A Model of Spoils Politics*

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Abstract

Accounts of state failure in the developing world frequently highlight a logic of "spoils politics" in which an incumbent government and opposing forces vie for control of the state and the accompanying spoils. Governmental attempts to coopt or buy the opposition off play a key role in this logic, and an informational problem often complicates these efforts. Due to limitations on transparency, the incumbent government has a better idea about the actual size of the spoils than the opposition does. We formalize this aspect of spoils politics as a simple signaling game in which the government tries to buy the opposing faction off by offering a share of the spoils which the opposition can accept or reject by fighting. The government knows how large the spoils are, but the opposition only has a rough idea. The unique perfect Bayesian equilibrium satisfying a common refinement (D1) is fully separating but inefficient. The probability of breakdown increases as times become harder. This formal result parallels the strong empirical finding that the probability of civil war is higher when income is low. In addition to the effect of harder times on the probability of conflict, we also study the effects of uncertainty, the opposition's military strength, how destructive conflict is, and power-sharing agreements.

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Several cases of acute state failure in the last two decades have taken place in Africa where much of post-colonial politics has been dominated by the logic of "spoils politics." Under this logic, political power is primarily a means to appropriate the economic spoils associated with the administrative control of the state (Allen 1995, 1999). This logic emerges in the context of what are often called "neopatrimonial" states (van de Walle, 1994) where the line separating the ruler's private property and the state's property has been blurred. Rulers in these states often try to sustain their preeminence by coopting opposition forces (be they an opposition party, a different ethnic group, or armed strongmen). Rulers for instance may direct resources selectively and extra-officially, (e.g., through the granting of "plunder rights" as in Liberia (Reno 1997)) or they may support extensive patronage networks (e.g., public employment, as in Zambia (Bratton 1994) and Guinea (Ayittey 1998)). If unappeased, these opposition forces might eventually rebel in order to obtain a more favorable distribution of the spoils (van de Walle 2001). Indeed, efforts to buy opposing factions off frequently do fail and break down in coups or civil war. The logic of spoils politics and the struggle to control the state's resources have been a key element in the conflicts in Nigeria, Sierra Leone, Liberia, Angola, and Zaire.[1]

Attempts to buy an opposing faction off may fail in part because of a lack of transparency in the management of public resources. Indeed, a lack of transparency has been repeatedly blamed for facilitating corruption and fueling intrastate conflict. For example, Exxon in negotiating with the government of Chad over the right to extract oil is reported to have foreseen high levels of political risk stemming from the opaque management of revenues expected from the Chad government. In order to mitigate this risk, Exxon joined with the World Bank to force the government of Chad to relinquish sovereignty on the oil revenue. This revenue would then be transparently recorded and spent according to predetermined criteria beyond the reach of political factions (Thurow and Warren, 2003). More generally, concerns about a lack of transparency have led to various

[1] See Collier *et. al.* (2004) for a variety of papers examining the connection between conflict and material interests.

initiatives designed to improve transparency, especially over natural resource revenues.[2]

The lack of transparency creates an informational asymmetry as it allows officials to siphon off unknown amounts of public revenues and later decide what share to use towards securing internal acquiescence (van de Walle 1994 and Jensen and Wantchekon 2004). More simply, a lack of transparency means that a ruler has a better idea about the size of the spoils than the opposition does.

In this paper we formalize spoils politics in a simple way which nevertheless captures the elements highlighted by the specialized literature and described above. In our model, an incumbent government and an opposition faction vie for control of the state and the spoils that come with it. The government decides to divide the state's resources, but the opposition can challenge this allocation by fighting for control of the state and the accompanying spoils. This threat gives the government an incentive to try to buy off or co-opt the opposition. Importantly, the government is assumed to know the size of the spoils or "pie" while the opposition only has a rough idea about its size. The opposition knows, for example, whether times are "good" or "bad" (e.g., oil prices are high or low, the economy is booming or in recession, the country is developed or underdeveloped) and therefore whether the pie is on average large or small. But the opposing faction is unsure of precisely how large the spoils are in good times or how small they are in bad times.

If conflict is about resources and fighting destroys some of these resources, there is more to be divided between the parties if they avoid fighting. Hence, there is a division of the spoils that would make both better off than they will be if they fight. Why then do they sometimes fight? This is known as the "inefficiency puzzle of war" in international relations theory (Fearon 1995; Powell 2004, 2006), and our model highlights a vexing strategic problem that hampers a government's efforts to coopt an opposing faction when the former knows the size of the spoils and the latter does not.

If the opposition also knew the size of the pie, they would accept a low offer when the

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[2] Examples include the Extractive Industries Transparency Initiative (*The Economist* 2005, DFID a, nd.; DFID b, nd.) and the "Publish What You Pay" initiative which encourages oil companies to disclose their payments to African countries so that the volume of transactions becomes public knowledge (Harsch 2007).

pie is small because the payoff to fighting and, if victorious, capturing the surviving spoils is also small. But always accepting lower offers cannot be equilibrium behavior when the size of the pie is uncertain. If the opposition is sure to agree when offered little, nothing deters the government from low-balling the opposition, i.e., offering a small amount when the pie actually is large. To prevent this, the opposition must sometimes reject low offers and bargaining breaks down in inefficient fighting with positive probability. Thus, the lack of transparency may lead to costly, inefficient conflict between government and opposition over the allocation of the state's resources.

The present focus on asymmetric information about the size of the spoils to be divided contrasts with other work in international relations and comparative politics in which one bargainer is trying to buy another off to prevent the latter from resorting to force. In asymmetric-information models of international conflict, states are typically assumed to be uncertain about the cost of fighting or the distribution of power, not the size of the spoils (e.g., Fearon 1995, Powell 1999, Slantchev 2003). In complete-information models of political transitions (Acemoglu and Robinson 2001, 2006) or of long civil wars (Fearon 2004), the government and opposition also know the size of the spoils to be allocated between them and fighting results from a commitment problem resulting from large shifts in the distribution of power.[3]

The formal analysis allows us to address two central questions. First, under what circumstances is inefficient distributive conflict – fighting – more likely? Do hard times, more uncertainty, and a stronger opposition make for more fighting? Secondly, theories that rely on asymmetric information rarely ask under what conditions is asymmetric information likely to be endogenously resolved. We do so here by asking: under what circumstances will the government move towards a more transparent regime that, while eroding its informational advantage, eliminates inefficient conflict?

[3] The closest existing models to the one studied here are in economics. In Hart (1989), for example, a union and management are bargaining about the terms of a contract and managment has private information about the profitability of the firm (and hence the spoils to be divided). However, the union makes all of the offers in this game and thus there is no signaling which is the central focus of the present analysis.

The government-opposition model developed below is a standard signaling game with a continuum of types and actions. As is commonly the case with such games, multiple equilibria exist. However, only one of these equilibria is supported by "reasonable" beliefs off-the-equilibrium-path satisfying a common equilibrium refinement (Cho and Kreps' 1987 condition D1). This equilibrium is fully separating with the government's offer strictly increasing in the spoils. The larger the pie, the more the government offers. Because pies of different sizes lead to different offers, the opposition can infer how much there is to be divided as well as its payoff to fighting. Nevertheless, the opposing faction, although now certain of the size of the pie, fights with positive probability. The smaller the offer, the more likely the opposition is to fight. Fighting is inefficient but necessary for the opposition to discipline the government. Without the threat of a fight if offers are low, the government would yield to an opportunistic temptation to low-ball the opposition.

The equilibrium has an interesting empirical implication. Bargaining between the government and the opposing faction is more likely to break down during hard times for two reasons. First, if the actual size of the pie which only the government knows, is small relative to the expected or average size, which both the government and opposition know, then the offer will be lower and the probability of fighting higher. Second, worse distributions of the pie (i.e. a lower average pie, as in a poorer country) will also make for more fighting. This second result tracks econometric work on civil war which generally finds that poor economic conditions – hard times – make conflict more likely (e.g., Collier and Hoeffler 1998; Fearon and Laitin 2003; Miguel, Satyanath, and Sergenti 2004).

The reason why a smaller average pie makes for more fighting in our model is that the relative size of the government's opportunistic temptation is larger, and hence the opposition's need for disciplining the government through the threat of fighting is also larger. The model further predicts that a stronger opposition makes conflict more likely. This result resonates with Fearon and Laitin's (2003) explanation for the negative relation between income and conflict. They argue that wealthier countries have better repressive capabilities and as a result less insurgency. Low income therefore proxies for weak government and weak government leads to more conflict. In our model, the stronger the opposition or equivalently the weaker the government, the higher the probability of fighting.

