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Corruption and Power in Democracies

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Corruption and Power in Democracies

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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 cover plausible dynamics of government formation in an otherwise stationary environment.

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1 Introduction

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 Githong to investigate corruption, but sacked him as Githong 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 voters dislike corruption; the second is that good intentions can be forgotten once one obtains access to power: as Acton put it, "power corrupts and absolute power corrupts absolutely". Kenya's recent history also suggests that voters' dislike of corrupt politicians and increasingly corrupt politicians may interact to produce a political cycle in which corrupt governments are repeatedly turned out. 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 and their partners shared power for about forty years after WWII. When do corrupt parties remain in government?

We investigate this question by analyzing a model of dynamic democracy, where citizens vote and governments form in a sequence of elections. We focus on Acton dictum's consequences by considering an environment which is stationary except for the corrupting effect of power on governing parties. We characterize one-period equilibria (the governments which form when parties have given tastes for corruption), and ergodic sets (the long-run cycles of governments) as a function of the salience of corruption and of the (fixed) 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 replaced each other (as in Germany).

Our benchmark model is quite simple. At each election, citizens vote for one of three parties. If some party secures a majority of votes then it is in power (alone), and can unilaterally choose policy, which is represented as a scalar, and its private consumption of graft. If no party secures a majority of votes then the parties which secure some votes negotiate formation of a coalition government. We model these negotiations axiomatically: requiring that the coalition government be minimal (two parties); that the coalition with the greatest joint surplus from an agreement over policy and graft forms the government; and that these parties implement the agreement which jointly splits the maximal surplus.

The electorate consists of three sorts of citizen. Each sort has single-peaked preferences over policy, and all citizens (equally) dislike corruption. Each party has the same ideal policy as one of the citizen sorts. In contrast to citizens, parties may also have a taste for graft. In our benchmark model, parties are either are absolutely corrupt, in the sense that they only care for graft, or absolutely pure, in the sense that they have no taste for graft, and only care for policy.

We characterize the strong equilibria of this one-election game for any configuration of party tastes for corruption. This solution concept implies that the government which forms is that most preferred by median citizens out of the three parties in power alone and the coalition which would form were parliament hung. The twist on a standard median voter model is that median citizens cannot control the outcome of negotiations in a hung parliament. The equilibrium outcome coincides with the core of the voting game played by citizens, conditional on party behavior.[1]

We then study a dynamic version of this game, in which citizens vote repeatedly, and parties' tastes evolve according to when they were last in power: a party which was last in government is absolutely corrupt, and a party which was last in opposition is absolutely pure. (This is what we mean by Acton's dictum.) We side-step time consistency issues by supposing that citizens' and parties' horizon is the length of the current government; so play across elections consists of equilibria in the sequence of one-election games because parties do not adjust current policy to affect their prospects in the next election. We characterize the unique ergodic set of this dynamic process: that is, a cycle of governments which, once reached, is never left.[2]

We obtain several intuitively plausible results in this set-up. In particular, coalitions can only share power temporarily, and only the median party can be perpetually in power. The median party then always chooses a constant, positive level of graft; so such an ergodic set exists if and only if corruption is sufficiently non-salient, and the other parties are sufficiently uncompetitive in the sense that their ideal policies are extreme enough. By contrast, the median party would always be in power and take no graft if parties could commit to their programs before an election.

If corruption is salient enough then parties may share power in the ergodic set. However, the only coalition government which can form after an election (on or off the ergodic path) consists of the two absolutely pure, non-median parties. This coalition alternates in power with the median party in the ergodic set if its two members' ideal policies are about equally extreme relative to the median citizen's ideal. There is never any corruption in such an ergodic set.

The argument for uniqueness of equilibrium coalitions turns on a couple of negative results. A coalition of absolutely corrupt parties cannot form a government in a hung parliament because there must always be an absolutely pure party, as the previous government was minimal winning; and an agreement between an absolutely pure and an absolutely corrupt party yields a greater joint surplus. On the other hand, an absolutely pure and an absolutely corrupt party cannot share power because they would agree to the absolutely pure party's ideal policy and allow the absolutely corrupt party to take some graft; so all citizens would prefer the absolutely pure party in power than sharing power.

Two corrupt parties which share power agree to less aggregate graft than either would choose when in power; but the median party is always in power in the ergodic set when corruption is sufficiently non-salient. The ergodic set

[1] Preferences are structured such that the core is non-empty, even though government choices are two-dimensional.

[2] A single party that is always in power is a special case of an ergodic set.

may therefore be suboptimal in the following sense: if corruption is sufficiently non-salient then median citizens are better off when the median party always shares power than when it is always in power.

Various of these results rely on our benchmark assumption that a party last in government [resp. opposition] is absolutely corrupt [resp. pure]: for example, corruption can be cyclical and policy-connected parties can temporarily share power if parties may care about both policy and graft. However, our benchmark results imply that a single coalition cannot always share power if they eventually become absolutely corrupt. This prediction is difficult to square with the decades-long coalitions in Austria and Italy. The benchmark results also imply that a corrupt enough party cannot share power with a pure enough party. This implication seems inconsistent with Shas's participation in Israeli governments led by Rabin and by Netanyahu. Shas, an ultra-orthodox party, is far more concerned with public funding of its educational system than with relations with the Palestinians, and has therefore been a natural partner of both doveish and hawkish parties. Similarly, the Progressive Democrats shared power with Fianna Fail after the 1989 Irish election, having campaigned against the latter's corruption. This episode was repeated in 1992, when Labour joined the coalition.

Accordingly, we study play in two variants on the benchmark model:

If parties can commit to share power with each other if they jointly win the election then the median party may always share power in an ergodic set. Commitments preclude inter-party negotiations and prevent the median party from being in power alone. Median citizens are worse off in this ergodic set than in the benchmark model.

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 coalition which can form in an ergodic set consists 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.

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.[3] The main differences are substantive. 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 introducing a formateur into our benchmark model may eliminate all coalition governments. Second, we assume that a minimal winning government forms, whereas their model implies that a party which secures a majority of votes would typically negotiate a coalition government. Single-party governments are therefore impossible in their model, but typical in our model. Third, preferences are constant in Baron and Diermeier: only

[3] Baron, Diermeier and Fong (2007) drop the last assumption.

the status quo evolves, changing every period in equilibrium; whereas tastes for corruption 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 decision, 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, and therefore model inter-party negotiations axiomatically. Volden and Wiseman also 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.

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 Israeli and Kenyan examples suggest.

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).

We define our benchmark model in Section 2 and characterize equilibria and ergodic sets in Section 3. We extend the benchmark model by allowing for intermediate tastes for graft in Section 4, prior commitments to coalition partners in Section 5, and expressive voting in Section 6. We conclude in Section 7, noting how the model might be extended to bicameral elections. We provide formal statements and proofs in the Appendix.

2 Benchmark model

We describe our benchmark model in this section. We present this model in a form which covers worlds with two and with three parties, even though most of our analysis concerns the latter case.

We analyze a game played over an infinite number of periods . Each period starts with an election, in which each citizen casts a vote for a party or abstains. A party which receives a majority of the votes cast is 'in power'; it chooses the government's program, which consists of policy and the graft it enjoys.[4] If none

[4] We treat 'corruption' and 'graft' as synonyms below.

of the parties receive a majority of votes then they bargain over government composition and its program. We say that the parties in government 'share power'. A period ends after the government implements its chosen or agreed program. We first spell out and discuss details of the one-period game, and then describe the full (multi-period) game.

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).[5] 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 represent a direct cost to all other parties. Graft could therefore be thought of as graft or as a means to finance electoral expenditures. It is important to distinguish such corruption from pork, as studied by Baron (1991) inter alia, which represents the diversion of public resources to a subset of citizens. 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

$$u_i(x, y) = -\beta[\varepsilon(x - x_i)^2 + (1 - \varepsilon)|x - x_i|] - \gamma \sum_j y_j:$$

where $\varepsilon \in (0, 1]$ and β is positive, so x_i is the ideal policy for citizens of sort i. We will refer to $\beta[.]$ as the 'policy costs' of a government. We suppose that γ is also positive; so, in contrast to pork, corruption is equally costly for all citizens, and may generate an incumbency disadvantage. We will explain why we treat policy costs as a convex combination of quadratic and linear terms in Section 4.

