Peace and War with Endogenous State Capacity[*]

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Abstract

We explore how peace or war can occur in the presence of commitment problems. These problems can be reduced by institutions of good governance or, alternatively, state capacity which (i) can be considered a collective good and (ii) can be improved through investments. We show how the likelihood of a peace agreement depends on the level of state capacity and on investments in state capacity made by adversaries. In accordance with existing evidence but contrary to various theories of conflict, we find that income levels unambiguously increase the chance of peace. Among other issues, we discuss the critical role of external actors in encouraging or discouraging commitment and in developing good governance institutions.

1 Introduction

Civil wars and other internal conflicts typically take long to resolve. For instance, the median length of a civil war in the post-World War II period has been more than seven years and persistence has been high as well (Collier et. al., 2003, p.80). Why wars last for as long as they do is akin to asking why conflict occurs in the first place. Answers that have been proposed in the literature include incomplete or asymmetric information; indivisibilities or increasing returns on matters of contention; risk-seeking behavior; hate, revenge, and other preferential externalities; excessive optimism and wrong mental models of the world; and incomplete contracting or commitment difficulties.[1]

Not all reasons for conflict are as important at the end of conflict as at the start. As conflicts drag out over months and years, adversaries' incomplete information can be expected to subside, as should excessive optimism or incorrect mental models of the conflict. In some cases, indivisibilities can persist reducing the contracting space for peace agreements to nothing. Additionally, it is possible that hate and the urge for revenge could increase with time, fatalities, and atrocities and thus complicate a conflict's ending. One persistent reason, however, that can cause conflict and perpetuate it is difficulties with trust or the absence of sufficient external enforcement in making adversaries abide by a peace agreement. That is, to phrase it differently, contracts on arming are difficult and costly to enforce and *commitments* to specific levels of arming can be difficult to implement.[2]

However, the modeling choice is not just between perfect commitment and its complete absence. Between the two extremes of the philosopher's state of nature (where there is no possibility of commitment)

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[1] For overviews of explanations of conflict see Fearon (1995), Hirshleifer (1995), and Skaperdas (2006). For overviews of the economics of conflict and the literature on civil wars, respectively, see Garfinkel and Skaperdas (2007) and Blattman and Miguel (2010). A thoughtful discussion on how these models pertain to the sustainability of post-conflict peace can be found in Cunningham (2006).

[2] Fearon (1995) first discussed the ideas associated with the problems of incomplete contracting, and dynamic models of the problem include Garfinkel and Skaperdas (2000), Fearon (2002), and Powell (2006). These enforcement issues as discussed specifically in the context of peace agreements are further developed in Werner and Yen (2005).

The first part of our model (on the choice between conflict and peace) is based on McBride and Skaperdas (2007, 2009), whereas the second part of the model (on investments in conflict management) is party inspired by Genicot and Skaperdas (2002). Kumar (2008) also examines a dynamic model of growth that incorporates investment in property rights.

on the one hand, and economic models in which property rights are perfectly and costlessly enforced (so that commitment is perfect and costless) on the other hand, there is a broad spectrum of commitment space which defines the agreements that can be reached and which agreements are not credible. Adversaries are typically able to make some limited commitments using third parties, social and political institutions that they have inherited from the past, or elements of the state that might have the independence and strength to partially guarantee peace agreements. That is, commitment problems can be thought to depend on a type of collective good that can be variously attributed to *governance, institutions, trust, social capital or bridging capital, property rights,* or *state capacity,* the last term being the one we will be mostly using in this paper.

As argued by North, Wallis, and Weingast (2009), over the past two centuries, the modern *state* (and, more expansively, what the authors call the *open social order*) has taken the form of a long-lived entity that is able to make long-term commitments to a much greater degree than it could do in the past. The ability to commit can be considered a combination of laws, formal institutions, and informal institutions. A well-functioning bureaucracy, independent courts, non-corrupt police, non-involvement of the military in civilian affairs, separation of powers, checks and balances, reasonably independent press, long-lived private organizations, as well as norms of elite cooperation are attributes that contribute to the state's ability to commit. This is, however, still an ideal type that is not satisfied by a large majority of the states existing today. No low-income countries are anywhere close to satisfying the conditions of having such a state and their capacity to commit is rather limited.

One distinction that we make is that between the *government* and the *state.* A government at a particular point in time is in charge of the state but the former is a short-lived collection of individuals whereas the latter, in its ideal type at least, is a long-lived entity consisting of many bureaucratic agencies and departments that have a measure of independence from the particular government that is in charge. A government cannot overturn all the decisions that have been made by previous legislatures, courts, and executives, a condition that allows the state to have some capacity to commit to some previous decisions that may be against a current government's wishes. The capacity to commit is correlated with the level of the state's sophistication as well as on norms in the society at large.

We employ the term state capacity to denote the level of commitment that can be achieved but which can change over time under the influence of outsiders as well as the actions of the major actors within countries. Moreover, agreements can be based on informal, traditional, historical or customary arrangements which cannot be measured by the metrics often associated just with the state. In the case of serious internal conflicts, reducing tensions can be initially achieved through intermediaries. With time, the adversaries themselves could engage in actions that enhance their collective ability to commit. Instances of such actions range from the hiring of a (limited) external enforcer, the *podesta*, by rival clans in late Medieval Genoa (Greif, 1998) to the often drawn-out negotiations, confidence-building measures, and state-building that adversaries have engaged in more recent times.[3] Detailed power-sharing agreements, like those of Lebanon (Salti and Frangie, 2009) or Mozambique (Cadeado and Hamela, 2009) whereby different posts in the state are filled by the different contenting groups, can be considered as intermediate cases in which partial commitment can be achieved through measures that may be considered crude, inefficient, and overly intrusive from the outside but which can significantly reduce the reoccurrence of civil war.