Intuitively, a stronger opposition might make fighting either more or less likely. On the one hand, a stronger opposition is more willing to fight, and this should tend to increase the chances that conflict occurs. On the other hand, a stronger opposition should induce the government to offer more in order to appease the opposition, and this tends to make fighting less likely.[4] The formal model in this paper clarifies why harder times, a stronger opposition, and lower costs of fighting all make fighting unambiguously more likely and that they do so for the same basic reason. They exacerbate the strategic tension between the government and opposition by raising the size of the government's opportunistic temptation relative to the cost of fighting. Our model also allows us to study the effects of uncertainty, and we show that these are related to the strength of the opposition.

When asymmetric information leads to bargaining breakdowns, it is natural to ask why bargainers did not simply reveal their private information and eliminate the asymmetry. Although a natural one, this question is rarely asked. We do so here, and this helps shed some light on the interesting problem of power-sharing agreements.

The government in our model has an incentive to share its information with the opposition so as to avoid fighting. Why then does it not adopt more transparent institutions that reveal its private information to the opposition? We consider the case in which the only way to credibly share private information with the opposition is to bring the latter into the government through a power-sharing agreement. For instance, opposition members may have to be brought into parliament, onto the boards of state-controlled corporations, or given control of important ministries or parts of the military.[5] However, bringing the opposition into the government also makes it more powerful, i.e., it increases

[4] See Powell (1999, 83-85) for a discussion of the competing factors.

[5] For example, in addition to specifying how oil revenues and public employment would be divided, the 2004 Comprehensive Peace Agreement for Sudan also gave the head of the rebel movement the position of First Vice-President (see U. S. Department of State and Nield 2004). There is some empirical indication that power-sharing agreements involving important political positions play a role in ending conflicts, over and above what can be achieved by integrating rebels to the official army (Glassmyer and Sambanis 2006). On power sharing more generally, see Walter (2002).

the chances the opposition will prevail in the event of a fight.

This shift in the distribution of power creates a commitment problem. If the opposition could commit to not using its greater power to secure more of the spoils, the government would want to reveal the size of the spoils to the opposition. But the opposition's inability to commit to this creates a trade off between an informational and a commitment problem for the government. The former swamps the latter if the shift in power brought by power sharing is sufficiently small and the pie to be divided is small enough. In theses circumstances, the government focuses on the information problem which it solves by sharing power with the opposition.

The informational problem formalized here is much more general than that of a government trying to coopt an opposing faction. Those controlling an organization – be it a firm, committee, ministry, or the state – typically have better information about the organization's resources than outsiders do. Outsiders often have the ability to challenge the insiders for control of the organization and the resources that come with it. When they do, the insiders have an incentive to try to buy the outsiders off. Our analysis highlights an important problem which complicates these efforts and may lead them to inefficient breakdowns.

In this spirit, we generalize the government-opposition model to show that it is but one of a larger class of "coercive" signaling models in which D1 implies uniqueness and separation. That the types separate leads directly to an explicit characterization of the equilibrium strategies of any game in this class. The conditions defining this class of games are also quite simple, and checking to see if a signaling game satisfies them is very easy. The set of coercive signaling games includes models of war closely related to the one Fearon (1995) studies, and it includes models of litigation (e.g., Reinganum and Wilde 1986).

The Model and Equilibria

In order to prevent a challenge, the government must buy off or co-opt an opposing faction. To this end, the government begins the game knowing π, the size of the pie to be divided, and makes an offer $y \geq 0$ to the opposition which can accept the offer or fight. Accepting ends the game with the government and opposition receiving $\pi - y$ and y respectively.[6] Fighting destroys a fraction $1 - \sigma$ of the pie while a fraction σ survives. If the opposing faction wins, which it does with probability p, it gets the surviving spoils. If the government wins it keeps the surviving spoils. Thus the payoffs to fighting for the government and opposition are $(1-p)\sigma\pi$ and $p\sigma\pi$, respectively.

To formalize the informational asymmetry, let $\pi = c + r$ where r has mean 0 and is distributed over $[\underline{r}, \overline{r}]$ according to H which has a continuous and strictly positive density h over $(\underline{r}, \overline{r})$. The government knows c and r, but the rebels only observe c. The parameter c measures the general climate of the times. The larger c, the larger π is and the larger the rebels expect it to be (i.e., the larger $\int_{\underline{r}}^{\overline{r}} \pi dH = c + \int_{\underline{r}}^{\overline{r}} r dH$ is). Thus the opposition knows whether times are good or bad (i.e., the opposition knows c), but the opposition does not know precisely how good or bad the times are (i.e., what the value of $\pi = c + r$ is).

A pure-strategy for the government specifies the government's offer as a function of its private information about the spoils: $y : [\underline{r}, \overline{r}] \to [0, \overline{\pi}]$ where $\overline{\pi} = c + \overline{r}$.[7] A strategy for the opposing faction defines the probability that the opposition accepts as a function of the government's offer: $\alpha : [0, \overline{\pi}] \to [0, 1]$. As for what the opposition believes about the size of the spoils after receiving an offer, let Δ be the set of distributions over $[\underline{r}, \overline{r}]$ and let $\mu(x) \in \Delta$ for all $x \in [0, \overline{\pi}]$ denote the opposition's beliefs following an offer of x. Finally, a perfect Bayesian equilibrium (PBE) is a strategy profile (y, α) and beliefs μ such that the government can never profitably deviate from offering $y(\pi)$ given the opposition's strategy $\alpha(x)$; $\alpha(x)$ is a best reply to x given $\mu(r|x)$; and μ is derived from

[6] Strictly speaking, the government could offer more than there is to be divided ($y > \pi$) in which case the payoffs would be $\pi - \min\{y, \pi\}$ and $\min\{y, \pi\}$. However, these offers are strictly dominated and will never be made, so we simplify the notation by taking the payoffs to be $\pi - y$ and y and $y \leq \pi$.

[7] We will focus on equilibria satisfying D1, in which the government does not mix. We then ease the exposition by assuming that the government does not mix.

H and y via Bayes' rule.[8]

The game has infinitely many PBEs. In some, the government pools on a specific offer, i.e., the government makes the same offer regardless of the size of the pie. In other semi-separating equilibria, the government's offer varies with the spoils but does not fully reveal the exact size of the pie. In these equilibria, there are a set of cutpoints $\underline{\pi} = k_0 < k_1 < \cdots < k_N = \overline{\pi}$ and a set of ever more favorable offers $p\sigma\underline{\pi} \leq y_1 < \cdots < y_N \leq p\sigma\overline{\pi}$ such that the government proposes y_j if $\pi \in (k_{j-1}, k_j)$. And, there is a fully separating equilibrium in which the government's offer is strictly increasing in the size of the pie. Incentive compatibility ensures that the equilibrium offers are weakly increasing in the spoils and that larger equilibrium offers are generally more likely to be accepted than smaller offers (see Lemma 1 in the Appendix).

Although there is a surfeit of equilibria, only the separating equilibrium is predicated on reasonable out-of-equilibrium beliefs in the sense that they satisfy Cho and Kreps' (1987) condition D1. Roughly, D1 requires the opposition to discount the possibility of facing type η after an out-of-equilibrium offer z if another type η' would always to deviate to z whenever η does and sometimes even when η does not.[9]

The out-of-equilibrium-beliefs satisfying D1 turn out to be very simple. Suppose that there is a gap in the offer function $y(\pi)$, i.e., $y(\pi)$ jumps up discontinuously at π' from $\underline{y}(\pi')$ to $\overline{y}(\pi')$.[10] Since $y(\pi)$ is weakly increasing (by Lemma 1), no type offers any z in this gap, i.e., any z between $\underline{y}(\pi')$ to $\overline{y}(\pi')$. What then should the opposition believe following an out-of-equilibrium offer z? D1, given the underlying payoff structure of the game, says that after an out-of-equilibrium offer z, the opposition believes that it is facing the type

[8] Because the parameter c is common knowledge, we abuse the notation slightly by taking y to be a function of π in order to simplify the exposition. Defining PBE's with a continuum of types raises a number of technical issues. For example, no offer is made with positive probability in a separating equilibrium. Bayes' rule therefore places no restriction on the opposition's beliefs following any offer. It suffices for the present analysis to assume that if the nonempty set of types offering z has zero measure, then the support of the opposition's beliefs following z is contained in the closure of the set $\{\pi : y(\pi) = z\}$. See Ramey (1996) for a definition of a sequential or perfect Bayesian equilibrium with a continuum of types.

[9] Unlike D1, Cho and Kreps' Intuitive Criterion has no bite in this game.

[10] Lemma 1 ensures that the offers are weakly increasing, so any jump in y must be up.

whose equilibrium offer is closest to z, namely π'. (See Lemma 2 in the Appendix.)

The key implication of D1 is that no two types can pool on the same offer in equilibrium. Hence, each type must make a different offer and the equilibrium is fully separating (see Lemma 3 in the Appendix). The remainder of this section characterizes the unique equilibrium strategies in any PBE satisfying D1.[11]

That the government separates implies that the opposition can infer π and hence its payoff to fighting, $p\sigma\pi$, from the government's offer $y(\pi)$. That the opposition must reject lower offers with higher probabilities in order to deter low-ball offers implies that the opposition must be indifferent between accepting and fighting. Otherwise the opposition could not randomize over these alternatives. Hence, the payoff to accepting $y(\pi)$ and fighting must be the same or $y(\pi) = p\sigma\pi$.