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 θ 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.[6] It is convenient to assume a PR election in a single constituency; but our results may also apply to winner-take-all elections in several constituencies.

[5] We write y for the vector of graft.

[6] Abstentions do not play a role in our analysis.

We will say that citizens vote 'sincerely' if every sort i citizen votes for party i.

Parties We treat parties as citizens who may develop a taste for graft if and only if they have been in government. Specifically, for every sort i of citizen there is a party whose preferences over a program are represented by

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

where α is positive and m_i represents some transferable currency (such as cabinet posts) whose distribution satisfies $\sum m_i = M$ where M is large. There are, therefore, three parties: L, M and R. We will drop the qualifier 'party' whenever it can be inferred from context.

In contrast to the citizen-candidate literature, we fix the number of parties:[7] citizens who find that their party is corrupt cannot form a competing pure party (as in Myerson (2006)).

We will refer to c_i as i's taste for corruption and suppose that it is in the interval $[0, 1]$. We will say that i is absolutely pure if $c_i = 0$, and absolutely corrupt if $c_i = 1$. In the benchmark model, every party is either absolutely corrupt or absolutely pure; but we allow for intermediate tastes (viz. $c_i \in (0, 1)$) in Section 4. To simplify exposition, we will drop the qualifier 'absolutely' whenever it can be inferred from context.

We include a normalization constant, $-c_i^2\alpha/4\gamma$, to ensure that party i's ideal policy and graft yield it a payoff of 0, irrespective of c_i.

An absolutely corrupt party (say, i) does not care about policy. We will treat party i's behavior as its limiting choices for a sequence of tastes $\{c_i\}$ which approach 1. In particular, we will suppose that it would choose its ideal policy when in power.

Government formation If any party secures more than half of the votes cast then it forms a government alone, choosing the program which maximize its payoff. We say that the party is then 'in power'.

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.[8]

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, who 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'.

[7] See, for example, Besley and Coate (1997).

[8] The alternative assumption does not affect our results qualitatively: it only changes the conditions under which two pure parties can share power.

The literature on government formation has focussed 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.[9] 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 (and therefore the formateur's role), which is crucial in finite bargaining models like Austen-Smith and Banks (1988). Accordingly, we adopt an axiomatic approach to inter-party bargaining, which easily delivers some simple and, we believe, robust properties of such negotiations.

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. A minimal winning (two-party) coalition always forms;

B. The parties which form a government reach a mutually efficient agreement on a program which divides their surplus equally. If the maximal surplus is independent of policy then the parties agree to policy $(x_i + x_j)/2$; and

C. The coalition whose putative agreement maximizes its members' payoff forms the government.

Taken literally, Condition A is empirically problematic; but we only use it to exclude the grand coalition. This ensures that some party is in opposition, and therefore pure. Condition A could therefore be relaxed in generalizations of our model to more than three parties.

The first part of Condition B is in the spirit of Baron and Diermeier (2001), inter alia, who study noncooperative models of efficient proto-coalitional bargaining. The crucial feature of Condition B is that the agreement is mutually efficient. This will imply that a corrupt and a pure party would agree to the pure party's ideal policy: which is the basis for Lemma 3.2 below. The premise of the second part of Condition B is satisfied if $c_i = c_j = 1$.

Condition C is redundant if only two parties secure votes. It will otherwise imply that a corrupt party has more to gain by reaching agreement with a pure party than with another corrupt party. Volden and Wiseman (2007) derive this rather natural property in a noncooperative bargaining model without elections.

Conditions A-C may be satisfied by more than one pair of parties. We then allow citizens to believe that any such pair might share power.[10]

Conditions A-C seem to be natural properties of inter-party negotiations. However, they may fail in some institutional settings: for example, when negotiations are conducted by a formateur. We will discuss the implications of a formateur mechanism in Section 3.4.

The combination of Conditions A, B and C allows us to characterize the government's membership and program after any election. In particular, it allows us to bracket out party choices; so we can treat citizens as the only

[9] See, for example, Volden and Wiseman (2007).

[10] This turns out to be relevant in proving Proposition 3.1d.

active players in in our benchmark model.[11]

Note that parties which share power agree on corruption as well as policy. We interpret such agreements as the indirect consequence of assigning ministries, which allow parties to control departmental resources.

One-period game 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 triple of tastes $\{c_i\}$, and thereby each citizen's payoff at any strategy combination.

Solution concept The one-period game possesses multiple Nash equilibria because a citizen is indifferent across her strategies unless she is pivotal; and any feasible government can be elected at a 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. This refinement implies that moderates determine government composition. We simplify exposition by referring to strong strategy combinations as 'equilibria'. We will characterize the equilibrium correspondence: viz. the equilibria for every triple of tastes and parameters $\{d, \theta, \alpha, \beta, \gamma\}$.

Citizens of the same sort can choose different strategies in equilibrium. Indeed, various strategy combinations can support a given outcome; equilibrium pins down the governments that form (and therefore outcomes) rather than strategy combinations.

Incumbency effects A candidate of a given party has an incumbency advantage, in conventional terms, if she is more likely to be elected as the incumbent than as the challenger. We can use the equilibrium correspondence to define incumbency effects for fixed parameters. A party has an incumbency advantage if a game in which it is corrupt (and therefore an incumbent) has an equilibrium in which it is in government; and a game in which it is pure has an equilibrium in which it is in opposition.[12] We define incumbency disadvantage analogously.

Characterizing programs We characterize the program chosen and each citizen's payoff for every possible government in Lemma A2.1, which we provide in the Appendix. We will repeatedly invoke Lemma A2.1 when proving further results.

Lemma A2.1 implies that any government's chosen corruption is proportional to α/γ: the proportion depending on the tastes of government members. Consequently, the cost of corruption to a citizen is also proportional to α/γ. The parameter δ, which we define as $\alpha/\beta\gamma$, therefore measures a citizen's tradeoff between policy and realized corruption. We will refer to δ as the 'salience' of corruption: an interpretation which seems to be consistent with the widespread use of salience in empirical studies.[13] Salience is a sufficient statistic for $\{\alpha, \beta, \gamma\}$ in many of our results. We will ignore some non-generic sets of parameters in which δ satisfies particular quadratic equations in d and θ.

[11] We will treat parties as active players in Section 5.

[12] Note that a given party may be in or may be excluded from several possible governments.

[13] See, for example, Epstein and Segal (2000) on empirical proxies for salience when surveys are unavailable.

Lemma A2.1 implies that aggregate corruption 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 sufficiently that they choose less graft in aggregate than an (absolutely) corrupt party in power. This will prove important below, as moderates may prefer to elect a hung parliament. The property holds whenever private benefits and costs are respectively polynomial and convex in graft. Example A2.1, which we present in the Appendix, illustrates how this condition could fail if private benefits are concave enough in graft. On the other hand, the condition may also hold in models where citizens punish governing parties, and coalition government blurs responsibility for past corruption: cf. Tavits (2007).

An efficient agreement between a pure and a corrupt party must cede policy choice to the pure party in return for some graft for the corrupt party. Lemma A2.1 specifies the surplus-maximizing graft. It also, crucially, implies that a coalition of a pure and a corrupt party yields a larger surplus than a coalition of two corrupt parties. This natural property also holds in Volden and Wiseman's (2007) model of a heterogeneous legislature. In contrast to their model, corrupt parties which share power choose more graft, the less salient is corruption.[14]

2.2 Multi-period game

Our analysis of the one-period game studies play with fixed tastes for corruption. We extend this analysis to capture Acton's dictum by considering play in a sequence of periods, where the only link between periods is the effect of power on tastes for corruption.

