lemmas 3.3 and 3.4 imply that this must either be a party in power or two pure parties sharing power.

If  $M$  is pure then it is by top-ranked by moderates, and must be in power in every equilibrium: for any other government must agree to some  $x \neq 0$  and/or some graft; so

moderates and citizens whose ideal policy has the opposite sign to  $x$  both prefer that  $M$  be in power. Accordingly, we can focus on states in which  $M$  is corrupt.

Suppose, first, that  $K$  is in power, and that moderates prefer that  $J \neq K$  be in power. Citizens of sort other than  $K$  who do not vote for  $J$  must then have a profitable joint deviation to doing so. Hence, moderates either top-rank  $K$  (and our claim is true) or they top-rank pure  $L$  and  $R$  sharing power. In each case, moderates prefer that  $R$  rather than  $L$  be in power, so  $K \neq L$ .

Suppose, contrary to our claim, that  $K$  is in power and that moderates prefer  $L$  and  $R$  to share power. If  $K = R$  then leftists also prefer a hung parliament over  $R$  in power; and if  $K = M$  then rightists also prefer a hung parliament over  $M$  in power because Lemma 3.1b implies that  $L$  and  $R$  would agree to a negative policy. Consequently, a majority of citizens must prefer a hung parliament; so citizens who are not sort  $K$  and vote for  $K$  have a profitable joint deviation.

Now suppose that  $L$  and  $R$  share power in an equilibrium, but moderates top-rank some party  $K$  in power. Arguments analogous to those in the last paragraph imply that a majority of citizens then top-rank  $K$  in power; so all such citizens who do not vote for  $K$  have a profitable joint deviation to doing so.

In sum, moderates top-rank the government which forms in any equilibrium. If moderates top-rank a party in power then there is an equilibrium in which all citizens vote for that party; and if moderates top-rank pure parties  $L$  and  $R$  sharing power then there is an equilibrium in which each citizen of sort  $i$  votes for party  $i$ . ■

**a.** This part follows immediately from Lemma 3.5 because moderates top-rank  $M$  in power.

**b.** If  $M$  and  $R$  are both corrupt then the only possible governments are  $L$  and  $M$  in power. Moderates respectively earn  $-\beta(d + \theta)$  and  $-\alpha/4\gamma$  when  $L$  and  $M$  are in power, so this part follows from Lemma 3.5.

**c.** The proof follows the same lines as that of part b.

**d.** If  $M$  is the only corrupt party then the only governments which can be formed in equilibrium are  $M$  in power,  $R$  in power and  $L$  and  $R$  sharing power. Now moderates prefer  $M$  in power over  $R$  in power if and only if  $\delta < 4d$ . This condition implies that  $M$  is in power because  $L$  and  $R$  only share power in a hung parliament if  $\delta > 4(2d + \theta)$ . Conversely, Lemma 3.5 implies that  $R$  is in power if  $4d < \delta < 4(2d + \theta)$ .

$L$  and  $R$  can only share power if moderates prefer that  $R$  share power with  $L$  than that it be in power (viz.  $d > 2\theta$ ) and that they form a coalition in a hung parliament (viz.  $\delta > 4(2d + \theta)$ ), which implies that moderates prefer a coalition government over  $M$  in power. The result then follows from Lemma 3.5. ■

**Observation 3.1** *If each party's preferences satisfy Condition P then a coalition of two corrupt parties yields a smaller surplus than a coalition of a pure and a corrupt party.*

**Proof** If condition P holds then we can normalize such that

$$f(0) = g(0) = \min_x h_i(x) = 0:$$

so  $K_i(0) = 0$  and  $K_i(1) = \max_y f(y) - g(y)$ . The latter expression does not depend on  $i$ , so we write it as  $K$ . Denote the derivative functions of  $f$  and  $g$  by  $f'(y)$  and  $g'(y)$ .

Suppose that parties  $i$  and  $k$  are corrupt and party  $j$  is pure.

If  $i$  and  $j$  share power then they set  $y_j = y_k = 0$ ,  $x = x_j$  and  $n_k = 0$ . With either  $v_i^A$  or  $v_i^B$ , the surplus can then be written as

$$\max_y V_{ij}(y_i) = f(y_i) - 2g(y_i) - K + N.$$

Condition P implies that this problem has a unique solution, which we write as  $y^{ij}$ . The surplus is then

$$V_{ij} = f(y^{ij}) - 2g(y^{ij}) - K + N.$$

Similarly, with either  $v_i^A$  or  $v_i^B$ , the surplus generated by a coalition of corrupt parties  $i$  and  $k$  is independent of  $x$ , and can be written as

$$\max_{y_i, y_k} V_{ik}(y_i, y_k) = f(y_i) + f(y_k) - 2g(y_i + y_k) - 2K + N.$$

Condition P implies that this problem is solved when both parties agree to a common level of graft, which we denote by  $y^{ik}$ . The surplus is then