As for the opposition's acceptance strategy $\alpha(y)$, offering $y(\pi) = p\sigma\pi$ must be a best reply to $\alpha(y)$ in equilibrium, and this pins down what α has to be. To sketch the argument, let $y = p\sigma\pi$ and $\widehat{y} = p\sigma\widehat{\pi}$ with $\pi^+ < \pi < \widehat{\pi}$. Because no type can profitably deviate,

$$\begin{aligned}\alpha(y)(\pi - y) + (1-\alpha(y))\,(1-p)\sigma\pi &\geq \alpha(\widehat{y})(\pi-\widehat{y}) + (1-\alpha(\widehat{y}))\,(1-p)\sigma\pi \\ \alpha(\widehat{y})(\widehat{\pi}-\widehat{y}) + (1-\alpha(\widehat{y}))\,(1-p)\sigma\widehat{\pi} &\geq \alpha(y)(\widehat{\pi}-y) + (1-\alpha(y))\,(1-p)\sigma\widehat{\pi}.\end{aligned}$$

Rewriting these inequalities and using the expressions for the government's offers to eliminate π and $\widehat{\pi}$ gives

$$\frac{\alpha(\widehat{y})p\sigma}{y(1-\sigma)} \geq \frac{\alpha(\widehat{y})-\alpha(y)}{\widehat{y}-y} \geq \frac{\alpha(y)p\sigma}{\widehat{y}(1-\sigma)}.$$

Letting $\widehat{y}$ go to y then yields

$$\frac{\alpha'(y)}{\alpha(y)} = \frac{p\sigma}{y(1-\sigma)}. \tag{1}$$

[11] The equilibrium strategies are unique in any equilibrium satisfying D1. But a multiplicity of equilibrium beliefs satisfy D1, because this condition does not pin down the opposition's beliefs if the offer is below $p\sigma\underline{\pi}$ or above $p\sigma\overline{\pi}$. The opposition in both cases has a unique best-response to the offer regardless of what it believes about the government, namely accept if $x < p\sigma\underline{\pi}$ and fight if $x > p\sigma\overline{\pi}$. This deprives D1 of any power to eliminate any types.

Solving this differential equation with the boundary condition $\alpha(p\sigma\overline{\pi}) = 1$ leads to $\alpha(y) = [y/(p\sigma\overline{\pi})]^{\sigma p/(1-\sigma)}$.[12]

PROPOSITION 1: *The unique equilibrium strategies in any PBE satisfying D1 are* $y(\pi) = p\sigma\pi$ *and* $\alpha(y) = 0$ *if* $y < p\sigma\underline{\pi}$, $\alpha(y) = [y/(p\sigma\overline{\pi})]^{\sigma p/(1-\sigma)}$ *if* $p\sigma\underline{\pi} \leq y \leq p\sigma\overline{\pi}$, *and* $\alpha(y) = 1$ *if* $y \geq p\sigma\overline{\pi}$.

Proof: See the proof of Proposition 6 in the Appendix.

In words, in the unique PBE satisfying D1 the government offers the opposition exactly the latter's certainty equivalent for fighting given the prevailing state of nature. The opposition is sure to accept the offer associated with the largest possible pie ($\alpha(p\sigma\overline{\pi}) = 1$) but fights if offered anything less. The lower the offer, the more likely the opposition is to fight. Notably, in the separating equilibrium the government ends up offering the same it would offer if information about the state of nature were symmetric to begin with, and in equilibrium the opposition learns that private information through the offer made by the government. However, the opposition fights with positive probability because it needs to discipline the government into not making low-ball offers.

Comparative Statics: What Makes for More Fighting?

Empirical evidence indicates that hard times make civil war and political conflict in general more likely. There is a strong negative relation between income and the likelihood of civil war (e.g., Collier and Hoeffler 2004; Fearon and Laitin 2003; Miguel, Satyanath, and Sergenti 2004). Low income also makes coups more likely (Londregan and Poole 1990), and recessionary crises tend to undermine democratic regimes (Gasiorowski 1995). Among other things, in this section we show that the empirical effects of income on conflict can be unbundled into different but complementary effects. This unpacking of the income-conflict connection is useful not just for understanding the nature of that link, but also for guiding empirical research.

Hard times make conflict more likely in the model as do a stronger opposition and lower costs of fighting. Proposition 2 formalizes the comparative statics of the equilibrium

[12] If $\alpha(p\sigma\overline{\pi}) < 1$, then $\overline{\pi}$ could profitably deviate by offering slightly more than $p\sigma\overline{\pi}$ which would be accepted for sure.

described in Proposition 1.

PROPOSITION 2: *Hard times (low expected income c), a strong opposition (high p) and less destructive conflict (higher σ) make fighting more likely.*

Proof: Recalling that $\pi = c + r$ with r distributed according to H over $[\underline{r}, \overline{r}]$, the probability of fighting is,

$$F = \int_{\underline{r}}^{\overline{r}} \left[1 - \left(\frac{c+r}{c+\overline{r}} \right)^{\frac{p\sigma}{1-\sigma}} \right] dH(r).$$

The integrand $I = 1 - [(c+r)/(c+\overline{r})]^{p\sigma/(1-\sigma)}$ is decreasing in c ($\partial I/\partial c < 0$). Bad times (lower values of c) therefore make fighting more likely ($\partial F/\partial c < 0$). The integrand is increasing in both p and σ. So a stronger opposition makes for more fighting ($\partial F/\partial p > 0$) while lower costs to fighting (i.e., a higher surviving fraction σ) lead to more fighting ($\partial F/\partial \sigma > 0$). ■

Two comments about the comparative statics are in order. The first centers on the interpretation of "hard times" as a low value of c rather than a low realization of r. The second remark provides some intuition for the comparative static results. We then specify how income could have both a direct and an indirect effect on conflict.

One might think of hard times as a negative value of r which makes the realized pie $\pi = c + r$ smaller than its average value of c. Incentive compatibility then implies (via Lemma 1 in the Appendix) that the probability of acceptance is weakly increasing in r. Thus hard times in the sense of a low r makes fighting weakly more likely. Moreover, this relation holds in every PBE because it is derived from incentive compatibility conditions that all PBEs must satisfy. By contrast, the fact that hard times in the sense of a low c makes conflict more likely only holds (or at least has only been shown to hold) in the particular equilibrium described in Proposition 1.

Why focus on the comparative statics involving c rather than the more general results for r? The reason is that the former are more in keeping with the econometric evidence linking hard times to political conflict. In these studies, most of which involve cross-country regressions, both the government and opposition know that the country is poor or rich. Government and opposition also know whether the state is strong or weak and generally lacking in repressive capabilities. These conditions are common knowledge at the outset and define the strategic arena in which the interaction between the government and opposition plays out.

In the model, the climate of the times c is part of the backdrop; it is common knowledge when play begins. If c is low, both sides know that times are hard when they try to divide what spoils there are. If, by contrast, hard times were defined as a low r, then the general conditions would not be part of the backdrop. It would not be true that both sides know whether times were good or bad. Thus although they are less general than the incentive compatibility results on r, the comparative statics on c in a specific equilibrium are of interest because they provide a more natural formal referent for the empirical findings.

The second remark offers some intuition for the comparative statics summarized in Proposition 2. Formal work in international relations theory shows that the relation between the distribution of power and the probability of fighting is ambiguous in general because of two competing pressures. As an actor gets weaker, it is more likely to accept any given offer and this tends to make fighting less likely. But as the other actor gets stronger, it demands more, and this tends to increase the probability of fighting. These opposing factors exactly cancel each other out in Fearon's (1995) model of war. But this is not a general result. Powell (1996), for example, finds that the probability of fighting increases as the distribution of power diverges from the distribution of benefits.[13]

In the government-opposition model analyzed here, the probability of fighting unambiguously goes down as the opposition weakens (p falls). Indeed, the probability that the opposition will accept the government's offer, $[(c+r)/(c+\overline{r})]^{p\sigma/(1-\sigma)}$, goes to one as p goes to zero regardless of the value of r. The reason for this is rooted in the strategic tension at the heart of the model. When the opposition is almost powerless the government need only pay a very small amount to keep the opposition from fighting. (In the limit when $p = 0$, the government's offer of the opposition's certainty equivalent $p\sigma\pi$ is zero regardless of the state of nature.) Thus, when p is very low, the government's temptation to low-ball the opposition is also very low. After all, being sure of buying the opposition

[13] See Powell (1999, 104-110) and Wagner (1994) on the relation between the distribution of power and the probability of war.

off by offering $p\sigma\overline{\pi}$ is nearly costless when p is small. That means the opposition need not threaten with high fighting probabilities to prevent the government from making low offers. Thus, a weak opposition goes hand in hand with low chances of conflict.