Formally, a dynamic process maps a strategy combination for citizens (say, s) and current tastes for graft ($c \equiv \{c_L, c_M, c_R\}$) into the next period's tastes. We write this Markovian process as $\Gamma(c, s)$.

In the benchmark model, we suppose that a party is (absolutely) corrupt if it was in government in the last period, and that it is otherwise (absolutely) pure. We extend our results to more general dynamic processes, in which parties may have intermediate tastes for corruption, in Section 4.

We do not provide a model of 'changing tastes', but Acton's dictum is consistent with a number of stories in which individuals' preferences are fixed: for example, parties in government may develop the skills needed to rob the public purse; or parties which implement new policies may need ideologically neutral but self-interested experts, who eventually determine the government's program.[15] Gary Hart's remark about superdelegates, "A reformer in office becomes an establishment figure by definition and then by definition resists the next round of reforms – it's human nature" (NYT 02/17/08) suggests another mechanism.[16]

[14] Their Proposition 2 relies, inter alia, on common preferences over policy.

[15] Weinstein (2005) describes a similar effect on the composition of rebel groups.

[16] della Porta and Pizzorno (1996) discuss Italian corruption in terms of 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, this effect may explain why policy-driven activists sometimes move parties which have left government away from the political center. Examples include the Goldwater candidacy, and the paths taken by the UK Labour party under Michael Foot after losing the 1979 election and the Tories under William Hague and Ian Duncan-Smith after losing the 1997 election.

We also suppose that the time which elapses between elections is long enough that citizens and parties only care about the next government's program. Parties have no incentive to divert public resources to finance re-election campaigns, 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. It also implies that citizens do not punish parties for their performance in past governments;[17] and that parties do not reduce current corruption to improve their subsequent electability.[18] This allows us to 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, calling our solution concept an 'ergodic set'. Formally, an ergodic set is a finite sequence of pairs $\{c^t, s^t\}_{t=1}^{t=T}$ such that s^t is an equilibrium in the one-period game when parties have tastes c^t; and tastes evolve according to the dynamic process $c^{t+1} = \Gamma(c^t, s^t)$: where we identify periods 1 and $T+1$. The composition of government may therefore be constant or cyclical in an ergodic set.

3 Benchmark results

In this section, we characterize equilibria and ergodic sets in the benchmark model, where parties are either (absolutely) pure or (absolutely) corrupt. 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 compare our results with ergodic sets in related models where a formateur chooses its partner. In Section 3.4, we compare benchmark results with equilibria and ergodic sets in a model with two parties. We collect and discuss some of the benchmark model's testable implications in Section 3.5.

3.1 Three parties

Our first result in this subsection characterizes equilibria of any one-period game which follows a minimal winning government: so at least one party is pure and

[17] 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 reelection. We will return to this issue in the Conclusion.

[18] Baron (1996) analyzes a related effect.

at least one party is corrupt. While the outcomes specified in Proposition 3.1 only depend on salience (δ), equilibrium payoffs depend on β and on α/γ.

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 L is in power if*

$$4[\varepsilon(d+\theta)^2 + (1-\varepsilon)(d+\theta)] < \delta;$$

and M is otherwise in power.

c. *If L and M are corrupt then M is in power if $\delta < 4[\varepsilon d^2 + (1-\varepsilon)d]$; and R is otherwise in power.*

d. *If M is the only corrupt party then M is in power if $\delta < 4[\varepsilon d^2 + (1-\varepsilon)d]$; L and R share power if and only if*

$$\theta < 2d \text{ and } 4[\varepsilon(2d+\theta)^2 + (1-\varepsilon)(2d+\theta)] < \delta;$$

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 3.1 *Two parties cannot split all of the votes cast equally in any equilibrium.*

Proof If i and j were to split all votes cast equally 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 3.1 implies that each party must secure some votes in a hung parliament.

Lemma 3.2 *Two corrupt parties do not share power in any equilibrium.*

Proof Lemma 2.1b implies that an agreement between the two corrupt parties yields a lower surplus than the other two possible agreements; so Condition C in Section 2 implies that the corrupt parties would not share power in a hung parliament.¥

Lemma 3.3 *A corrupt and a pure party do not share power in any equilibrium.*

Proof Denote the pure party by i. Lemma 2.1b implies that the two parties would agree to policy x_i and to some corruption. All citizens must then prefer that i be in power.¥

Lemmas 3.2 and 3.3 imply that any coalition government must consist of two pure parties. Our next result pins this possibility down further:

a. Suppose there is an equilibrium in which M does not get a majority of votes. This means that either two parties share power or that a party other than M secures a majority of the votes cast. Policy is $x \neq 0$, and there may also be some corruption. In this case, a coalition of moderates and citizens who top-rank a policy with the opposite sign to x have a profitable deviation to voting for M. Conversely, there is an equilibrium in which all citizens vote for M.

We will use part a to prove

Lemma 3.4 *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 hung.*

Proof Part a implies this result when M is pure; so suppose that M is corrupt.

Denote the party which moderates most prefer to be in power by K. No other party can be in power in an equilibrium because some citizens who do not vote for K have a profitable joint deviation to doing so.

If some party other than M is also corrupt then Lemmas 3.2 and 3.3 imply that each citizen top-ranks a single party in power. There must then be an equilibrium in which all citizens vote for K. Conversely, no other government can form because citizens who vote for the corrupt party in the coalition can profitably jointly deviate to voting for the pure party. Accordingly, suppose henceforth that L and R are both pure.

Lemma 2.1b implies that L and R only share power in a hung parliament if

$$\delta > 4[\varepsilon(2d+\theta)^2 + (1-\varepsilon)(2d+\theta)]. \tag{3.1}$$

If (3.1) fails then the argument in the last paragraph again implies the result. Accordingly, suppose that (3.1) holds. It is easy to confirm that moderates then prefer L and R to share power over M in power.

The coalition's program is a policy of $-\theta/2$ and no graft; so moderates and rightists prefer the coalition government over L in power, precluding the latter government. Two possibilities remain:

- If moderates top-rank R in power then rightists must also do so. There must then be an equilibrium in which all citizens vote for R, and no other government can form in equilibrium.
- If moderates prefer the coalition government over M or R in power then so do leftists. There is then an equilibrium in which all citizens vote sincerely because (3.1) implies that rightists also prefer the coalition government

over M in power. No party can be in power because at least two sorts of citizen prefer the coalition government.¥

b. If M and R are both corrupt then the only possible governments are L and M in power. Moderates respectively earn

$$-\beta[\varepsilon(d+\theta)^2+(1-\varepsilon)(d+\theta)]$$

and $-\alpha/4\gamma$ when L and M are in power, so this part follows from Lemma 3.4.

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

d. If M is alone corrupt 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 $\delta < 4[\varepsilon d^2+(1-\varepsilon)d]$. This condition implies that M is in power because (3.1) then fails. Conversely, Lemma 3.4 implies that M is not in power if the condition fails.

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. (3.1)), which implies that moderates prefer a coalition government over M in power. The result then follows from Lemma 3.4.¥

Lemma 3.2 states that two corrupt parties do not share power in any equilibrium. It follows from an implication of Lemma 2.1b: that an agreement between two corrupt parties yields a smaller surplus than an agreement between a pure and a corrupt party. The latter pair can gain more from trade because there is no conflict of interest over policy. This property also holds in Volden and Wiseman (2007).

Lemma 3.3 states that a corrupt and a pure party do not share power in any equilibrium: the reason being that such parties would agree to the pure party's ideal policy and some graft (cf. Lemma 2.1b), so all citizens are better off if the pure party is in power. This argument, which relies on endogenizing the legislature's composition, distinguishes our results from Volden and Wiseman (2007).

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. This result relies on the absence of effects which explain an incumbency advantage in Congress, such as financing re-election campaigns (pork) and information on candidates, which may deter high-quality challengers from entering. However, we will argue in subsequent sections that the result does not generalize to variants on the benchmark model which also omit these conventional features. Inspection of Proposition 3.1 also reveals that each party has an incumbency disadvantage for some parameters.