We first explore the factors that determine whether peace or conflict will prevail for a given, exogenous level of state capacity. Given a certain level of arming, each adversary compares expected payoffs from conflict against those of a peace agreement. Conflict has costs that may involve destruction and additional use of resources, but provides the chance of being in a better strategic position in the future and having to spend less on arming in order to maintain such a position. Peace avoids the current costs of conflict but requires, because of commitment problems, the continued maintenance of some level of arming in order to have the bargaining position that will allow the peace agreement to be self-enforcing. The higher the level of commitment, induced by greater state capacity, the lower is the level of arming that each side would have to maintain in order to self-enforce peace.

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[3] Credible, neutral and respected peacekeepers, mediators and observers from international and regional institutions can also fill the gap, creating commitment space for otherwise untenable agreements. We caution, though, that just as NGOs providing humanitarian aid can supplant local capacity to deliver social services, so too can international peacekeeping contribute to peace through building commitment space that does not reflect actual state capacity for commitments. Policymakers must ask, when peacekeepers leave, what state capacity has been built in country to deliver this commitment space? For more on the importance of aligning political missions and state capacity building to peacekeeping missions for success in peacebuilding, see Doyle and Sambanis (2006).

Peace becomes possible only when all parties to the agreement prefer it to continued conflict, and that is possible when state capacity is above a critical threshold. The threshold level itself depends on the destruction and other possible extra costs of conflict but also on the discount factor, the shadow of the future. In particular, the effect of a longer shadow of the future tends to be a detriment to peace in the sense that state capacity's critical threshold becomes higher the higher is the discount factor.

We next explore the determinants of state capacity. In section 3 we consider three factors that could affect the degree of commitment through state capacity. First, outside forces can intervene for good (third parties genuinely interested in peace) or bad (third parties that have an interest in the continuation in conflict or are biased toward changing the terms of an eventual peace in favor of one of the adversaries). Second, the degree of commitment depends on the history of interaction among the parties, with a longer history of conflict, mutual isolation, and distrust reducing the capacity for commitment. Finally, the adversaries themselves can engage in investments that improve state capacity for commitments.

In section 4 we extend our model to consider the first and last factors. In this environment, adversaries will undertake positive levels of investment in state capacity only when they expect to induce peace, although they will also engage in some arming given that commitment is not typically perfect in equilibrium. In this respect, our model captures the truly ambivalent nature of peace negotiations, where the actors grip the olive branch in one hand and the sword in the other. Whereas the levels of investment in state capacity in equilibrium are unique, those are not necessarily the only levels of investment that might be expected to occur. It would be generally in the collective interest of both parties to engage in investments that are higher than those that would occur in equilibrium and if the parties could coordinate on higher levels they might be able to do so. The ability to coordinate on and implement such investments may well be a key factor for some countries in maintaining peace.

Another notable effect we find is that an increase in the value of the "prize" that is the object of contention between adversaries unambiguously increases investments in state capacity (except when these investments are already zero) and thus unambiguously enhances the payoffs under peace. If the value of the prize and income are correlated, then this result implies that we would expect higher income countries to have both higher state capacity and better prospects of peace, whereas lower income countries would tend

to have lower levels of state capacity and more fighting. This is in line with the correlations observed (Collier et. al., 2003) but also with the attempts to disentangle causality and with Miguel et. al. (2004) showing how lower incomes appear to cause conflict with data for African countries. While intuitively plausible, the correlation between low income and conflict has been difficult to explain theoretically since the typical contest model of conflict (that we also employ in section 2 below) shows a positive relation between income and arming, with the latter considered a measure of conflict. Our dynamic model distinguishes between actual conflict and peace under the threat of conflict (in which there is still arming). By doing that, we no longer have to consider arming as a proxy for conflict. More importantly, not only do we find a relationship between income and conflict that is consistent with the empirical evidence but also we find a very plausible mediating mechanism: the incentive to invest more in state capacity for commitments when there is more income at stake. This is consistent with recent findings that weak political systems (proxied by anocracies, but possibly more reflective of young democracies) are more prone to conflict than established political systems and stronger bureaucracies (Fearon and Laitin, 2003, Keefer, 2008, Fearon, 2010).

Finally, we consider the possibility of the State as an actor while still maintaining our basic framework. We consider the State as an actor with outside support in arms, with advantage in conflict, and as the sole contributor to state capacity. In each formulation, the main logic of the earlier part of our paper remains intact, though investments may now be more or less likely to occur depending on the exact setting.

2 The basic setting with exogenous state capacity

We consider the case of two groups, A and B, each contesting a rent (or, income) Y in each period over an indefinite time horizon. Although one of the groups can be a government, for simplicity we initially suppose that the two groups as identical in their characteristics. We later allow for asymmetry when considering one of the groups to have attributes that provide it with the advantage that a government might have.

Each group $i=A,B$ can produce arms in period t, denoted g_{it}, at constant marginal cost. Furthermore, we assume that the payoffs under War and Peace are different for both sides, reflected by the superscripts w and p. The main differences are that under War, there is destruction, $(1-\varphi)$, of a fraction of the rents and the winner gains an advantage in future interactions. For simplicity, we suppose that the winner of conflict receives the rent in all future periods, whereas the loser does not receive anything (for a relaxation of this assumption, see McBride and Skaperdas, 2007). Under both War and Peace a fraction of the rents are protected for both agents by the quality of the institutions they create to regulate and enforce their powersharing agreement, reflected by a security parameter $\sigma \in [0,1]$. We assume σ is fixed for now; we discuss its determinants in section 3 and allow for it to be increased via costly investments in Section 4.

Under these assumptions, the following single-period t payoffs for group i under War is

$$U_{it}^{w}\left(g_{At},g_{Bt}\right)=\left[\sigma\varphi\frac{1}{2}+\left(1-\sigma\right)\frac{g_{it}}{g_{At}+g_{Bt}}\varphi\right]Y-g_{it},\tag{1}$$

where $\varphi<1$ and $\dfrac{g_{it}}{g_{At}+g_{Bt}}$ represents the probability group i wins the conflict. The single-period t payoff for group i under Peace is

$$U_{it}^{p}\left(g_{At},g_{Bt}\right)=\left[\sigma\frac{1}{2}+(1-\sigma)\frac{g_{it}}{g_{At}+g_{Bt}}\right]Y-g_{it},\tag{2}$$

where $0\leq\sigma\leq1$.