A similar rationale lies behind the results for the comparative statics on σ and c. If the cost of fighting is very high (σ is close to zero), the cost of offering enough to be certain of buying the opposition off, $\sigma p\overline{\pi}$ is again very small. Hence the temptation to low ball the opposition is small and a small probability of fighting is enough to deter the government from making low-ball offers. As for the effects of c, a higher c shifts the whole distribution over π upwards, and this too reduces the government's temptation to low-ball the opposition. Relative to the size of the pie $\pi = c + r$, the gain to be had by risking war in order to convince the opposition that the size of the pie is at some lower value $\pi' = c + r'$ (with $r' < r$) is $(\pi - \pi')/\pi = (r - r')/(c + r)$ which decreases as c increases.

Our model can help discern between two complementary effects that higher income per capita may have on conflict. First, there is a direct effect, as captured by changes in c, working through the raw incentives of the two players. Second, there can be an indirect effect if the strength of the opposition p goes down as average income c gets larger, because we have shown that weaker opposition and stronger government lead to less conflict. Therefore, empirical work studying the connection between income and conflict should take into account that there can be two separate effects of income, one of which is mediated by the (potentially endogenous) strength of the opposition. This unbundling of the effects of income on conflict helps frame the debate on why poorer nations have more conflict by categorizing different arguments as pertaining to the direct vs indirect effects of income. According to one class of arguments (e.g., Collier and Hoeffler 1998), more income reduces conflict because it makes players' incentives less conflict-prone (as with our c-driven effects). For others (notably, Fearon and Laitin 2003) the reason is that wealthier countries have stronger governments, and hence, in relative terms, weaker oppositions. Note that the latter argument contains two parts. One is that more national wealth translates into a weaker opposition, and the other one is that weak oppositions make for less conflict. Our comparative static on p offers a formal proof for the second part of that argument. Our model can easily incorporate the first part by endogenizing p as a negative function of c.

Previous work in political economy has emphasized that regime transitions (which are usually associated to a form of conflict, namely coups) are more likely during recessions, although in a different context. Acemoglu and Robinson (2001) analyze a dynamic model where an elite lacks commitment to future redistributive transfers. In their setup, democratization may be followed by coups engineered by the displaced elite. Coups are more likely during recessions due to lower opportunity costs of staging a coup (see also Acemoglu and Robinson, 2006 for related treatments). Our model emphasizes an informational problem–rather than a commitment one–that arises even in a static environment.

Turning to the role of uncertainty, greater uncertainty makes fighting weakly more likely when the opposition is weak. By contrast, the effects of greater uncertainty on the probability of fighting are ambiguous when the opposition is strong. Formally, assume that the distribution of benefits is $\pi = c + s$ where s is distributed over $[\underline{s}, \overline{s}]$ according to the cumulative distribution G. Assume further that the spoils when distributed according to H are more uncertain than when distributed according to G in the sense that G second-order stochastically dominates H.[14] Then,

Proposition 3: *If the opposition is sufficiently weak (i.e. if $p \leq (1-\sigma)/\sigma$) and the distribution of spoils H is more uncertain than G in the sense that G second-order stochastically dominates H, then the probability of conflict is weakly higher with the more uncertain spoils H than with G.*

Proof: See Appendix.

Power Sharing: Why Not Reveal the Size of the Pie?

The opposition fights because it has to deter the government from bluffing, i.e., making low offers when the spoils are relatively large. Why is conflict, and the informational roots driving it, so hard to eliminate? Suppose there were some way the government could reveal the size of the pie to the opposing faction that was not vulnerable to misrepresentation.

[14] See Mas-Collel, Whinston and Green 1995, 197-99) on second-order stochastic dominance.

Then the government would reveal the spoils in this way because it would increase the government's payoff. If, more specifically, the government verifiably reveals the size of the pie to the opposing faction before offering that faction its certainty equivalent $p\sigma\pi$, the opposition would accept this offer for sure rather than with probability that is smaller than one (i.e., $\alpha(p\sigma\pi) = (\pi/\overline{\pi})^{p\sigma/(1-\sigma)} < 1$).[15] As a result, verifiably revealing the spoils would raise the government's payoff from $\alpha(p\sigma\pi)(\pi - p\sigma\pi) + [1 - \alpha(p\sigma\pi)](1-p)\sigma\pi = \pi(1-p\sigma) - [1-\alpha(p\sigma\pi)]\pi(1-\sigma)$ to $\pi(1-p\sigma)$. Why, then, does the government not verifiably reveal its private information?

One answer may be that there is simply no way to reveal private information that is not vulnerable to bluffing. An alternative is that there are ways to credibly reveal information, but those are typically costly for the government so the latter may eliminate its private information only rarely. Here we examine one such alternative and ask under what conditions, if any, would the government eliminate its own private information. Suppose that the government cannot credibly commit to transparent institutions which would reveal the size of the pie to outsiders, but the government can reveal the size of the pie to the opposition by bringing it inside – possibly through some sort of power-sharing arrangement. However, revealing information in this way is costly. In particular, giving opposition elements positions of influence also shifts the distribution of power in the opposition's favor by increasing the probability it prevails from p to $p + \psi$.

This shift introduces a commitment problem alongside the original informational problem. If the opposition could commit to accepting $p\sigma\pi$ and to not exploiting its enhanced bargaining power, then the government would reveal the spoils, the opposing faction would accept the government's offer, and there would be no fighting. But the opposition cannot commit to this and will fight if offered anything less than $(p+\psi)\sigma\pi$. Thus,

[15] Although the opposition is indifferent between accepting its certainty equivalent and fighting, it accepts for sure for the same reason that it is sure to accept this offer in a complete-information, take-it-or-leave-it-offer game. If the government has verifiably revealed the spoils to be π, then the opposition accepts any $z > p\sigma\pi$ with probability one as it is sure to do strictly better by accepting than by fighting. But if in turn it does not accept $z = p\sigma\pi$ for sure, then the government has no best reply to the opposing faction's strategy, and this strategy cannot be part of an equilibrium.

verifiably revealing the spoils to the opposition also raises the cost of buying it off from $p\sigma\pi$ to $(p+\psi)\sigma\pi$. When this cost is too large, we will show that the commitment problem swamps the informational problem, and the government foregoes the opportunity to reveal the spoils.

To formalize these issues, assume that the government can reveal the spoils to the opposition by sharing power or it can make an offer to the opposing faction. If the government shares power, the game ends with payoffs $\pi - (p+\psi)\sigma\pi$ and $(p+\psi)\sigma\pi$ for the government and opposition respectively. (These are the payoffs that would result if the size of the pie were known to both at the outset of the game.) If the government makes an offer rather than sharing power with the opposition, the game proceeds as before, and we again focus on equilibria of the game under asymmetric information that satisfy D1. The only difference is that, in equilibrium, the opposition must have consistent beliefs about the distribution of the pie in the respective events in which power is shared and when it is not. Then,

Proposition 4: *If times are bad enough and the shift in power is small enough, i.e., if* $\pi < \overline{\pi}\left[(1-\sigma-\psi\sigma)/(1-\sigma)\right]^{(1-\sigma)/(p\sigma)} \equiv \overline{\pi}\chi$ *then the government shares power in equilibrium. Otherwise, the government keeps power and makes an offer as in the original game.*

Proof: If the game after no power sharing is played in a way that satisfies D1, the unique perfect Bayesian equilibrium takes the form stated in the proposition. A proof of this uniqueness result is available upon request. Here we simply demonstrate that the strategy in the Proposition is indeed part of a PBE. The payoff from sharing power and thereby avoiding any risk of fighting is $\pi[1-(p+\psi)\sigma]$ while the expected payoff from playing the game with private information is $\alpha(p\sigma\pi)\pi(1-p\sigma) + [1-\alpha(p\sigma\pi)](1-p)\sigma\pi$ where $\alpha(p\sigma\pi) = (\pi/\overline{\pi})^{p\sigma/(1-\sigma)}$. Algebra demonstrates that former payoff is larger than the latter if and only if the condition stated in the proposition holds. ■

As said above, one way to interpret this result is in terms of an informational vs commitment trade-off. An alternative view is that the shifting distribution of power along with the opposition's inability to commit create a trade off between the efficiency gains and distributive costs for the government. Sharing power solves the inefficiency problem which benefits the government as it alone pays the efficiency costs. But sharing power also affects the distribution of the spoils as the now more powerful opposition can claim a larger fraction of the pie. If the distributive costs to the government are too high, it will prefer the larger share of the (in expectation) smaller pie to the smaller share of the larger pie.[16] The government will forego the opportunity to resolve the inefficiency.