Lemmas 3.2 and 3.3 imply that only pure parties can share power, even though Lemma 2.1 implies that negotiations between a corrupt and a pure party or between two corrupt parties would internalize the costs of corruption. It is therefore not surprising that only pure parties can share power in a variant of the model where parties in power unilaterally choose graft, rather than negotiate it. Indeed, it is easy to show that all of the results on government composition in this section hold for such a game.

Proposition 3.1 specifies unique equilibrium governments after any history. We now use this result for one-period games to construct the ergodic set in multi-period games, exploiting our assumption that citizens have a one-election horizon:

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

a. *If $\theta < 2d$ and $4[\varepsilon(2d+\theta)^2 + (1-\varepsilon)(2d+\theta)] < \delta$ 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 $-\beta[\varepsilon\theta^2 + 2(1-\varepsilon)\theta]/4$ in alternate periods.*

b. *If $4[\varepsilon d^2 + (1-\varepsilon)d] < \delta$ and if $2d < \theta$ or*

$$\delta < 4[\varepsilon(2d+\theta)^2 + (1-\varepsilon)(2d+\theta)]$$

then M and R alternate in power, and neither government chooses any graft. Moderates earn 0 and $-\beta[\varepsilon d^2 + (1-\varepsilon)d]$ in alternate periods.

c. *If $\delta < 4[\varepsilon d^2 + (1-\varepsilon)d]$ then M is always in power, and always chooses some graft. Moderates earn $-\alpha/4\gamma$ each period.*¥

We omit the proof of Proposition 3.2 because it follows easily from Proposition 3.1.

If M is pure then its program is ideal for moderates; so it must be in power (cf. Lemma A3.4). If corruption is salient enough then citizens vote out each party in government. The critical level of salience trades off reduced corruption against worse policy when M is turned out of government. M must then alternate in power either with R or with a coalition of L and R; and these 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 the coalition policy $(-\theta/2)$ is closer to the moderates' ideal policy; so M then alternates in power with the coalition.

M is always in power (and chooses its ideal policy) if corruption is sufficiently non-salient relative to the policy differences between M and its nearest rival (R). This result is consistent with Rundquist et al's (1977) argument that citizens trade off corruption against policy costs.

These arguments imply that 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). In the latter two cases, policy never changes by an amount more than d.

Suppose that M is corrupt. If θ is small enough (so L and R are almost equally extreme) then moderates prefer that L and R share power than that either M or R be in power. However, L and R can only share power if their agreement yields a larger surplus than an agreement between M and a pure party: which requires that corruption be very salient. Consequently, the conditions for M to always be in power are independent of θ, only depending on how competitive R is for the votes of moderates. Measures of citizen heterogeneity like polarization also depend on θ, and therefore do not track corruption in this model.[19]

We can use Propositions 3.1 and 3.2 to show that the ergodic set is reached after at most two elections, starting from any initial minimal winning government (so at least party is pure and at least one party is corrupt).

3.2 Optimality

Lemma 3.4 states that moderates effectively choose the equilibrium government from the quadruple of the three parties in power and the coalition which emerges from a hung parliament. This suggests that moderates may sometimes top-rank a coalition government which does not emerge from a hung parliament.

In this subsection, we show that the ergodic set may be suboptimal in the following sense: there is a cycle where tastes evolve as in the benchmark model in which moderates are at least as well off in every period and otherwise better off than in the ergodic set.[20] This 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 the former case.

A government of pure M chooses moderates' ideal program; so pure M must also be in power after alternate elections in any improving cycle. As the cycle satisfies the benchmark version of Acton's dictum, M must alone be corrupt in the alternate elections. Consequently, every possible coalition must contain a pure party.

Suppose that an agreement between L and R yields a larger surplus than one between M and a pure party. Moderates are better off with the pure party in power than sharing power with M (cf. Lemma 3.3); so no cycle which satisfies Acton's dictum can improve on the ergodic set. Now consider the other case, Lemma 2.1 implies that

- An agreement between L and R yields a smaller surplus than one between M and a pure party; and
- Moderates prefer L and R to share power over either M or R in power

if and only if $\theta < 2d$ and

$$\varepsilon\theta^2 + 2(1-\varepsilon)\theta < \delta < 4[\varepsilon(2d+\theta)^2 + 2(1-\varepsilon)(2d+\theta)]. \tag{3.2}$$

[19] See Esteban and Ray (1994) for a formal definition of polarization.

[20] In light of Lemma A3.4, leftists and rightists can obviously do better than in the ergodic set.

If $\theta < 2d$, (3.2) and the conditions in the premise of Proposition 3.2d hold then a cycle in which M alternates in power with a coalition of the pure improves on the ergodic set.

In every other ergodic set, M is always in power. This ergodic set is suboptimal if and only if moderates are better off when M and R always share power or when M alternates in power. The former condition is satisfied when $2\varepsilon d^2 + 4(1-\varepsilon)d < \delta$: corruption is sufficiently salient that moderates prefer to sacrifice policy for the lower aggregate graft agreed by two corrupt parties. This preference is irrelevant in the ergodic set because two corrupt parties never share power.

Lemma 3.4 and the argument for the other ergodic sets imply that moderates are better off when M is corrupt if and only if $\theta < 2d$ and inequalities (3.2) hold. These conditions imply that moderates are better off in every period when M alternates in power with a coalition of L and R.

In sum,

Proposition 3.3 *Moderates may be better off than in the ergodic set in cycles where M alternates in power with a coalition of L and R, and in cycles where M and R always share power.*¥

3.3 Formateurs

In the last subsection, we attributed the ergodic set's suboptimality to Condition C in Section 2, which requires that a coalition which yields the largest surplus share power. In this subsection, we analyze variants on the benchmark model where negotiations are conducted via a formateur. We suppose, following Diermeier et al (2003), that the formateur negotiates with, rather than makes exclusive proposals to, a chosen protocoalition. 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.[21] We analyze these cases in sequence.

If a previous incumbent is appointed formateur then the party which selects a coalition partner must always be corrupt. There are two cases. If one of the other parties is corrupt then Lemma 3.2 implies that the formateur agrees with the pure party, so Lemma 3.3 implies that citizens cannot vote a hung parliament because they all prefer the formateur's coalition partner in power. If the other two parties are pure then the formateur must agree with a pure party; and Lemma 3.3 again implies that citizens can then not vote a hung parliament.

These observations imply that a single party is always in power if the formateur was in the previous government. Lemma 3.4 also holds: the equilibrium government is that top-ranked by moderates. Consequently, there is generically a unique ergodic set: M is always in power if corruption is sufficiently non-salient; otherwise, M and R alternate in power.

[21] See, for example, Ansolabehere et al (2005).

Now suppose that the largest party is sure to be selected as formateur.[22] We will argue that equilibrium play coincides with the benchmark model, again distinguishing between the two cases:

If there are two corrupt parties then Lemma 3.2 implies that the pure party shares power, irrespective of the formateur's identity, just as in the benchmark model; so Lemma 3.3 implies that citizens cannot vote a hung parliament.

If there are two pure parties then citizens can prevent them from sharing power when their agreement yields the highest surplus by giving the corrupt party most votes (making it the formateur). However, this cannot change equilibrium play because all citizens prefer that the pure party be in power than that it share power with the corrupt party. If an agreement between the pure parties yields a lower surplus then citizens can ensure that a particular pure party shares power by making it formateur. However, this cannot change equilibrium play because all citizens prefer that the pure party be in power than that it share power with the corrupt party.

In sum,

Proposition 3.4

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 3.4 implies that replacing Conditions A-C 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, reinforcing the suboptimality result of the last subsection. In Section 3.5, we will suggest that the benchmark model likely underpredicts coalition governments. Models with a formateur mechanism do not address this issue.

3.4 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. On the other hand, 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.

[22] 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.

An increase in the number of parties therefore makes governing parties more accountable, and reduces corruption.