Note that the term in braces represents group i's share of the rent. Under both War and Peace, the share each side receives depends partly on state capacity and partly on arming. The better the state capacity, the larger the share of rents that are not contestable via threats with arms. When σ is close to 0, arming plays the biggest role in determining the share of each group. When σ is close to 1, arming plays very little role in the share of each side. The $\frac{1}{2}$ share of Y indicates that the adversaries equally split the rents that are protected by state capacity. That the contestable portion of group i's rents depends on how well it would do

in a conflict captures how the bargaining outcome under the threat of conflict will depend on the relative strength of each group as measured by arms.[4] Another equivalent interpretation is that each adversary has an endowment of $\sigma Y/2$ that is protected from capture under both War and Settlement, although some of it is destroyed under War.[5]

We note that it is typical for peace agreements to have the parties to the agreement maintain their military capacity, either informally – through militias and other forms of military readiness – or formally as part of the agreement. Lebanon, for example, has had quotas for its different confessional groups in the military as well as for its political and administrative offices. In addition to any formal agreements that involve explicit quotas in national armies, different political parties, and administrative or electoral offices, ethnic or religious groups need to maintain militias and keep other resources (arms caches, training grounds, readiness for mobilization and special funds dedicated to them) both as a deterrent and as a bargaining tool.[6]

In a particular period t, the two sides make the following decisions:

1. Each side chooses its arming level g_{it}.

2. Given these levels of arming, each side makes a decision whether to accept a Peace agreement or not. If both agree to Peace, then Peace occurs. If one or both choose conflict, then War occurs.

We are interested in knowing when an equilibrium with Peace exists. Specifically, we will show when the highest payoff symmetric Markov Perfect Equilibrium (MPE) with peace exists.[7] This setting is a dynamic

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[4] Anbarci et. al. (2002) show how different bargaining solutions can induce different levels of arming in equilibrium when the utility possibilities frontier is strictly convex. Dinopoulos and Syropoulos (1998) employ the same functional form for the distribution of a prize in the case of rents from intellectual property rights, with greater protection of such rights inducing a higher σ.
[5] North, Wallis, and Weingast (2009, Chapter 3) describe how, gradually, losers of wars and political battles in England went from first losing their heads, to then losing their titles and lands, to finally just losing their influence or seats in parliament. That is, there appears to be a strong relationship between greater insitutional development and fewer losses of the losers of civil wars and political battles, just as higher σ reduces the losses of the losers.
[6] See, for example, the case studies of power-sharing agreements in Colombia (Gutierrez and Guataqui, 2009) and Lebanon (Salti and Frangie, 2009). Research on the type of power-sharing arrangement suggests that power-sharing agreements with military and territorial agreements serve as more credible signals and are more successful in keeping the peace, whereas political power-sharing agreements are less costly and, therefore, less successful (Jarstad and Nilsson, 2008).
[7] See Fudenberg and Tirole (1996) for a discussion of MPE. MPE are easier to solve than history dependent strategies. Additionally, our setting immediately goes to an abosrbing state after conflict thus precluding

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game with three states: A has full power and obtains all the rents without need to arm or bargain with B; B has full power; and both can contest for a share or all of the rents. The first two states can only be reached after a conflict occurs. The setting begins in the third state. A Markov strategy is a Subgame Perfect Equilibrium in which each group chooses a strategy that depends not on the history of play but on the state. With choices only relevant to the third state, a Markov strategy tells a player to play a fixed strategy in that state.

Yet before turning to a Peace equilibrium, we first note that there always exists a symmetric MPE with War. Conditional on the other choosing War in step 2, a group's choice between War and Peace is irrelevant, so both choosing War can always be sustained in an MPE. There will thus be an MPE in which each chooses an arming level g_W^* and War. Given War, the value function for a group is

$$V_{it} = \left[\sigma \frac{1}{2} + (1-\sigma) \frac{g_{it}}{g_{At} + g_{Bt}} \right] \left(\varphi + \frac{\delta}{1-\delta} \right) Y - g_{it} \qquad (3)$$

To find the equilibrium g_W^*, we obtain the first order condition of (3) and use symmetry $g_W^* = g_i$ to solve for g_W^*:

$$\left[\frac{1}{g_{it} + g_W^*} - \frac{g_{it}}{\left(g_{it} + g_W^* \right)^2} \right] (1-\sigma) \left[\varphi + \frac{\delta}{1-\delta} \right] Y - 1 \quad = \quad 0 \Rightarrow$$

$$\frac{g_W^*}{\left(g_W^* + g_W^* \right)^2} (1-\sigma) \left[\varphi + \frac{\delta}{1-\delta} \right] Y \quad = \quad 1 \Rightarrow$$

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history dependent punishment across time periods. The only role for history dependence is within a single round wherein an actor can condition its decision to fight on the other actor's arming level. However, the strategic relevance for such history dependence is limited. When the MPE with Peace exists, it yields the highest payoff under Peace, so history dependent strategies will not improve payoffs. When it does not exist, any change in arming relative to that arising under the MPE with war will put one party in a better position to fight, thus not averting War. Given that the payoffs under the War MPE are the best under War, again no deviations need be considered.