Our results on power sharing yield several testable hypothesis. Proposition 4 implies that power sharing will occur if and only if $\pi < \overline{\pi}\chi$. Hence, the probability that the government shares power is $\Pr(\pi < \overline{\pi}\chi) = \Pr[r < \chi\overline{r} - c(1-\chi)] = H[\chi\overline{r} - c(1-\chi)]$.

PROPOSITION 5: *The probability of power sharing increases when:*
(i) *The opposition becomes stronger (i.e., p goes up);*
(ii) *The climate of the times gets worse (i.e., c goes down);*
(iii) *The highest possible value of the spoils is larger (i.e., when $\bar{r}$ goes up).*

Proof: See the Appendix.

The last proposition implies that there is a subtle difference in the effects that different income-related magnitudes have on power sharing. An increase in average income c makes power sharing less likely, while an increase in the highest potential income shock $\bar{r}$ makes power sharing more likely. Note also that power sharing never occurs if the induced shift in power ψ is too large. In particular, when the power shift is too large (i.e., when $\psi > [(1-\sigma)/\sigma]\left[1-(\underline{\pi}/\overline{\pi})^{p\sigma/(1-\sigma)}\right]$) we have $\underline{\pi} > \overline{\pi}\chi$ and the probability of power sharing $\Pr\{\pi < \overline{\pi}\chi\}$ is zero.

A More General Model

The strategic problem examined in this paper is more general than that confronting an incumbent government and an opposing faction. Those controlling an organization – be it a firm, committee, ministry, or the state – typically have better information about the organization's resources than outsiders do. If these outsiders have the ability to challenge the insiders for control of the organization and its spoils through a costly conflict, the insiders have an incentive to try to buy the outsiders off. The outsiders in turn must

[16] The larger share of the smaller pie is $\alpha(p\sigma\pi)(\pi - p\sigma\pi) + [1-\alpha(p\sigma\pi)](1-p)\sigma\pi = [(1-p)\sigma + \alpha(1-\sigma)]\pi$.

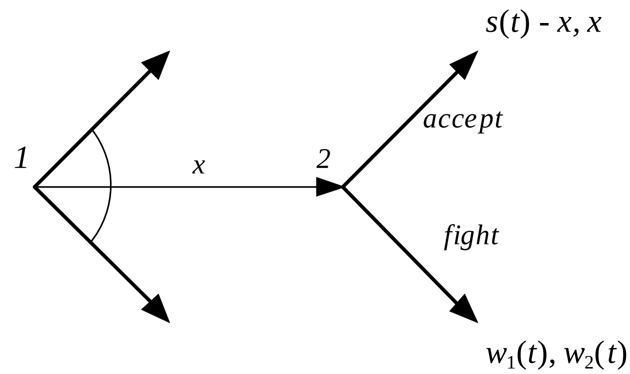

Figure 1: A General Coercive Signaling Game

be concerned about low-ball offers. Indeed, the dilemma is still more general as the model of war below illustrates. If one player has private information about the value of the other player's payoff to rejecting the former's offer (say by fighting or walking away from negotiations), then the latter player must be concerned about low-ball offers. This section formalizes a class of "coercive" signaling games in which the sender has private information about the receiver's payoff to rejecting the sender's offer to divide the pie. We then illustrate our more general results with models of war and litigation.

Let Γ be the class of signaling games in which the sender (player *1*) knows t which defines the situation facing the actors. The receiver believes t is distributed according to H which has a continuous and strictly positive density over $(\underline{t}, \overline{t})$. In the example above, t was the size of the spoils. The sender then proposes a division x of the spoils $s(t)$ as illustrated in Figure 1 where $x \leq s(\overline{t}) - w_1(\overline{t})$.[17] The receiver (player *2*) can accept this offer or try to impose a settlement through the costly use of some form of power. Accepting ends the game in payoffs $s(t) - x$ and x for *1* and *2*, respectively. Fighting ends the game in an inefficient outcome with payoffs $w_1(t)$ and $w_2(t)$ where s, w_1, and w_2 are assumed to be continuously differentiable.

These functions satisfy three additional conditions: Fighting is inefficient, i.e., $w_1(t) + w_2(t) < s(t)$ for all $t \in [\underline{t}, \overline{t}]$. The receiver's payoff to fighting is increasing in t, $w_2'(t) > 0$.

[17] This restriction on x simplifies the notation and parallels the restriction in footnote 6, but it is not essential.

And, the difference between the spoils and the sender's payoff to fighting is increasing, $s'(t) - w_1'(t) > 0$.[18] These conditions capture what we call a coercive signaling game. The most general feature of a coercive signaling game is that a fight occurs whenever the uninformed player rejects the offer made by the informed player. Fighting is essentially defined by the presence of dead weight losses: play following a rejection is inefficient because aggregate payoffs are lower than they would have been following an agreement. The more specific conditions are that the informed player's potential gains from peace are larger in better states of nature, and that fighting for a larger pie should in expectation be better for the uninformed player than fighting for a smaller pie.

Definition 1: *A signaling game γ is coercive if: (i) $s(t)$, $w_1(t)$, and $w_2(t)$ are continuously differentiable; (ii) $s'(t) - w_1'(t) > 0$ and $w_2'(t) > 0$; and (iii) $w_1(t) + w_2(t) < s(t)$ for all $t \in [\underline{t}, \bar{t}]$.*

The receiver in this game faces the same dilemma in any coercive signaling game as the opposition does in the example above. If the value of t were common knowledge and the receiver was weak (t is small), the receiver's expected payoff to fighting would be low and it would accept a low offer. But if the receiver is unsure of t and hence $w_2(t)$, it needs to deter the sender from making low offers when t is high. To do this, the receiver must reject offers less than $w_2(\bar{t})$ with positive probability. The probability of fighting and the corresponding probability of acceptance are given by the solution to a differential equation analogous to (1) above. More precisely,

Proposition 6: *Let γ be a coercive signaling game. Then PBEs satisfying D1 exist and the unique strategies in them are:*[19] *$y(t) = w_2(t)$ for all $t \in [\underline{t}, \bar{t}]$; $\alpha(x) = 0$ if $x < w_2(\underline{t})$; $\alpha(x) = 1$ if $x > w_2(\bar{t})$; and*

$$\int d \ln \alpha(x) = \int \frac{w_2'(\tau) d\tau}{s(\tau) - w_1(\tau) - w_2(\tau)}$$

for $w_2(\underline{t}) \leq x \leq w_2(\bar{t})$. This expression along with the boundary condition $\alpha(w_2(\bar{t})) = 1$

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[18] Alternatively, we could denote the types by $w_2 \in [\underline{w}_2, \overline{w}_2]$ and assume $d[s(w_2) - w_1(w_2)]/dw_2 > 0$.

[19] D1 does not pin down *2*'s beliefs if $x < w_2(\underline{t})$ or $x > w_2(\bar{t})$. In both cases, *2* has a unique best response regardless of its beliefs, namely, fight if $x < w_2(\underline{t})$ and accept if $x > w_2(\bar{t})$. This deprives D1 of any power to eliminate any types.

gives

$$\alpha(x) = \exp\left[-\int_{w_2^{-1}(x)}^{\bar{t}} \frac{w_2'(\tau)d\tau}{s(\tau) - w_1(\tau) - w_2(\tau)}\right]. \tag{2}$$

Proof: See the appendix.

Two examples illustrate the proposition.

War and uncertain military power: Suppose two states, S_1 and S_2, are bargaining about revising the territorial status quo. S_1 makes a take-it-or-leave-it offer $x \in [0, 1]$ to S_2 who can accept or reject by fighting. Accepting ends the game with payoffs $1 - x$ and x for S_1 and S_2. Fighting destroys a fraction $1 - \sigma$ of the value of the territory with the winner taking what is left. The payoffs to fighting are therefore $(1 - p)\sigma$ and $p\sigma$ for S_1 and S_2 where p is the probability that S_2 prevails. However, the distribution of power p is uncertain. In particular, $p = \widehat{p} + \varepsilon$ where ε is distributed over $[\underline{\varepsilon}, \overline{\varepsilon}]$ according to G with mean zero. S_1 begins the game knowing the balance of power, i.e., S_1 knows ε, but S_2 does not.

This formulation parallels Fearon's (1995) model of inter-state bargaining but with two differences. First, the informed state makes the offer here whereas the uninformed state makes the offer in Fearon's game. Second, the uninformed party is uncertain about the distribution of power here and not about the rival's cost of fighting as in Fearon's formulation. Formally, the present model entails correlated values whereas Fearon's set up and much of the existing work in international relations entails independent private values. More substantively, the source of uncertainty highlighted here is more in keeping with Blainey (1983) who argues that "wars usually begin when fighting nations *disagree* on their relative strength" (1973, 122).