In this subsection, we will argue that introduction of a party representing moderates has an ambiguous effect on corruption. We obtain this result by fully characterizing one-period equilibria and the ergodic set in a world with three sorts of citizen and two parties. We label the parties l and r, and suppose that their ideal policies satisfy

$$-d - \theta \leq x_l < 0 < x_r \leq d.$$

Our main result in this subsection is

Proposition 3.5 (Two parties)

a. *For any pair of tastes $\{c_l, c_r\}$, every generic one-period game has a unique outcome: l is in power if and only if*

$$4[\varepsilon(x_l^2 - x_r^2) - (1-\varepsilon)(x_l + x_r)] < \delta(c_r^2 - c_l^2);$$

otherwise r is in power.

b. *Every generic game has a unique ergodic set: l is always in power and chooses some graft if*

$$\delta < 4[(1-\varepsilon)(x_l + x_r) - \varepsilon(x_l^2 - x_r^2)];$$

r is always in power and chooses some graft if

$$\delta < 4[\varepsilon(x_l^2 - x_r^2) - (1-\varepsilon)(x_l + x_r)];$$

and l and r otherwise alternate in power, with neither government choosing any graft.¥

Proposition 3.5a can be proved by recalling that the two parties are equally likely to be in power if they share votes equally; by noting that moderates top-rank the equilibrium government; and by substituting from Lemma 2.1a.

The nature of the ergodic set, and the ensuing corruption, depends on the opportunity cost for moderates to replace the party whose ideal policy is closest to 0. Suppose, for simplicity that ε is very small. Proposition 3.2 then implies that there is corruption in the ergodic set of a three-party world if and only if $\delta < 4d$. If x_l and x_r are both close enough to 0 then there is weakly more corruption in a three-party world, as Myerson's (2006) arguments suggest. However, if $x_l = -d-\theta$ and $x_r = d$ then l cannot always be in power, and there is corruption in an ergodic set if and only if $\delta < 4\theta$; so, for fixed salience, there is weakly more corruption in a two-party world if and only if $\theta < d$.[23] Tavits (2007) reports that an increase in the number of effective parties raises corruption; but the

[23] In contrast to Anderson (2000), the conditions do not depend on uncertainty about government composition because only single-party governments choose graft in our model, and our solution concept excludes any strategic uncertainty.

independent variable depends on vote shares, which are not only endogenous in our model, but are also not uniquely pinned down in equilibrium.

We end this subsection with a calculation. Suppose that ε is very small and that both parties are corrupt. Moderates prefer the policy which r would choose in power over that chosen by a coalition government, but prefer the parties to share power over either party in power if

$$0 < 4|x_l + x_r| - 8x_r < \delta.$$

This preference is irrelevant here because parties are equally likely to be in power if they secure the same number of votes. We will return to the conditions when we discuss bicameralism in the Conclusion.

3.5 Testable implications

Propositions 3.1 and 3.2 entail 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) Extremist L is only in government in an ergodic set when it shares power;
    (c) No coalition or coalitions can always be in power;
    (d) Only disconnected parties can share power.
2. Realignment theory
    (a) Policy does not change sign across elections;
    (b) Incumbency effects are temporary.
3. There is only corruption in an ergodic set if M is always in power.
4. No party has an incumbency advantage.

Some of the implications about government composition appear to be consistent with the evidence: for example, Implication 1a) seems to square with the prolonged periods of one-party rule in Japan and Sweden; while 1b) tracks the Haider-led FPO 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 1c).

Implication 1d), 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 connected; while Warwick (1994) argues that disconnected coalitions are more unstable.[24] The implication 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. The associated empirical literature demonstrates that 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.[25] The arguments used to prove Lemmas 3.3 and 3.4 do not rely on the possible formation of a disconnected coalition; so no coalition could form in equilibrium if disconnected coalitions were excluded by assumption.

Implication 2 captures two aspects of Mayhew's (2002) stylized version of realignment theory. Both parts follow from the benchmark assumption that M is absolutely pure after a period in opposition. Mayhew contests the 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.[26] Nevertheless, Implication 3 seems too stark: turning out a government may reduce, but does not eliminate corruption. Conversely, parties which are turned out do not immediately become absolutely pure; so a recent incumbent may continue to benefit from its predecessor's poor reputation, as exemplified by the time it has taken for the Tories to shake off their image of sleaze after losing the 1997 election in the UK. Such examples are inconsistent with Implication 2b).

Implication 4 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. We have excluded such features from the model.

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

[24] See also Brams et al (2002) on disconnected coalitions when policy is multi-dimensional.

[25] 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).

[26] See Pellegrini and Gerlagh (forthcoming).

4 Intermediate tastes for graft

The benchmark model has an extreme dynamic theory: any party which was last in government [resp. opposition] is absolutely corrupt [resp. pure]. In this section, we consider the ergodic sets of a model in which parties can have intermediate tastes for graft (viz. $c \in (0,1)$) which evolve in accord with a weaker form of Acton's dictum: a party which was last in government [resp. opposition] becomes more [resp. less] corrupt.

Various properties of the ergodic set detailed in Proposition 3.2 hold for dynamic processes which satisfy a pair of weaker but plausible conditions.

- In presenting the model in Section 2, we noted that the only difference between citizens i and party i is that the latter may have been in government. This suggests that a party which is never in government eventually becomes absolutely pure.
- It seems natural to interpret Acton's second claim, that absolute power corrupts absolutely, as asserting that a party which is always in government eventually becomes absolutely corrupt.

Consider any dynamic process which satisfies these two conditions. If this process yields an ergodic set in which some party i [resp. j] is always in government [resp. opposition] then citizens must repeat equilibrium play in the benchmark model. Proposition 3.1 then implies that no coalition can always be in power, and that only M can always be in power. Conversely, if $\delta < 4[\varepsilon d^2 + (1-\varepsilon)d]$ then any dynamic process has a unique ergodic set, with M always in power. In sum, Implication 1a) at the end of the last section carries over when absolute power corrupts absolutely. Analogous arguments imply that no coalition can then always be in power: so a weak form of Implication 1c) also carries over. In the remainder of this section, we will show that the other implications need not hold. Before doing so, we must address a technical issue:

The ergodic set exists and is generically unique in the benchmark model. Existence does not carry over for generic games when ε is close to 1 (so the policy cost is almost quadratic) because there are generic one-period games which do not possess an equilibrium. To see this, note that moderates must top-rank any equilibrium government (by the argument in Lemma 3.4). Now suppose that parties enter an election with equal taste for corruption (say, c): so Lemma 2.1b implies that M and R would share power if parliament hangs. If $\delta > 2d^2/c^2$ then moderates prefer this coalition over any party being in power. However, leftists prefer either L or M in power over M and R sharing power if $\delta < (10d^2 + 8d\theta)/c^2$. Consequently, parliament cannot hang in an equilibrium if δ satisfies both conditions.

By contrast, Lemma 3.4 generalizes to every $c_i \in [0,1]$ when ε is small enough (policy costs are 'almost linear'):

Lemma 4.1 *Every generic one-period game in which policy costs are almost linear possesses a unique equilibrium outcome. The government* *which forms is that favored by moderates out of the three single-party governments and the coalition which would form were parliament hung.*

Proof Write the pair of parties who would share power were parliament hung as $\{i, j\}$.

If moderates most prefer some party (say, K) in power over the other parties in power and $\{i, j\}$ then K alone can be in power in an equilibrium. Consider a strategy combination in which all citizens vote for K. By construction, moderates cannot profitably deviate. There are then no alternative governments which leftists and rightists all prefer over K in power. Conversely, there cannot be a hung parliament in equilibrium because some leftists or rightists must prefer K in power over $\{i, j\}$.

Now suppose that moderates most prefer $\{i, j\}$ over any party in power. A strategy combination in which all citizens vote sincerely forms an equilibrium if and only if

1. Leftists prefer $\{i, j\}$ over either M or R in power; and
2. Rightists prefer $\{i, j\}$ over either L or M in power.