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$$g_W^* = \frac{1}{4}(1-\sigma)\left[\varphi + \frac{\delta}{1-\delta}\right]Y.$$

The MPE has each group choose this g_W^* and War. Group i's present discounted payoff in this MPE is

$$V_i^W = \sigma\left[\varphi + \frac{\delta}{1-\delta}\right]\frac{1}{2}Y + \frac{g_W^*}{g_W^* + g_W^*}(1-\sigma)\left[\varphi + \frac{\delta}{1-\delta}\right]Y - g_W^*$$

$$= \frac{1}{4}(1+\sigma)\left[\varphi + \frac{\delta}{1-\delta}\right]Y \qquad (4)$$

We are interested in when an equilibrium with Peace exists. Consider a Markov strategy of this form: "In period t of a contestable state: set $g_{it} = g_P^*$ and choose Peace." If each group follows this strategy, then group i's present discounted payoff is

$$V_{it}^P = \frac{1}{1-\delta}\left[\sigma\frac{1}{2} + (1-\sigma)\frac{g_P^*}{g_P^* + g_P^*}\right]Y - \frac{1}{1-\delta}g_P^*$$

$$= \frac{1}{1-\delta}\frac{1}{2}Y - \frac{1}{1-\delta}g_P^* . \qquad (5)$$

Each choosing this strategy will be a MPE (hereafter, equilibrium) when neither group can make a one-shot deviation to achieve a higher payoff. There are three types of one-shot deviation to consider. The first type is to set $g_{it} \neq g_P^*$ in step 1 and choose Peace in step 2. The second type is to set $g_{it} = g_P^*$ but choose War in step 2. The third is to set $g_{it} \neq g_P^*$ in step 1 and choose War in step 2.

A first type deviation will not be made if, conditional on peace, g_P^* is a Nash equilibrium of the single-period arming game. To find this g_P^*, we obtain the first order condition of $U_{it}^p\left(g_{At}, g_{Bt}\right)$,

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$$(1-\sigma)\left[\frac{1}{g_{At}+g_{Bt}}-\frac{g_{it}}{\left(g_{At}+g_{Bt}\right)^2}\right]Y-1 = 0 \Rightarrow$$

$$(1-\sigma)\frac{g_{jt}}{\left(g_{At}+g_{Bt}\right)^2}Y = 1,$$

and use symmetry $g_{it}=g_{jt}=g_P^*$ to obtain

$$g_P^* = \frac{1}{4}(1-\sigma)Y.$$

With this g_P^* arming level, no second type deviations will be made. From now on, we assume this g_P^* so that equation (5) becomes

$$V_i^P = \frac{1}{1-\delta}\frac{1}{4}(1+\sigma)Y.$$

A second type deviation will not be made in step 2 if the payoff of choosing Peace exceeds that of choosing War condition on both having chosen g_P^* in step 1:

$$\frac{1}{2}Y+\delta V_i^P \geq \frac{1}{2}\left[\varphi+\frac{\delta}{1-\delta}\right]Y \Rightarrow \qquad (6)$$

$$\sigma \geq 1-\frac{2\left(1-\varphi\right)\left(1-\delta\right)}{\delta}\equiv\sigma^* \qquad (7)$$

This value σ^* is the minimum level of state capacity required to prevent a second type deviation. Observe that this is more likely to be met when conflict is destructive (φ low) and the future is heavily discounted (δ low). (Note also that for σ^* to be positive, δ needs to be larger than $\frac{2-2\varphi}{3-2\varphi}$, but even if σ^* were negative (6) would be satisfied.)

A third type deviation will not be made in steps 1 and 2 when V_i^P is greater or equal to the payoff from the deviation:

$$\frac{1}{1-\delta}\frac{1}{4}(1+\sigma)Y \geq \sigma\frac{1}{2}\left(\varphi Y+\frac{\delta}{1-\delta}Y\right)$$

$$+\max_{g'}\left\{(1-\sigma)\frac{g'}{g'+g_P^*}\left(\varphi+\frac{\delta}{1-\delta}\right)Y-g'\right\}. \quad (8)$$

The right hand side (*RHS*) of this inequality is the highest payoff achievable when choosing g' given g_P^* and War.

Solving for the best arming deviation g'^* yields

$$g'^* = \sqrt{(1-\sigma)g_P^*\left(\varphi+\frac{\delta}{1-\delta}\right)Y}-g_P^*. \quad (9)$$

Plugging g'^* into condition (8) and some manipulation reveals that (8) is satisfied when

$$\sigma \geq \frac{\left[4(\varphi(1-\delta)+\delta)-4\sqrt{1-\delta}\sqrt{\varphi(1-\delta)+\delta}-\delta\right]}{2-2(\varphi(1-\delta)-\delta)+\left[4(\varphi(1-\delta)+\delta)-4\sqrt{1-\delta}\sqrt{\varphi(1-\delta)+\delta}-\delta\right]} \equiv \hat{\sigma} \quad (10)$$

It can be shown that the denominator of $\hat{\sigma}$ is always positive although the numerator can be negative for combinations of a low φ and a low δ, and we have $\hat{\sigma} < 1$. Moreover, if a second type deviation is profitable then there must be a profitable third type deviation, which in turn implies that for some values of σ there is a profitable third type deviation but not a profitable second type deviation. Thus, $\hat{\sigma} \geq \sigma^*$.

Continuing the logic, the Peace MPE exists when $\sigma \geq \hat{\sigma}$. When state capacity σ is sufficiently large, Peace is a self-enforcing arrangement between potential adversaries. Peace is costly to maintain as each side must continue to arm to maintain a bargaining position. However, with the peace arming level $g_P^* = \frac{1}{4}(1-\sigma)Y$, we observe that the higher the state capacity the fewer the resources devoted to arming.

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With maximal state capacity ($\sigma=1$), the Peace equilibrium achieves an efficient outcome with no resources spent on arming and no resources destroyed by conflict.

We note that $\hat{\sigma}$ approaches 1 as the discount factor δ goes to 1. That Peace requires low discount factors runs counter to the standard Folk Theorem intuition. However, as McBride and Skaperdas (2007, 2009) explain, this counterintuitive result follows from the dynamic nature of the interaction. Because one group can eliminate its opponent through conflict, engaging in a conflict may be costly today but yield high rewards tomorrow as future resources need not be devoted to arming.