Because S_1 knows whether it is strong or weak, S_2 uncertain about the distribution of power and hence its payoff to fighting. It must therefore try to deter S_1 from claiming to be strong and offering little when S_1 actually is weak. Formally, S_2 fights with positive probability in response to all $x < (\widehat{p} + \overline{\varepsilon})\sigma$ in order to deter S_1 from making low offers when S_2 is strong (ε is large). To determine the corresponding probability of acceptance, take $s(\varepsilon) = 1$, $w_1(\varepsilon) = [1 - (\widehat{p} + \varepsilon)]\sigma$, $w_2(\varepsilon) = (\widehat{p} + \varepsilon)\sigma$. It follows that $w_2' = \sigma$,

$s(\varepsilon) - w_1(\varepsilon) - w_2(\varepsilon) = 1 - \sigma$, $w_2^{-1}(y) = y/\sigma - \widehat{p}$, and, by Proposition 6, $y(\varepsilon) = (\widehat{p} + \varepsilon)\sigma$ with $\alpha(y) = \exp\left[-\int_{y/\sigma-\widehat{p}}^{\overline{\varepsilon}} [\sigma/(1-\sigma)] d\varepsilon\right] = e^{[y-y(\overline{\varepsilon})]/\sigma}$.

Litigation: Models of litigation and conflict are closely related. In each, one actor threatens to use coercive force – legal or military – to impose a settlement. But the use of force is costly and the resulting outcome is *ex post* inefficient. (Powell (1999, 216-19) discusses the parallel between models of litigation and war.)

The second example is Reinganum and Wilde's (1986) model of litigation. A plaintiff, P, has private information about the damages d it has suffered and makes a settlement offer of x to the defendant D. The defendant is unsure of d but believes it to be distributed over $[\underline{d}, \overline{d}]$ according to the strictly increasing distribution $G(d)$. The defendant can accept the demand or fight by going to court.

If the plaintiff proposes x and the defendant agrees, the game ends with payoffs $-x$ and x for P and D, respectively. If D refuses x, and the case goes to court, the court finds in favor of the plaintiff with probability π and awards td to her. Litigation costs the plaintiff c_P and the defendant c_D, and the parameters π, t, c_P, and c_D are common knowledge. The payoffs to going to court are therefore $\pi td - c_P$ for the plaintiff and $-\pi td - c_D$ for the defendant.

Unsure of the actual damages, the defendant must deter large demands when the actual damages are small. To appeal to Proposition 6, let $s(d) = 0$, $w_1(d) = \pi td - c_P$, and $w_2(d) = -\pi td - c_D$. Because $w_2' = -\pi t < 0$, redefine the type-space via $\phi = \overline{d} - d \in [\underline{\phi}, \overline{\phi}] = [0, \overline{d} - \underline{d}]$ where ϕ is the difference between the worst-case damages and the actual damages. Larger ϕ therefore mean higher payoffs for the defendant. Now define $\widehat{w}_2(\phi) \equiv w_2(d) = -\pi t(\overline{d} - \phi) - c_D$, $\widehat{w}_1(\phi) \equiv w_1(d) = \pi t(\overline{d} - \phi) - c_P$, $\widehat{s}(\phi) = s(d) = 0$, and observe $\widehat{w}_2' = \pi t > 0$ and $\widehat{s}'(\phi) - \widehat{w}_1'(\phi) \equiv \pi t > 0$. Proposition 6 then implies that the plaintiff demands $y = w_2(d) = \widehat{w}_2(\phi)$ and the probability of acceptance satisfies

$$\int d \ln \alpha(x) = \int \frac{\pi t d\tau}{c_P + c_D}.$$

Hence the probability that a case goes to court is

$$1 - \alpha(x) = 1 - \exp\left[-\frac{\pi t(\overline{\phi} - \phi)}{c_P + c_D}\right] = 1 - \exp\left[-\frac{\pi t(d - \underline{d})}{c_P + c_D}\right],$$

which is what Reinganum and Wilde (1986, 562) report.

The results summarized in Proposition 6 are closely related to previous work on D1 in signaling games. Cho and Sobel (1990) show that D1 implies uniqueness and separation in monotonic signaling games with finitely many types.[20] Ramey (1996) extends Cho and Sobel's analysis to signaling games with a continuum of types, the sender's and receiver's strategies are elements of $\mathbb{R}^n$ and $\mathbb{R}$ respectively, and the game satisfies a more general monotonicity condition. (Mailath 1987 also analyses separating equilibria in signaling games with a continuum of types.) Cho and Sobel (1990) observe that D1 implies uniqueness and separation in many models that are non-monotonic (e.g., Reinganum and Wilde 1986), and in which the sender's action space is a closed interval, and the receiver has two responses (e.g., accept or fight). The results derived above complement those analyses by identifying a set of continuous-type, non monotonic, signaling games which is easier to characterize than Cho and Sobel's set and in which D1 implies uniqueness and separation.

Conclusion

In this paper we offer a formal model of spoils politics. In spoils politics governments and opposing factions vie for control of the state and the spoils that come with it. Because of an absence of checks and balances, as well as limitations on transparency, governments tend to have discretion over the allocation of resources and an informational advantage regarding the true value of those resources. (For example, the government knows more about how much oil the national oil company is extracting). But the opposing faction typically has the ability to rebel if the allocation proposed by the government is deemed

[20] Roughly, a signaling game is monotonic if whenever one type prefers the receiver to take action a rather than a' following a given signal, then all types prefer a to a'. In addition to monotonicity, several other conditions are needed. See Cho and Sobel's Proposition 4.5 (1990, 399).

inappropriate. Therefore, governments decide the allocation of resources with an eye towards buying off the opposition and thus avoiding a challenge.

These factors create a vexing strategic problem for the government and the opposing faction vying for control of the state. Formalizing the interaction between government and opposition as a signaling game highlights and helps to answer two important questions. First, what makes conflict more likely? Do more (in expectation) resources, more destructive conflict technologies, or a stronger opposition make for more conflict? One might have supposed, for example, that a stronger opposition could lead to less conflict because the government will be more willing to offer more in order to buy the opposition off. The formal analysis shows this is not the case. Harder times, a stronger opposition, and lower costs to fighting all make fighting more likely for the same fundamental reason. They increase the value to the government of exploiting its private information relative to the cost of fighting. The effects of uncertainty on the probability of fighting depend on the strength of the opposition. If the opposition is weak enough, more uncertainty leads to more conflict.

The second question, which is relevant to any theory where asymmetric information creates inefficiency, relates to the incentives facing the informed party to share its private information and eliminate inefficiency. Sometimes the only bluff-proof way to reveal the spoils to the opposition may be by giving members of the opposing faction influential positions in government. This, however, may make the opposition more powerful and thereby create a commitment problem. If the opposition could commit to not exploiting its more powerful position, the government would reveal the information to the opposition by bringing it into the government. But if the opposition cannot commit, the government faces both an information and a commitment problem. The former dominates the latter and the government shares power with the opposition when the efficiency gains which the government alone captures are large enough relative to the distributive shift induced by the change in the distribution of power. This occurs if the shift in power towards the opposition is sufficiently small and times are bad enough.

Finally, the government-opposition signaling game can be seen as one example of a larger class of coercive signaling games in which the sender has private information about the value of the receiver's outside option. This class includes models of war and litigation. In these games distributive struggles become inefficient when outsiders (the receiver) have to deter low-ball offers from insiders (the sender) who have private information and cannot commit not to exploit it. The larger the insiders' temptation to exploit their private information, the more likely conflict becomes.

Appendix

The government-opposition game is an element of the more general set of coercive signaling models. We therefore establish our results with respect to this more general class. The analysis begins with three lemmas and then a proof of Proposition 6 which describes the D1 equilibria of any coercive signaling game. (Proposition 1 which formalizes the equilibrium of the government-opposition game is a special case of Proposition 6). After characterizing the equilibrium in Proposition 6, we prove the comparative static results described above in Propositions 3 and 5.

Incentive compatibility ensures that the equilibrium offers are weakly increasing in the spoils and that larger equilibrium offers are generally more likely to be accepted than smaller offers. More formally:

LEMMA 1: *Let* $(y(t), \alpha(x); \mu(x))$ *be a PBE of a* $\gamma \in \Gamma$ *with* $y' = y(t')$, $y'' = y(t'')$, *and* $t' < t''$. *Then:*
(i) $\alpha(y'') \geq \alpha(y')$;
(ii) *if* $\alpha(y') > 0$, *then* $y'' \geq y'$;
(iii) *if* $\alpha(y'') > 0$ *or* $\alpha(y') > 0$ *and if* $y'' > y'$, *then* $\alpha(y'') > \alpha(y')$.