$$V_{ik} = 2f(y^{ik}) - 2g(2y^{ik}) - 2K + N.$$

Using this notation, the Observation is equivalent to  $V_{ik} < V_{ij}$  or

$$2f(y^{ik}) - 2g(2y^{ik}) < f(y^{ij}) - 2g(y^{ij}) + K. \quad (\text{A})$$

The right-hand side of this inequality exceeds  $f(y^{ik}) - 2g(y^{ik}) + K$  because  $y^{ij}$  maximizes  $f(y) - 2g(y)$ , so

$$f(y^{ik}) - 2[g(2y^{ik}) - g(y^{ik})] < K$$

is sufficient. Now

$$\begin{aligned} g(2y^{ik}) - g(y^{ik}) &= \int_{y^{ik}}^{2y^{ik}} g'(y) dy \\ &> g'(y^{ik}) y^{ik} \\ &> g(y^{ik}) = \int_0^{y^{ik}} g'(y) dy: \end{aligned}$$

where both of the inequalities follow from the strict convexity of  $g$ . Hence, (A) is satisfied if

$$f(y^{ik}) - 2g(y^{ik}) < K = \max_y f(y) - g(y).$$

The left-hand side is less than  $f(y^{ik}) - g(y^{ik})$  which, in turn, is less than  $K$ . ■

**Proposition 4.1 (Equilibria)** *If parties can commit to coalition partners then the game has a unique equilibrium.*

- a. *If  $M$  is pure then it is in power.*
- b. *If  $M$  and  $R$  are corrupt then*

- $M$  is in power if  $\delta < 4(d + \theta)$ ;
- $M$  and  $R$  share power after forming a coalition if  $4(d + \theta) < \delta < 4(d + 2\theta)$ ;
- $L$  is in power if  $4(d + 2\theta) < \delta$ .

c. If  $L$  and  $M$  are corrupt then  $M$  is in power if  $\delta < 4d$ ; and  $R$  is otherwise in power.

d. If  $M$  alone is corrupt then

- $M$  is in power if  $\delta < \min\{4d, 2\theta\}$ ;
- $L$  and  $R$  form a coalition and share power if  $2\theta < \delta < 4d$ ;
- $L$  and  $R$  share power if  $\theta < 2d$  and  $4(2d + \theta) < \delta$ ;
- Otherwise,  $R$  is in power.

### Proof

a. Obvious.

b. Proposition 3.1b implies that, absent any commitments,  $L$  would be in power if  $4(d + \theta) < \delta$ , and that  $M$  would otherwise be in power.

If  $\delta < 4(d + \theta)$  then  $M$  could profitably deviate from forming a coalition, whereas a coalition between  $L$  and  $R$  would lose the election; so  $M$  is in power in every equilibrium. If  $4(d + \theta) < \delta$  then  $L$  cannot share power, as it could profitably deviate to announcing itself. Consequently, there are two possible pure strategy equilibrium outcomes: either  $L$  wins the election or  $M$  and  $R$  form a coalition and win the election. If  $4d + 8\theta < \delta$  then  $M$  and  $R$  would lose the election if they formed a coalition, so  $L$  is in power in every equilibrium; otherwise,  $M$  and  $R$  form a coalition because they then win the election.

c. Proposition 3.1c implies that, absent any commitments,  $M$  is in power if  $\delta < 4d$  and  $R$  is otherwise in power. If  $\delta < 4d$  then  $M$  cannot share power.  $M$  is in power in every equilibrium because  $\delta < 4d$  implies that  $M$  would win the election, irrespective of whether  $L$  and  $R$  form a coalition. If  $\delta > 4d$  then  $R$  cannot share power, and a coalition of  $L$  and  $M$  would lose the election; so  $R$  is in power in every equilibrium.

d. Suppose that  $\delta < 4d$ . Proposition 3.1d implies that, absent any commitments,  $M$  is in power. Consequently,  $M$  cannot share power so, in any equilibrium, either  $M$  is in power or  $L$  and  $R$  form a coalition and share power. If  $\delta < 2\theta$  then a coalition of  $L$  and  $R$  would lose the election, so  $M$  is in power in equilibrium; otherwise  $L$  and  $R$  form a coalition in equilibrium because they win the election.

Now suppose that  $\theta < 2d$  and  $4(2d + \theta) < \delta$ . Proposition 3.1d implies that, absent any commitments,  $L$  shares power with  $R$ . Coalitions of  $L$  and  $M$  and of  $M$  and  $R$  would each lose the election; so no coalition forms in equilibrium.

Proposition 3.1d implies that, absent commitments,  $R$  is in power in all other cases. A coalition of  $L$  and  $M$  would lose the election, so  $R$  is in power in every equilibrium. ■