Suppose, without loss of generality, that i and j choose a negative policy.

1. If moderates prefer i and j sharing power over M in power then aggregate corruption must be lower in the former case; so leftists must also prefer i and j sharing power. Furthermore, if moderates prefer i and j sharing power over R in power then so must leftists.
2. Moderates and rightists share the same preference ordering over i and j sharing power and L and M in power alone.

There are no other equilibrium outcomes because if moderates prefer a hung parliament over some party in power then another sort of citizen must share that preference; and this coalition can ensure that parliament hangs.¥

If policy costs are almost linear then all citizens prefer a hung parliament over M in power if moderates top-rank a hung parliament. This property precludes the indirect preference ordering which yields non-existence when policy costs are almost quadratic for some configuration of preferences. Almost-linearity also allows us to prove Lemma 4.1 without characterizing the coalition government which would form were parliament to hang (cf. the proof of Lemma 3.4).

Lemma 4.1 implies that games with almost linear policy costs possess an ergodic set if the set of feasible tastes is finite. In the rest of this section, we focus on games with almost linear policy costs.

We now present an example of games whose ergodic sets fail Implications 1b), 1d), 2 and 4 at the end of the last section, which respectively state that L is only in government if it shares power; that only disconnected parties can share power; that there is only corruption in an ergodic set if M is always in power; and that government turn-over never changes policy by more than d.

Example 4.1 *Suppose that ε and θ are both very small; that $\delta > 64d$; and that the dynamic process satisfies the following properties:*

- *If a party which is in opposition with taste $1/4$ in some period is in government next period then its taste becomes $3/4$;*
- *If a party which is in government with taste $3/4$ in some period is in opposition next period then its taste becomes $1/4$.*¥

If L has taste $3/4$ and M and R each have taste $1/4$ then M and R would share power in a hung parliament because $\delta > 12d$;[27] and moderates prefer this coalition to share power (over M in power) because $\delta > 64d$. Conversely, if L has taste $1/4$ and M and R each have taste $3/4$ then L and M would share power in a hung parliament; and moderates prefer L in power over sharing power with M, and over M in power because $\delta > 8d$. Lemma 4.1 then implies that there is an ergodic set in which L alternates in power with a coalition of the other two parties. Consequently, Implications 1b) and 1d) do not carry over from the benchmark model.

L chooses graft of $\alpha/64\gamma^2$ when in government, whereas the coalition chooses graft of $\alpha/128\gamma^2$ in this ergodic set. Corruption may therefore be cyclical and always positive, even though M is never in power. Consequently, Implication 2 does not carry over to this model. Indeed, it is easy to construct perturbations of Example 4.1 in which a succession of newly elected governments are more corrupt than their predecessors because parties in the preceding government would have chosen even more graft if re-elected. However, this process cannot continue indefinitely in an ergodic set if absolute power corrupts absolutely.

The cyclicity of corruption represents a pattern of successive, temporarily effective cleanups. Gillespie and Okruhlik (1991) attribute such a pattern to the variable inflow of seizable assets; whereas corrupt parties deplete the resources they devote to pork in Bicchieri and Duffy (1997). Corruption is cyclical here because power corrupts, and relatively corrupt parties lose elections.

Notice that policy switches between $-d - \theta$ when L is in power, and $d/2$ when M and R share power. In other words, policy can change sign across governments, contradicting Implication 2a).

Finally, we consider the duration of an incumbency effect when tastes can be intermediate. Governments which are turned out only survive for a single election in the benchmark model because they immediately become absolutely corrupt, and the opposition immediately becomes absolutely pure. We illustrate alternative possibilities by focusing on a simple example:

Suppose that $\delta > 4d$ and that ε and θ are respectively very small and very large. Proposition 3.2b then implies that M and R alternate in power in the ergodic set of the benchmark model, with no government choosing any graft. Now suppose that a party becomes absolutely corrupt once it is in power, but that a party which is turned out of government has tastes of $1/2$ in the first period after leaving office, and becomes absolutely pure thereafter, where

[27] The arguments in this paragraph follow from Lemma 2.1.

$\delta < 16d/3$. If M is in power then moderates prefer that M remain in power than that R immediately return to power. L and M would share power in a hung parliament if L were absolutely pure; so M would remain in power in equilibrium, and would choose some graft in its second term. Proposition 3.2b implies that M would be replaced in power by R after winning two elections. On the other hand, moderates always prefer M in power over returning R to power, and L and R would share power in a hung parliament; so M would be in power once R has been in power. Thus in the ergodic set, M would be re-elected once and then replaced in power by R for a single term in office, contrary to Implication 2b). This result may illustrate why the Tories, who were unable to lose their poor reputation, lost subsequent elections after being turned out of office in 1997.

This example and our observation above suggest that models with intermediate tastes may allow for critical elections, in which policy changes significantly, and then persists for several elections.

5 Commitments to coalition partners

Lemmas 3.2 and 3.3 imply that a corrupt party can never share power in the benchmark model. In this section, we demonstrate that a corrupt party may share power with a pure or with a corrupt party 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;[28] and a center-left coalition won the 2006 Italian election after running together as The Union.[29] Golder (2005) reports that about a quarter of pre-election coalitions in her sample of 23 countries between 1946 and 2002 went on to form a government; while more than a third of the coalition governments in Strom and Muller's (1999) sample were based on pre-electoral agreements.[30]

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. 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 complete model of pre- and post-electoral bargaining, which shows how parties may precommit in order to allow corrupt parties to share power.

[28] Indeed, they were the first coalition government returned to power since 1969.

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

[30] Martin and Stevenson (2001) Table 3 provide evidence that parties which precommit to partners are more likely to 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 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 Conditions A and B on negotiations, but replaces Condition C (as do the formateur models in Section 3.3).

Citizens observe whether any coalition has formed and then vote, as in previous sections.[31] Specifically, the benchmark three-party game corresponds to subgames which follow no coalition formation; and the two-party game in Section 3.4 corresponds to subgames which follow coalition formation.

The simultaneous move structure in the first stage may again generate multiple Nash equilibria. Accordingly, we analyze the game by focusing on pure strategy equilibria in which no pair of parties can profitably deviate from their announcements.[32]

We will focus, for expositional convenience, on games where preferences are almost linear (ε is very small).[33]

Proposition 5.1 (Equilibria) *Suppose that parties can commit to coalition partners and that preferences are almost linear.*

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 if $4(d + \theta) < \delta < \min\{4d + 8\theta, 16\theta/3\}$;*
- *L is in power if $4d + 8\theta < \delta$; and*
- *There is no pure strategy equilibrium if*

$$\max\{\frac{16}{3}\theta, 4(d + \theta)\} < \delta < 4d + 8\theta.$$

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*

[31] Our results would also hold if parties which formed a coalition ran a single slate of candidates.

[32] We do not allow for joint deviations of citizens and parties.

[33] This assumption is not responsible for the existence of games without a pure strategy equilibrium.

- *M is in power if* $\delta < \min\{4d, 2\theta\}$*;*
- *L and R share power if* $16\theta < \delta < 4d$*; or* $\theta < 2d$ *and either* $\min\{16\theta, 4(2d + \theta)\} < \delta$ *or* $8(2d + \theta) < \delta$*;*
- *M and R share power if* $\theta < 2d$ *and* $4(2d+\theta)\} < \delta < \min\{16\theta, 8(2d+\theta)\}$*;*
- *R is in power if* $4d < \delta$ *and if* $2d < \theta$ *or* $\delta < 4(2d + \theta)$*; and*
- *There is no pure strategy equilibrium if* $2\theta < \delta < \min\{16\theta, 4d\}$.¥

We prove Proposition 5.1 in the Appendix. Part a is trivial. We prove the remaining parts by noting that a party in power in the benchmark model would not commit to share power in any equilibrium. We then test for profitable joint deviations by parties, given citizens' best responses, from putative equilibria in which the remaining governments form. An equilibrium does not exist when L alone is pure if salience is such that every coalition would win an election, and L would win if no coalition formed.