3 On the determinants of commitment and state capacity

We have seen the critical importance the level of the parameter σ has in whether War or Peace prevails. Low levels of the parameter imply that the mechanisms that induce Peace are rather undeveloped and the adversaries need to keep high levels of arming in order to maintain their bargaining power. In turn, this high cost of Peace would lead to War. When the mechanisms for supporting Peace are more developed and the parties can keep lower levels of arming in order to maintain their respective bargaining positions, War is not attractive. What determines, then, the level of governance, security, property rights, or, in short, state capacity, which encourages these commitments to peace? We first briefly discuss some of the possible determinants in general, and then examine the actions that the adversaries might be able to take to improve their ability to commit.

We can conceive of σ as a function of accumulated investments. The least that is required is the presence of channels of communication and diplomacy between the participants. For higher levels of commitment, rudimentary forms of governance become necessary: mechanisms for making collective decisions and agreements; elementary courts for the adjudication of disputes; security officers for the enforcement of decisions, court rulings, and agreements.

An example of such a rudimentary institution of governance that was agreed upon and paid for by adversaries who were seeking to minimize outright conflict among them is that of the *podesta* in fourteenth century Genoa (Greif, 1998). The main competing clans – previously engaged in intermittent civil war for

decades, with no clear dominant clan among them – agreed to hire every year an outsider, the *podesta*, along with a limited staff and armed men, who served as administrator and law enforcer but without having enough military capacity to ally himself with one of the clans and expect to defeat the others. Thus, the clans paid for the services of the *podesta* to maintain a delicate balance of power. They still had to maintain some military readiness but evidently not as much as in the absence of the *podesta* and with lower risk of warfare.

Whereas many developing countries might still benefit from institutions like that of the podesta, any institutions that allow for greater commitment and less arming on the part of the adversaries would be useful. Predictable and institutionalized ways of law making increases the commitment power of the state that the laws will continue to hold (Keefer, 2008, North et. al., 2009). Power-sharing agreements, like those in Lebanon (Salti and Frangie, 2009) and Mozambique (Cadeado and Hamela, 2009), that specify in detail how different offices in the bureaucracy and the military are to be distributed between the former adversaries may seem rigid and inefficient yet they can be successful in sustaining peace because of the degree of commitment that they create. In the case of Mozambique the military officers down to the lowest ranks are alternating between supporters of FRELIMO and RENAMO, the two main parties representing the two sides in their civil war, an arrangement that has provided reasonable assurance and commitment to both parties that the other will not use the power of the state against the other. Moreover, although FRELIMO has been continuously in power as the government since the end of civil war (as well as before), the military itself is perceived as being a state organization that is relatively independent of the government (Cadeado and Hamela, 2009) and, thus, it could argued to have contributed to almost two decades of peace in the country.

Building professional police forces, armies, a modern bureaucracy as well as courts are all means for enforcing laws can also be considered investments that enhance state capacity.[8] Modern, western versions of these institutions take tremendous resources and time to build and should only be built for their function

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[8] The contribution of a modern bureaucracy towards peace and prosperity is not to be overlooked. Research by Przeworski et al (2000) and Keefer (2008) demonstrate that the level of voice and accountability embodied by democratic institutions does not contribute to peace and prosperity so much as the establishment of permanent institutions and bureaucracies that reliably define the "rules of the game".

and not just to mimic form embodied by the modern state. Like the podesta, local institutions, expanded to sustain peace and build credible commitments can lead to future investments and expansion of state capacity. Examples of such institutions include the Conflict Early Warning and Early Response Mechanism (CEWARN) active in pastoral areas of Ethiopia, Kenya, Uganda and Sudan, which serves as a local observer and early warning system to avoid conflict, where publicity acts as a type of enforcement. The investments by local actors, including those who have been engaged in violence in the past, are intended to reduce current expenditures on arming which can range from simply mobilizing quickly with response to a threat to actively engaging in negotiations over issues which are raised by CEWARN.[9] Likewise, the Gacaca courts of Rwanda can be interpreted as a local investment in state capacity to make credible commitments in post-confict as they provided a local means of settling grievances that was more credible than state institutions. Actors in post-conflict countries and countries at high risk of conflict that do not invest in such institutions must continue arming in order to maintain their respective bargaining positions

We next review the actors and forces that can determine investments in state capacity.

3.1 Outsiders

No country is an island when it comes to influences on civil wars and other domestic conflicts. Outsiders – states, international organizations, NGOs, firms, and powerful individuals – typically have direct economic or other interests in the country whereas larger states might have longer-term, geopolitical interests on the political and economic direction a country takes.

The post-World War II collective security arrangements tend to guarantee existing borders. While these arrangements might have reduced the number of interstate wars, the large number of civil wars indicates that collective security norms do not spill over into the domestic arena[10]. With regard to improving domestic security and conflict management, outsiders can be a source of both good and bad influence.[11]

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[9] See examples 4 and 5 on http://www.cewarn.org/documents/success%20stories2.pdf.
[10] Indeed, the legacy of international borders defined by the international state system may contribute to the incidence of civil wars (see Herbst, 2000 and Spears, 2002).
[11] Doyle and Sambanis (2006) find a positive role for UN peacekeeping operations, whereas Sambanis and Schulhofer-Wohl (2005) find evidence of a positive effect of UN peacekeeping operations but no

They can be a source of good by providing mediation services and even by nudging the adversaries with sticks and carrots toward solutions that the sides could not come up by themselves. They can provide short-term and long-term assistance with state building, from direct budgetary help to advice on the building of bureaucracy and courts, as well as of the more conventional technical assistance in the building of infrastructure.

Outsiders can be a negative influence when they directly intervene in conflict and even instigate conflict, wittingly or unwittingly. When outside economic interests feel threatened by a government and finance military opposition, even as a bargaining device, the level of trust and ability to commit to future agreements (that is, the level of σ) between the government and its domestic adversaries cannot but deteriorate. Large states with long-term geopolitical interests might want to undermine stability in another large state's backyard of a satellite state and undermine domestic stability there or simply makes sure to fuel continued conflict. Even some actions of the "international community" that are professed to be in the interest of peace and stability could unwittingly, and arguably, undermine stability and peace.[12].