Proof: Incentive compatibility implies,

$$\begin{aligned} &\alpha(y')(s(t') - y') + (1 - \alpha(y'))\, w_1(t') \\ &\qquad \geq \alpha(y'')(s(t') - y'') + (1 - \alpha(y''))\, w_1(t'), \end{aligned} \tag{A1}$$

and

$$\begin{aligned} &\alpha(y'')(s(t'') - y'') + (1 - \alpha(y''))\, w_1(t'') \\ &\qquad \geq \alpha(y')(s(t'') - y') + (1 - \alpha(y'))\, w_1(t''). \end{aligned} \tag{A2}$$

To establish (i) subtract (A1) from (A2) to obtain $[\alpha(y'') - \alpha(y')][s(t'') - w_1(t'') - (s(t') - w_1(t'))] \geq 0$. That $s(t) - w_1(t)$ is increasing in t then leaves $\alpha(y'') \geq \alpha(y')$.

For (ii), assume $\alpha(y') > 0$ and rewrite (A1) to obtain $\alpha(y'')(y'' - y') \geq [\alpha(y'') -$

$\alpha(y')][s(t') - y' - w_1(t')]$. Because y' is accepted with positive probability, it must bring the sender t' as least as much as it would get by fighting (otherwise the offer would not be made). So, $s(t') - y' \geq w_1(t')$. This along with part (i) implies $[\alpha(y'') - \alpha(y')][s(t') - y' - w_1(t')] \geq 0$. Part (i) also ensures that $\alpha(y'') \geq \alpha(y') > 0$ which leaves $y'' \geq y'$.

As for (iii), again take $\alpha(y') > 0$ and $y'' > y'$. Rewriting (A2) gives $\alpha(y')(y'' - y') \leq [\alpha(y'') - \alpha(y')]\,[s(t'') - y'' - w_1(t'')]$. The left side of this inequality is positive. And, $\alpha(y') > 0$ implies $\alpha(y'') > 0$ from (i). Because y'' is accepted with positive probability, agreeing to y'' must bring t'' as least as much as it would get by fighting. So, $s(t'') - y'' \geq w_1(t'')$. Hence, $\alpha(y'') > \alpha(y')$.

Now suppose $\alpha(y'') > 0$. If $\alpha(y') = 0$, there is nothing to show. If $\alpha(y') > 0$, the previous argument ensures $\alpha(y'') > \alpha(y')$.■

LEMMA 2: *Take $(y(t), \alpha(x); \mu(x))$ to be a PBE satisfying D1. Assume further that z is an out-of-equilibrium offer, i.e., $z \notin \{y(t) : t \in [\underline{t}, \overline{t}]\}$ such that $w_2(\overline{t}) > z > y(\tau)$ for some $\tau > t^+ \equiv \inf\{t : \alpha(y(t)) > 0\}$. Then the receiver believes that it is facing $\widehat{t}$ with probability one where $\widehat{t} \equiv \sup\{t : y(t) < z\} = \inf\{t : y(t) > z\}$.*

Proof: The set of strategies that are mixed best responses to z given some set of beliefs is simply $\alpha \in [0, 1]$ as any α is a best reply to z if the opposition believes $t = w_2^{-1}(z)$. Moreover, deviating to z from $y(t)$ given α is weakly profitable if,

$$\alpha\,(z)\,[s(t) - z] + (1 - \alpha)w_1(t) \geq \alpha(y(t))[s(t) - y(t)] + [1 - \alpha(y(t))]w_1(t)$$

$$\alpha \geq \alpha^*(t) \equiv \alpha(y(t)) \left(\frac{s(t) - w_1(t) - y(t)}{s(t) - w_1(t) - z} \right),$$

as long as $s(t) - w_1(t) - z > 0$. Hence, the set of strategies α for which deviating from $y(t)$ are strictly and weakly profitable are, respectively, $D(z, t) \equiv (\alpha^*(t), 1]$ and $D^0(z, t) \equiv [\alpha^*(t), 1]$.

There are now two cases to be considered. Assume, first, that $t^+ < t < t'$ and $y = y(t) > z$. Because $t > t^+$, $\alpha(y(t)) > 0$ and, consequently, $0 \leq s(t) - y(t) - w_1(t) <$

$s(t) - z - w_1(t)$. It follows that,

$$1 - \frac{y - z}{s(t') - w_1(t') - z} \quad > \quad 1 - \frac{y - z}{s(t) - w_1(t) - z}$$

$$\alpha(y)\left[\frac{s(t') - w_1(t') - y}{s(t') - w_1(t') - z}\right] \quad > \quad \alpha(y)\left[\frac{s(t) - w_1(t) - y}{s(t) - w_1(t) - z}\right].$$

Incentive compatibility implies $\alpha(y')[s(t') - w_1(t') - y'] \geq \alpha(y)[s(t') - w_1(t') - y]$ which leaves,

$$\alpha(y')\left[\frac{s(t') - w_1(t') - y'}{s(t') - w_1(t') - z}\right] \quad > \quad \alpha(y)\left[\frac{s(t) - w_1(t) - y}{s(t) - w_1(t) - z}\right]$$

$$\alpha^*(t') \quad > \quad \alpha^*(t).$$

Hence, $D^0(z,t) \subset D(z,t')$, and D1 eliminates t' along with all $t > \inf\{t : y(t) > z\}$.

Now suppose $t^+ < t < t'$ and $y(t') < z$. Then repeating the argument above shows that D1 eliminates t. It follows that D1 eliminates all t such that $t^+ < t < \sup\{t : y(t) < z\}$. If $\alpha(y(t^+)) > 0$, the same argument eliminates t^+. So suppose $\alpha(t^+) = 0$, and consider any $t \leq t^+$. This type cannot profitably deviate to y', so $w_1(t) \geq \alpha(y(t'))[s(t) - y'] + [1 - \alpha(y')]w_1(t)$. This implies $w_1(t) \geq s(t) - y' > s(t) - z$. Consequently, no $\alpha > 0$ can rationalize t's deviation to z and $D^0(t,z) = \{0\} \subset D(t',z)$. D1 therefore eliminates all $t \leq t^+$. ■

Lemma 3: *Let $(y(t), \alpha(x); \mu)$ be a PBE satisfying condition D1 with $t^+ \equiv \inf\{t : \alpha(y(t)) > 0\}$. Then all $t > t^+$ separate: $y(t') < y(t'')$ whenever $t^+ < t' < t''$.*

Proof: Arguing by contradiction, there must be two types t' and t'' such that $t^+ < t' < t''$ and t' and t'' make the same offer $\widehat{y}$. Let $\widehat{t} = \inf\{t : \widehat{y} = y(t)\}$. It follows that $\widehat{y} > w_2(\widehat{t})$. To see this, note that because $y(t)$ is nondecreasing , all $t \in [t', t'']$ propose $\widehat{y}$. This interval has positive measure, and therefore player *2*'s payoff to fighting must be strictly larger than the payoff to fighting the lowest type. Formally, $\int_{\{t:\widehat{y}=y(t)\}} w_2(t)d\widehat{H}(t) > \int_{\{t:\widehat{y}=y(t)\}} w_2(\widehat{t})d\widehat{H}(t) = w_2(\widehat{t})$ where $\widehat{H}$ is the posterior of H given $\widehat{y}$. Lemma 1 guarantees $\alpha(y(t)) > 0$ for all $t > t^+$. Thus, the opposition accepts $\widehat{y}$ with positive probability which leaves $\widehat{y} \geq \int_{\{t:\widehat{y}=y(t)\}} w_2(t)d\widehat{H}(t) > w_2(\widehat{t})$.

Now consider any offer of slightly less than $\widehat{y}$, i.e., some $z \in (\widehat{y}-\varepsilon, \widehat{y})$ for an ε small enough to ensure $z > w_2(\widehat{t})$. If the opposition strictly prefers accepting z to fighting, then $\alpha(z) = 1$ and a contradiction results as those offering $\widehat{y}$ could profitably deviate to the lower offer z. To see that the opposition does prefer accepting z, suppose that z is an equilibrium proposal, i.e., $y(t) = z$ for some t. Because y is nondecreasing and $z < \widehat{y}$. The opposing faction therefore believes that t is bounded above by $\widehat{t}$ after being offered z since $\sup\{t : z = y(t)\} \leq \inf\{t : y(t) \geq \widehat{y}\} = \widehat{t}$. Hence, the opposition's payoff to fighting is bounded above by $p\sigma\widehat{t}$ which is strictly less than z. If z is an out-of-equilibrium offer, then the argument in the second case in the proof of Lemma 2 implies that the opposition believes it is facing $\sup\{t : y(t) \leq z\} \leq \widehat{t}$ after z. The opposing faction's expected payoff to fighting is therefore $w_2(\widehat{t})$ and again strictly less than z. ■

Proof of Proposition 6: Let $(y(t), \alpha(x), \mu(t))$ be a PBE of $\gamma \in \Gamma$ satisfying D1 and recall that $t^+ = \inf\{t : \alpha(y(t)) > 0\}$. The first step in the proof shows $y(t) = w_2(t)$ for all $t \in (t^+, \bar{t}]$. The second step is to demonstrate that $\alpha(x)$ is continuous at any $x \in (w_2(t^+), w_2(\bar{t})]$. This and the incentive compatibility conditions will imply that α' is well-defined at x and that $\alpha(x)$ is given by equation (2) for all $x \in (w_2(t^+), w_2(\bar{t}))$. The third step establishes that $t^+ = \underline{t}$. It follows that $y(t) = w_2(t)$ for all t. Finally we verify that $y(t)$ and $\alpha(x)$ are equilibrium strategies and therefore that equilibria satisfying D1 exist.