Proposition 5.1 demonstrates that policy-connected parties (M and R) can form a coalition, whereas coalition governments which form absent commitments are policy-disconnected. These results are supported by Golder's (2006) cross-country evidence.

A pure party never shares power with a corrupt party in the benchmark model (cf. Lemma 3.3). This result relies on Lemma 2.1b, which states that such a coalition would agree to the pure party's ideal policy and some corruption. All citizens then prefer that the pure party be in power than that it share power with a corrupt party. Proposition 5.1 demonstrates that equilibrium commitments can prevent citizens from unravelling such a putative coalition (when M is the only corrupt party).

Two corrupt parties never share power in the benchmark model (cf. Lemma 3.2) because a corrupt party prefers to share power with a pure party in a hung parliament. Proposition 5.1 implies that 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.

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, but M would be in power if L were corrupt. Consequently, R has an incumbency advantage for these parameters, contrary to Implication 3a).[34]

Proposition 5.1 immediately implies

Proposition 5.2 (Ergodic sets) *Suppose that parties can commit to coalition partners and that preferences are almost linear.*

[34] L and M only have an incumbency disadvantage.

a. *If* $16\theta < \delta < 4d$ *or if*

$$\theta < 2d \text{ and } \min\{16\theta, 4(2d+\theta)\} < \delta \text{ or } 8(2d+\theta) < \delta$$

then there is an ergodic set in which 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 about* $-\beta\theta/2$ *in alternate periods.*

b. *If* $4d < \delta$ *and if* $2d < \theta$ *or* $\delta < 4(2d+\theta)$ *then there is an ergodic set in which* M *and* R *alternate in power, and neither government chooses any graft. Moderates earn* 0 *and about* $-\beta d$ *in alternate periods.*

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

d. *If* $4(d+\theta) < \delta < \min\{4d+8\theta, 16\theta/3\}$ *then there is an ergodic set in which* M *and* R *always share power, and always choose some graft. Moderates earn about* $-\beta d/2 - \alpha/8\gamma$ *each period.*¥

Proposition 5.2d demonstrates that two connected parties may always share power, contrary to Implications 1c) and 1d) of the benchmark model.

There are no ergodic sets for some parameters, such as $\delta \in (2\theta, \min\{16\theta, 4d\})$, because the one-period game with M alone corrupt has no equilibrium. In further contrast to the benchmark model, a given game may have several ergodic sets, for example if

$$4(d+\theta) < \delta < \min\{4d+8\theta, 16\theta/3, 4(2d+\theta)\}.^{35}$$

Proposition 5.2d specifies conditions under which two corrupt parties always share power. Under these conditions, M would alternate in power with R in the ergodic set of the benchmark model. Proposition 3.2b then implies that moderates are better off in every period in the benchmark model than in this ergodic set of the commitment game, which is therefore suboptimal in the sense defined in Section 3.2.[36]

6 Expressive voting

In Section 3, we demonstrated that a pure and a corrupt party never share power if citizens are sophisticated: for they recognize that such a government would choose the pure party's ideal policy and some corruption, 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

[36] The results in this paragraph do not rely on the supposition that preferences are almost linear.

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 in power every period.

Formally, we suppose that each citizen compares the policy and graft that each party would choose in power (as described in Lemma 2.1a), and votes the party which she most prefers: behavior which we describe as 'expressive voting'. Citizens i may most prefer party $j \neq i$ in power, so expressive citizens need not vote sincerely.

We also adopt two assumptions which simplify exposition: we suppose that policy costs are almost linear; and we exclude cases in which a majority of citizens are moderates.[37]

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-C in Section 2 and Lemma 2.1, and that citizens vote expressively. We will abuse terminology by again referring to such strategy combinations as 'equilibria', and will use these strategy combinations to construct long-run cycles which we refer to as 'ergodic sets'.

We start with some simple properties of this model:

Lemma 6.1 *If citizens vote expressively then all citizens of the same sort vote the same party: each citizen votes sincerely when its party is pure; and if a citizen votes for another party then that party must be pure.*¥

We omit this and subsequent proofs in this section.

We can now use Lemmas 2.1, 3.2 and 6.1 to characterize equilibria. We organize Proposition 6.1 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 6.1 (Equilibria) *Suppose that citizens vote expressively and that preferences are almost linear.*

a. *One corrupt party:*

- *If $i \in \{M, R\}$ alone is corrupt then it shares power with one of the pure parties if $\delta < 4d$, and $j \neq i \in \{M, R\}$ is in power otherwise.*
- *If L alone is corrupt then it shares power with one of the pure parties if $\delta < 4(d + \theta)$, and M is in power otherwise.*

b. *One pure party*

- *If $i \in \{M, R\}$ alone is pure then it shares power with one of the corrupt parties if $\delta < 4d$, and is otherwise in power.*

[37] If moderates were in a majority then M is either always in power or always alternates in power with R.

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

A pure and a corrupt party cannot share power in the benchmark model because some citizens can profitably deviate to voting for the pure party. By contrast, citizens who vote expressively ignore the outcome of negotiations. Lemma 3.3 therefore fails in this model, and a pure and a corrupt party can share power in equilibrium.

Proposition 6.1a 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 Implication 3a).

Lemma 2.1b 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.[38]

Lemmas 3.2 and 3.3 imply that only pure parties can share power in the benchmark model. Lemma 3.2, whose proof relies on inter-party negotiations, still holds in this model; so corrupt parties cannot share power when citizens vote expressively. By contrast, Lemma 3.3 relies on strategic voting. Indeed, Proposition 6.1 implies that any coalition government must consist of a pure and a corrupt party.

We now use Proposition 6.1 to characterize ergodic sets:

Proposition 6.2 (Ergodic sets) *Suppose that citizens vote expressively and that preferences are almost linear.*

a. *If $\delta < 4d$ then a pure party shares power with a corrupt party each period in every ergodic set, and the government always chooses some graft.*

b. *If $\delta > 4d$ then there is a unique ergodic set in which M alternates in power with R, and no government chooses any graft.*¥

The proof of Proposition 6.2a exploits the possible multiplicity of equilibrium outcomes to construct multiple ergodic sets when $\delta < 4d$. L is then always in power in an ergodic set, contrary to Implications 1a) and 1b) of the benchmark model, where it is never in power in an ergodic set.

Proposition 6.2 does not specify moderate payoffs because it does not pin down the government's policy.

Proposition 6.2a may explain why the ultra-orthodox party Shas has shared power (with rare exceptions) since 1990. Shas is primarily concerned with public funding of its educational system, and has participated in governments led by both Rabin and Netanyahu. While corruption is clearly salient in Israel, it is not salient enough relative to differences on policy towards the Palestinians.[39]

If citizens vote strategically then moderates must top-rank the equilibrium government, else some citizens have a profitable joint deviation; so M must be

[38] Uniqueness would be restored if tastes were intermediate.

[39] This interpretation admittedly stretches our notion of graft, as Shas voters are its main beneficiaries.

in power if d is large enough. Proposition 6.2 implies that these properties do not even hold in an ergodic set: if $\delta < 4d$ then all citizens vote sincerely, and the equilibrium government chooses the pure party's policy, no matter how extreme that might be. Elections may therefore be critical, contrary to Implication 2a) of the benchmark model.

If citizens vote strategically and parties are either absolutely 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 5.2). By contrast, Proposition 6.2a implies that expressive voters may replace governments without reducing corruption, contrary to Implication 2.

Proposition 3.1 implies that only policy-disconnected parties can share power (Implication 1d); Proposition 3.2 implies that, in every ergodic set, a party is sometimes in power. Proposition 6.2 implies that neither property generalizes to a model with expressive voting.

7 Conclusions

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. However, our focus on a stationary environment may limit the model's empirical power.