The duality of external interventions as either stabilizing or destabilizing forces is further complicated by the identification of some actors with the government. When one of the actors is the government, its interventions from external actors on behalf of that actor are interpreted as "stabilizing" in one sense (reinforcing the international architecture through collective security agreements as described above), while possibly protracting a conflict that is otherwise untenable and thereby leading to "instability" in the form of protracted conflict. We explore the implications of such interventions in the final section of the paper.

Given that the world has become increasingly globalized economically since World War II, it would be difficult to conceive of internal conflicts in isolation from the rest of the world and the role that outside actors play in either alleviating or exacerbating these conflicts. Research on the effectiveness of peacekeeping on promoting the peace in post-conflict environments (Fortna, 2004, Doyle and Sambanis,

discernible effect on non-UN operations. Walter (2002) finds a positive correlation between third-party security guarantees and power-sharing agreements but had difficulties finding evidence of causality one way or another.
[12] Prunier (2009), for example, makes a strong case that a series of actions by Western states and NGOs both prolonged the Rwandan genocide and subsequently unwittingly facilitated the intensification of the wars in the Democratic Republic of the Congo.

2006) and the role of third parties (Walter, 20002) provides useful insights on the role of outsiders . Still, there is much more room for investigation of the role that other external actors, neighbors, regional actors and global superpowers, play in the promotion and undermining of peace.

3.2 History

Thinking of conflict management institutions as capital inevitably brings forth the importance of what has occurred in the past between the adversaries involved in conflict and in the history of the country in general. Very intense and long-lasting conflicts may be intractable.[13] Weak governance in the first place is more likely to lead to conflict. And once conflict begins, whatever little capital of conflict management existed beforehand can quickly depreciate. Bureaucracies, courts, security agencies can deteriorate or stop functioning altogether. Even channels of communication and diplomacy may shut down. Achieving a long-lasting agreement, then, could become ever harder as conflict progresses. Political and governance traditions from the past could help to at least start negotiation. These can vary widely and can include traditional tribal practices of elder gatherings to governance practices imported from abroad.

3.3 Investments by the adversaries

In the end, given whatever capital has been left over from the past and with the help (or hindrance) of outsiders, the adversaries themselves will need to negotiate, structure an agreement, and make sure that it is long-lasting. That is, the parties themselves can be thought of as making investments in conflict management and governance. The actual choices of investment by the parties can be ordinary non-cooperative choices or closer to the socially optimal ones (which are higher than the noncooperative choices.) We next turn to a formal analysis of this problem.

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[13] Hartzell and Hoddie (2003) find that more intense conflicts result in less sustainable peace. Cunningham (2006) finds that longer wars produce more spoilers and veto players which further perpetuate conflict.

4 Endogenous determination of state capacity

As we mentioned earlier, the parameter σ can be considered a function of the total "capital", K, in conflict management and governance, where $\sigma(K)$ denotes the relevant function. K can be broken down into two parts: K_-, the capital that has been inherited from the past and includes the effects of third parties; and the investments undertaken by the two parties, I_A and I_B. Thus, $\sigma = \sigma\left(I_A + I_B + K_-\right)$. In addition to $\sigma(\cdot)$ being increasing in its argument, we assume that it is strictly concave and differentiable. Furthermore, let q denote the price of these investments to each party.

To keep our analysis simple and main idea clear, we here suppose that each of the two adversaries can undertake a one-time investment in state capacity capital. After they make their investments simultaneously and publicly, then engage in the interaction studied in Section 2. That is, after making their investments, they then decide how much to arm and whether or not to engage in conflict. As before, conflict occurs if one or both choose it.

If $\sigma\left(K_-\right) \geq \hat{\sigma}$, then Peace can be sustained no matter the investments I_A and I_B. The interesting case, and the case which we assume from now on, is when $\sigma\left(K_-\right) < \hat{\sigma}$.

We again focus on symmetric strategies both before and after investments are made. If investments raise $\sigma\left(I_A + I_B + K_-\right)$ above σ, then we assume the (symmetric) Peace equilibrium is played thereafter.[14] If $\sigma\left(I_A + I_B + K_-\right) < \hat{\sigma}$, then the (symmetric) War equilibrium prevails. Thus, we need to find under what conditions the groups will choose investments that raise the total capital to a level above the threshold σ.[15]

Given symmetric coordinated actions after investments, the expected payoff for group i from before investments are made is:

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[14] Because both the War MPE and Peace MPE exist when the Peace MPE exists, our assumption is valid to the extent that there is a viable equilibrium selection argument that can justify selecting Peace. In our case, there is a simple selection principle of weak dominance that gives us the Peace MPE. See Baron and Kalai (1993) for a discussion.

[15] We here ignore dynamic considerations that might induce each side to invest in building capital for the future even though they would go to War now. A model that has genuine dynamics would be required to allow for that possibility.

$$V_i(I_A + I_B) = \begin{cases} \dfrac{1}{4}\dfrac{1}{1-\delta}\left(1 + \sigma(I_A + I_B + K_-)\right)Y - qI_i, & \text{if } \sigma(I_A + I_B + K_-) \geq \hat{\sigma}, \\[2ex] \dfrac{1}{4}\left(1 + \sigma(I_A + I_B + K_-)\right)\left[\varphi + \dfrac{1}{1-\delta}\right]Y - qI_i, & \text{if } \sigma(I_A + I_B + K_-) < \hat{\sigma}. \end{cases} \qquad (11)$$

Notice that War payoff is increasing in σ as well. However, the marginal return on investing in state capacity under War ($\sigma'(I_A + I_B + K_-)\left[\varphi + \frac{\delta}{1-\delta}\right]\frac{Y}{4}$) is lower than that under Peace ($\sigma'(I_A + I_B + K_-)\frac{Y}{4(1-\delta)}$). Moreover, although there might be circumstances under which adversaries might choose to invest in state capacity even when they anticipate War, such investment can be expected to be logistically more difficult to accomplish and we therefore disregard this possibility here. We therefore concentrate on cases in which if investments in state capacity cannot bring security to or above the threshold level σ, no investment can be expected at all.