Lemma 3 implies $t > t^+$ separate. Lemma 1 then implies that $y(t)$ and $\alpha(y(t))$ are strictly increasing in t for $t > t^+$. This leaves $0 < \alpha(y(t)) < \alpha(y(\bar{t})) \leq 1$. That *2* is mixing in response to $y(t)$ implies *2* is indifferent between accepting and fighting. Hence, $y(t) = w_2(t)$ for all all $t \in (t^+, \bar{t})$ and $y(\bar{t}) \geq w_2(\bar{t})$.

The receiver is sure to accept any $x > w_2(\bar{t})$ as the payoff to fighting is bounded above by $w_2(\bar{t})$. Hence, $a(x) = 1$ for all $x > w_2(\bar{t})$, and it follows that $\bar{t}$'s offer satisfies $y(\bar{t}) = w_2(\bar{t})$ (otherwise $\bar{t}$ could reduce its offer towards $w_2(\bar{t})$ and still have it accepted for sure). Also, $\alpha(y(\bar{t})) = 1$; otherwise $\bar{t}$ could profitably deviate to some x larger than $w_2(\bar{t})$ but sufficiently close to it.

To see that $\alpha(x)$ is continuous at any $x \in (w_2(t^+), w_2(\bar{t})]$, let $y = w_2(t)$ and $y' = w_2(t')$ for $t^+ < t < t'$. The incentive compatibility conditions imply,

$$\alpha(y)[s(t) - y] + [1 - \alpha(y)]w_1(t) \geq \alpha(y')[s(t) - y'] + [1 - \alpha(y')]w_1(t)$$

$$\alpha(y')[s(t') - y'] + [1 - \alpha(y')]w_1(t') \geq \alpha(y)[s(t') - y] + [1 - \alpha(y)]w_1(t'),$$

Rewriting these conditions gives,

$$\frac{\alpha(y)(y' - y)}{s(t) - y - w_1(t)} \geq \alpha(y') - \alpha(y) \geq \frac{\alpha(y')(y' - y)}{s(t') - y' - w_1(t')}.$$

The bounds on $\alpha(y') - \alpha(y)$ go to zero as y' goes to y, thereby ensuring that α is continuous.

Dividing the previous expression by $y' - y$, letting y' go to y, and using $\lim_{y' \to y} \alpha(y') = \alpha(y)$ yields,

$$\frac{\alpha(y)}{s(t) - y - w_1(t)} \geq \alpha'(y) \geq \frac{\alpha(y)}{s(t) - y - w_1(t)}.$$

Hence,

$$\frac{\alpha'(y)}{\alpha(y)} = \frac{1}{s(t) - y - w_1(t)}$$

for all $y \in (w_2(t^+), w_2(\bar{t})]$. Recalling that $y(t) = w_2(t)$ and using the boundary condition $\alpha(y(\bar{t})) = 1$ we get,

$$\frac{d \ln \alpha(w_2(t))}{dt} = \frac{w_2'(t)}{s(t) - w_1(t) - w_2(t)}$$

$$\alpha(y) = \exp\left[-\int_{w_2^{-1}(y)}^{\bar{t}} \frac{w_2'(t)dt}{s(t) - w_1(t) - w_2(t)}\right] \qquad \text{(A3)}$$

for $y \in (w_2(t^+), w_2(\bar{t})]$.

To demonstrate that $t^+ = \underline{t}$, assume the contrary, i.e., that $t^+ > \underline{t}$, and take $\varepsilon > 0$ so that $s(t^+) - w_1(t^+) - w_2(t^+) - \varepsilon > 0$. Then some $t < t^+$ would have an incentive to deviate $z = w_2(t^+) + \varepsilon$ and this contradiction implies $t^+ = \underline{t}$. Deviation is profitable if $w_1(t) < \alpha(z)[s(t) - z] + [1 - \alpha(z)]w_1(t)$ where $\alpha(y(t)) = 0$ because $t < t^+$. Hence, offering z is profitable if $0 < \alpha(z)[s(t) - w_1(t) - w_2(t^+) - \varepsilon]$. Equation A3 ensures $\alpha(z) > 0$ and taking t close enough to t^+ guarantees that the second factor is positive. Hence, $t^+ = \underline{t}$. An immediate consequence of this is that $\alpha(\underline{t})$ is also defined by A3 above. Were α to be discontinuous at $\underline{t}$, some type in the neighborhood of $\underline{t}$ could profitably deviate.

In sum, if a PBE satisfying D1 exists, the equilibrium strategies must be defined by $y(t) = w_2(t)$ and equation A3. To show that these actually are equilibrium strategies, observe trivially at $\alpha(y)$ is a best reply for *2* to a separating offer that leaves it indifferent between accepting and fighting.

To see that $y(t) = w_2(t)$ is a best reply to $\alpha(x)$, differentiate t's payoff to offering x,

$$\begin{aligned}
U(x|t) &= \alpha(x)[s(t) - x] + [1 - \alpha(x)]w_1(t) \\
U'(x|t) &= \alpha'(x)[s(t) - x - w_1(t)] - \alpha(x) \\
\operatorname{sgn}[U'(x|t)] &= \operatorname{sgn}\left[\frac{\alpha'(x)}{\alpha(x)}[s(t) - x - w_1(t)] - 1\right].
\end{aligned}$$

Differentiating A3 gives,

$$\frac{\alpha'(x)}{\alpha(x)} = \frac{1}{s\left(w_2^{-1}(x)\right) - w_1\left(w_2^{-1}(x)\right) - x},$$

which leaves $\operatorname{sgn}[U'(x|t)] = \operatorname{sgn}\left[s(t) - w_1(t) - \left(s\left(w_2^{-1}(x)\right) - w_1\left(w_2^{-1}(x)\right)\right)\right]$. But $s\left(w_2^{-1}(x)\right) - w_1\left(w_2^{-1}(x)\right)$ is strictly increasing in x. Hence, $t = w_2^{-1}(x) \Leftrightarrow x = w_2(t)$ uniquely satisfies the first and second order conditions and therefore is the unique best response to α.■

Proof of Proposition 3: Given $p \leq (1 - \sigma)/\sigma$, the integrand in the expression for the probability of acceptance $A = 1 - F = \int_{\underline{r}}^{\overline{r}} [(c+r)/(c+\overline{r})]^{\frac{p\sigma}{1-\sigma}} dH$ is concave. Second-order stochastic dominance then implies,

$$\begin{aligned}
\int_{\underline{r}}^{\overline{r}} \left(\frac{c+r}{c+\overline{r}}\right)^{\frac{p\sigma}{1-\sigma}} dH &\geq \int \left(\frac{c+s}{c+\overline{r}}\right)^{\frac{p\sigma}{1-\sigma}} dG \\
&\geq \left(\frac{c+\overline{r}}{c+\overline{s}}\right)^{\frac{p\sigma}{1-\sigma}} \int \left(\frac{c+s}{c+\overline{r}}\right)^{\frac{p\sigma}{1-\sigma}} dG = \int \left(\frac{c+s}{c+\overline{s}}\right)^{\frac{p\sigma}{1-\sigma}} dG,
\end{aligned}$$

where the final inequality is strict whenever $\overline{s} > \overline{r}$. (That H is second-order stochastically dominated by G implies $\overline{s} \geq \overline{r}$.) ■

Proof of Proposition 5: The probability of sharing power is $H\left[\chi\overline{r} - c(1-\chi)\right]$. Because H is increasing, we only need to differentiate its argument with respect to p, c, and $\bar{r}$ to obtain the results.

(i) To see that this is increasing in p, it suffices to observe that χ is increasing in p as

$$\begin{aligned}\frac{\partial\chi}{\partial p} &= \frac{\partial d\left((1-\sigma-\psi\sigma)/(1-\sigma)\right)^{(1-\sigma)/(p\sigma)}}{\partial p} \\ &= -\frac{1}{p^2\sigma}\left(\ln\frac{1-\sigma-\sigma\psi}{1-\sigma}\right)(1-\sigma)\left(\frac{1-\sigma-\sigma\psi}{1-\sigma}\right)^{\frac{1-\sigma}{p\sigma}} > 0.\end{aligned}$$

(ii) The probability of sharing power is decreasing in c as $\partial\left[\chi\overline{r} - c(1-\chi)\right]/\partial c = -\left(1-\chi\right) < 0$.

(iii) The probability of sharing power is increasing in $\overline{r}$ as $\partial\left[\chi\overline{r} - c(1-\chi)\right]/\partial\overline{r} = \chi > 0$. ■

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