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 variant on our model with two parties and citizens who vote both for Congress and the Presidency:

The calculations in Section 3.4 reveal that moderates may split their votes in equilibrium if corruption is salient enough, even though they prefer the policy which a party would choose in power. By contrast, moderates split their votes because they prefer the compromise policy agreed by a divided government in Alesina and Rosenthal (1996) and Fiorina (1996). Alesina and Rosenthal also argue that the President's party typically loses seats in mid-term elections because the distribution of ideal policies is not commonly known; so citizens are surprised by the results of simultaneous elections. (See also Mebane and Sekhon (2002).) We have excluded any incomplete information, but our model suggests that the corrupting effect of power might explain mid-term losses: which seems like a more plausible explanation of the 2006 Congressional elections, among others.

We have followed conventional wisdom by assuming that Acton's dictum is correct. We have suggested various a priori reasons for the dictum, but our model could be naturally extended by providing testable micro-foundations. More generally, it seems important to provide evidence on the empirical significance of the dictum. Unfortunately, the evidence available, like Transparency

International's Corruption Perceptions Index, are built up from surveys which ask about governmental and bureaucratic corruption as a whole and cannot really capture governmental corruption in itself (cf. Treisman (2000)). Moreover, these series seem to change too slowly to test for changing corruption (cf. Tavits (2007)), and do not separate graft from pork.

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APPENDIX

Lemma 2.1

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

$$-\beta[\varepsilon(x_i - x_k)^2 + (1-\varepsilon)|x_i - x_k|] - \alpha c_i^2/4\gamma.$$

b. *Let $x_i < x_j$ and write*

$$\frac{1}{2-c_i-c_j}[(1-c_i)x_i + (1-c_j)x_j + \frac{1-\varepsilon}{2\varepsilon}(c_i - c_j)]$$

as X.

If i and j share power then they agree to respective graft of $\alpha c_i^2/16\gamma^2$ and $\alpha c_j^2/16\gamma^2$. They agree to a policy of $(x_i + x_j)/2$ if $c_i = c_j = 1$ or $\varepsilon = 0$ and $c_i = c_j$; otherwise, they agree to a policy of x_i if $X \leq x_i$, of x_j if $X \geq x_j$, and of X otherwise. Sort k citizens earn

$$-\beta[\varepsilon(x - x_k)^2 + (1-\varepsilon)|x - x_k|] - \frac{\alpha}{16\gamma}(c_i^2 + c_j^2)$$

if parties i and j share power and choose policy x.

- *If i and j agree to policy x_i then the program yields a surplus of*

$$-\beta(1-c_j)[\varepsilon(x_j - x_i)^2 + (1-\varepsilon)(x_j - x_i)] - \frac{\alpha}{8\gamma}(c_i^2 + c_j^2);$$

- *If i and j agree to policy x_j then the program yields a surplus of*

$$-\beta(1-c_i)[\varepsilon(x_j - x_i)^2 + (1-\varepsilon)(x_j - x_i)] - \frac{\alpha}{8\gamma}(c_i^2 + c_j^2);$$

- *If i and j agree to policy X then the program yields a surplus of*

$$-\beta\{\frac{(1-c_i)(1-c_j)}{2-c_i-c_j}[\varepsilon(x_j - x_i)^2 + 2(1-\varepsilon)(x_j - x_i)] - \frac{(1-\varepsilon)^2}{4\varepsilon}\frac{(c_i - c_j)^2}{2-c_i-c_j}\}$$
$$-\frac{\alpha}{8\gamma}(c_i^2 + c_j^2).\text{¥}$$

Note that $X \in [x_i, x_j]$ if $\varepsilon = 1$.

We phrase Lemma 2.1 in terms of $\{x_i\}$ in order to cover games with either two or three parties, and allow for every $c_i \in [0,1]$ to cover the intermediate tastes which we discuss in Section 4.

The proof of part a is trivial. (Recall our assumption that party i chooses x_i even if it is absolutely corrupt.)

The graft specified in part b maximize the surplus, $v_i(x,y) + v_j(x,y)$, with respect to y. Substitution into $u_k(x,y)$ yields the payoff of sort k citizens.

Efficiency (Condition B in Section 2) requires parties i and j to agree to a policy in $[x_i, x_j]$. Policy X maximizes the surplus with respect to x, and equals $(x_i + x_j)/2$ when $c_i = c_j$. The agreed policies then follow because the surplus is strictly concave in x. The remainder of the Proposition follows by substituting the program into $v_i(x,y) + v_j(x,y)$.

Example 2.1 *Each party's payoff function is*

$$v_i(x,y) = c_i\alpha \ln[\ln(y_i + 1) + 1] - (1 - c_i)\beta(x - x_i)^2 - \gamma(\sum_l y_l)^2 + m_i$$

where α is close enough to 0.¥

If payoff functions satisfy Example 2.1 then a corrupt party would choose fewer graft than a coalition of two corrupt parties.

Proposition 5.1 (Equilibria) *Suppose that parties can commit to coalition partners and that preferences are almost linear.*

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 if $4(d + \theta) < \delta < \min\{4d + 8\theta, 16\theta/3\}$;*
- *L is in power if $4d + 8\theta < \delta$; and*
- *There is no pure strategy equilibrium if*

$$\max\{\frac{16}{3}\theta, 4(d + \theta)\} < \delta < 4d + 8\theta.$$

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 share power if $16\theta < \delta < 4d$; or $\theta < 2d$ and either $\min\{16\theta, 4(2d + \theta)\} < \delta$ or $8(2d + \theta) < \delta$;*
- *M and R share power if $\theta < 2d$ and $4(2d+\theta)\} < \delta < \min\{16\theta, 8(2d+\theta)\}$;*
- *R is in power if $4d < \delta$ and if $2d < \theta$ or $\delta < 4(2d + \theta)$; and*
- *There is no pure strategy equilibrium if $2\theta < \delta < \min\{16\theta, 4d\}$.*

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 cannot share power, and a coalition between L and R would lose the election; so M is in power in every equilibrium.

Now suppose that $4(d+\theta) < \delta$. 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 (possibly against a coaliltion of M and R) 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. Accordingly, suppose otherwise.

Lemma 2.1 implies that a corrupt party prefers to share power with a pure than with another corrupt party. Consequently, M and R only share power in an equilibrium if L loses the election after forming a coalition, else L and another party could profitably deviate by announcing each other: that is, if $\delta < 16\theta/3$. Both M and R prefer to share power over L being in power, so there is an equilibrium in which they form a coalition and share power if $4(d+\theta) < \delta < \min\{4d+8\theta, 16\theta/3\}$. Conversely, there is no pure strategy equilibrium if

$$\max\{\frac{16}{3}\theta, 4(d+\theta)\} < \delta < 4d+8\theta.$$

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. Proposition 3.1d implies that, absent any commitments, M is in power if $\delta < 4d$; L shares power with R if $\theta < 2d$ and $4(2d+\theta) < \delta$; and R is otherwise in power. Furthermore, a coalition of L and M would lose the election; a coalition of L and R would lose the election if $\delta < 2d$; and a coalition of M and R would lose the election if and only if $16\theta < \delta$.

Suppose that $\delta < 4d$. M cannot share power so, in any equiilibrium, 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. If $16\theta < \delta < 4d$ then L and R form a coalition in equilibrium because they win the election, and a coalition of M and R would lose the election. If $2\theta < \delta < \min\{16\theta, 4d\}$ then there is no pure strategy equilibrium.

Now suppose that $\theta < 2d$ and $4(2d+\theta) < \delta$. L and R then earn $-\beta(2d+\theta)/2$ if no coalitions form. L and R share power in equilibrium if a coalition of M and R would lose the election or if R prefers to share power with L than with M. These conditions are respectively satisfied if $16\theta < \delta$ and $8(2d+\theta) < \delta$. If neither condition holds then M and R form a coalition and share power in equilibrium.

If R is in power, absent any commitments, then either R is in power or L and M form a coalition and share power in any equilibrium. However, a coalition of L and M would lose the election, so R is in power in every equilibrium.¥