As before, a War equilibrium in which each selects $\left(I_i = 0, g_W^*, War\right)$ always exists. The strategy of interest to us has each group select $\left(I^*, g_P^*, Peace\right)$ with $\sigma\left(2I^* + K_-\right) \geq \sigma$. Given that the last two in this triplet have been studied above, we need only determine when the investment I^* is optimal given the opponent chooses this strategy.

There are two things to consider here: what is the I^* that maximizes the Peace payoff, and is each contributing I^* enough to bring state capacity above σ? We examine each of these in turn. The first order condition of the $V_i\left(I_A, I_B\right)$ Peace payoff with $I_A = I_B = I^*$ identifies the best investments assuming Peace:

$$\sigma'\left(2I^* + K_-\right) = \frac{4q(1-\delta)}{Y}. \qquad (12)$$

If we have

$$\frac{1}{4}\frac{1}{1-\delta}\left(1 + \sigma\left(2I^* + K_-\right)\right)Y - qI^*$$

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$$\geq \quad \frac{1}{4}\left(1+\sigma\left(K_-\right)\right)\left[\varphi+\frac{\delta}{1-\delta}\right]Y, \quad (13)$$

then the Peace with investment equilibrium exists.

This last condition reveals that high destruction from conflict (low φ) makes Peace more likely. It is also worth noting the role of the function $\sigma(\cdot)$. For investments in Peace to occur, the returns to investment must be sufficiently large. For one, the slope of the state capacity production function must be sufficiently high. In particular, if we define $\sigma\left(\overline{K}\right) \equiv \hat{\sigma}$ then it is necessary that

$$\sigma'\left(\overline{K}\right) \geq \frac{4q\left(1-\delta\right)}{Y}.$$

If current investment brings the adversaries right to the threshold capital level, then the adversaries must be willing to maintain (or exceed) those investments. Intuitively, this requires the price of investment q to be sufficiently low, and as in Section 2 the discount factor must be sufficiently low. However, observe that Y must also be sufficiently large. If the rents are too low, then the prize is not worth the investment in state capacity.

We find this last result to be significant. In most models of conflict (Przeworski 2005 is a notable exception in a different setting[16]), a higher prize implies higher arming and worse conflict. Here we also find arming to increase in the size of the prize holding all else constant, yet there are mitigating factors that may swamp out that effect. As income rises, so do the returns to Peace and the returns to investments in the institutions that foster Peace. If the technology exists to create governance institutions, then the rising returns to Peace through investing in institutions may lead adversaries to the bargaining table as Y increases.

However, there are two constraints that might well prevent the implementation of Peace. First, one problem might be the capacity to build $I_A^* + I_B^*$, when, as we discussed earlier, modern governing institutions take many years and decades to build. Second, even if the institutions could be built at once, it is likely the fiscal capacity of the adversaries would be severely limited and they could contribute only a

fraction of the equilibrium level of investment. When obstacles to reaching equilibrium investment exist, then there is space for a good-willed outsider to intervene.

Plugging in $I^* = \frac{1}{2}\left(K^* - K_-\right)$ into the value function for peace yields

$$\frac{1}{4}\frac{1}{1-\delta}\left(1 + \sigma\left(K^*\right)\right)Y - q\frac{1}{2}K^* + q\frac{1}{2}K_-. \tag{14}$$

Although a change in K_- does not change K^*, it does affect the payoffs of the two groups. Due to the substitutability between K_- and the adversaries' investments I_A and I_B, an increase in K_- increases the adversaries' payoffs in the case of Peace because the adversaries need only invest smaller amounts to achieve Peace.

Outside forces can help or hinder Peace. By lowering K_- via actions destructive to state capacity, outside forces can transform a peaceful setting into a conflictual one. By raising K_- via actions that build local institutions directly or by providing resources conducive to the development of governance institutions, outside forces can help foster peace.

Finally, we observe that the positive externality associated with investment in state capacity will likely yield an underprovision of governance institutions. When investments for Peace work, the equilibrium will be inefficient. Welfare (in the form of the sum of payoffs) is maximized at $\left(I_A, I_B\right) \geq \left(\hat{I}, \hat{I}\right)$ when it solves

$$\max_{I_A, I_B} V_A\left(I_A, I_B\right) + V_B\left(I_A, I_B\right).$$

In the case of Peace, total welfare equals

$$\frac{1}{2}\frac{1}{1-\delta}\left(1 + \sigma\left(2\hat{I} + K_-\right)\right)Y - q\hat{I},$$

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and the level of total capital $\hat{K} = 2\hat{I} + K_-$ that would maximize is implicitly defined by[17]

$$\sigma'(\hat{K}) = \frac{2q(1-\delta)}{Y}. \qquad (15)$$

By comparing (12) and (15) it is clear that $\hat{I} > I$ and $\hat{K} > K^* = 2I^* + K_-$, i.e., the level of security under welfare maximization would be higher than under equilibrium, the amount of arming necessary to maintain Peace would be lower and, of course, payoffs and welfare would be higher.

Obviously, because the optimal level of investment is not an equilibrium, it would be harder to implement in a conflictual environment where the elites – typically the agents of initiatives – are divided . Moreover, because there may be any number of challenges to implementing the equilibrium levels of investment (capacity to build, fiscal constraints), the implied optimal levels which are even higher would be very difficult to achieve.

Both the equilibrium and optimal levels of investment, however, share some similar comparative static results. Using (10) and (13), it can be demonstrated that the respective investment levels are (i) increasing in the contestable income Y; (ii) increasing in the discount factor δ; and (iii) decreasing in the price of investments q. *This suggests that wealthier countries should enjoy higher levels of security, at least in the long run when liquidity and capacity constraints are relaxed.* External intervention that can overcome these liquidity and capacity constraints may promote attainment of equilibrium levels of security. It is important to highlight the distinction here between relaxation of liquidity and capacity constraints and substituted capacity from international actors. Relaxation of liquidity and capacity constraints effectively creates the commitment space for adversaries to make their own investments in state capacity. Meanwhile, substituted capacity, as described above, can supplant and even reduce the incentives for actors to invest in their own state capacity, reducing the attainability of sustainable peaceful equilibria.

The effect of the discount factor is the same implied by a folk-theorem argument and contrary to the effect it has on arming effect that we found earlier. Therefore, the shadow of the future can have two

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[17] We here assume $Y\sigma'(K_-)/2(1-\delta) - q \geq 0$.

countervailing effects. Which effect dominates on arming can be expected to depend on the particular functional form of σ(·) and the initial parameters.

5 The Government as an advantaged actor

As clarified in the introduction, one of the actors in a civil conflict can be, and often is, the Government, which is the actor currently in charge of the State. Though the Government can be one of the two actors in our analysis up to this point, the two adversaries have been considered identical with similar budgets, constraints, and efficacy in fighting for control of the contested prize. What changes if the Government is different? We consider two relevant adjustments to the model when considering the Government to be one of the two actors. We forgo a detailed treatment of each and instead focus on what changes, if any, occur relative to the logic of the symmetric model from Sections 2 and 4.

Asymmetric Strength. The first adjustment is that the Government has an advantage in conflict that affords it a better probability of winning a conflict. Letting the Government be actor A, this is captured simply by adding parameter $\gamma > 1$ to the contest success function so that the Government's probability of winning a conflict is

$$\frac{\gamma g_A}{\gamma g_A + g_B},$$

and the Rebels' probability of winning is

$$\frac{g_B}{\gamma g_A + g_B}.$$

Observe that the condition $\gamma > 1$ yields the Government the probabilistic advantage in a fight. Reflecting the asymmetry in power, state capacity also guarantees the State share $\frac{\gamma}{\gamma+1}$ rather than $\frac{1}{2}$ over the secure part of income.

Leaving all else unchanged, it is straightforward to show using the first order conditions for A and B that in the War MPE each chooses arming level $g_W^* = \dfrac{\gamma}{(\gamma+1)^2}(1-\sigma)\left(\varphi+\dfrac{\delta}{1-\delta}\right)Y$, and in the Peace MPE each chooses $g_P^* = \dfrac{\gamma}{(\gamma+1)^2}(1-\sigma)Y$. (The symmetric case with $\gamma=1$ yields the g_W^* and g_P^* arming levels reported in Section 2.) Although both actors choose the same level of arming in this case, the level of arming is lower the higher is the asymmetry parameter γ. Therefore, given that the Government receives the greater share of Y, the Government's payoff is higher, the higher is the value of γ. Naturally, it can also be shown that the Rebels' payoff is lower as parameter γ increases.

Though introducing this asymmetry changes the exact conditions for Peace to exist as an equilibrium, the changes are only quantitative in nature. The primary qualitative findings of interest from Sections 2 and 4 remain: peace arises when state capacity σ is sufficiently large, and investments to peace will occur with large income Y. As far as investing in state capacity is concerned, however, there is a key difference because the marginal benefit of investing in state capacity is greater for the Government than it is for the rebels. This feature typically makes the Government the sole actor to invest in equilibrium in state capacity. That is, given the asymmetry in power expressed by γ, the Government has a greater incentive to, so to speak, "tie its hands" further by investing in commitment devices, because that greater commitment brings about greater payoffs than it would bring for the rebels.

"Over-the-horizon Guarantees." The second adjustment is such that an outside party promises to intervene in support of the State in the case of conflict, as described by Collier (2007). Again, let actor A be the Government, and actor B be the Rebels. Over-the-horizon guarantees are captured by assuming that $g_A = g_A' + g_X$, where g_A' is the amount of arms paid for by the Government, g_X is the amount of arms directed to the aid of the Government by the external actor, and g_A is thus the effective arming on behalf of the Government. The payoff functions are similar to before except g_X is taken to be exogenous and the cost

of arming is $-cg'_A$. We here assume that g_X is credibly promised in case of a fight, which in turn implies

that the Government is assumed to have $g_A = g'_A + g_X$, effectively, when bargaining for Peace.

It is reasonable to assume that $g_X < g^*_W$ and $g_X < g^*_P$ so that the Government must undertake some level of

arming itself. The marginal arming conditions for the Government are unchanged, so that g_A will equal the

g^*_W or g^*_P calculated in Section 2 depending on whether War or Peace occurs. However, the total arming

paid for by the Government, g'_A, is less than what was paid before because g_X of its arms are provided by

the external actor. This lower cost implies a higher payoff for the Government under both War and Peace,

and the payoff increase is much higher in case of Peace because the g_X promise is in effect for all future

periods and not just the period of conflict. Although this makes Peace more profitable for the State, the

Rebels' War-Peace payoffs are unchanged. Finally, because both sides must agree to Peace for it to occur,

the conditions for the Peace MPE holding state capacity σ fixed are unchanged.

If all other parameters are held constant, then we see no change in incentive to invest in state capacity

for the two actors. Yet, the reduced need to spend resources on arms may relax the Government's fiscal

constraints thereby enabling it to increase its investment in state capacity. In this regard, an external actor's

promise to support the Government in case of War can create fiscal space for investments in the state

capacity and improve the conditions under which Peace attains.

6 Concluding Remarks

In this paper we develop a simple model of conflict, allowing actors to invest in state capacity for

commitment. We first employ a model in which state capacity is given exogenously to demonstrate what

conditions are necessary for war to be an equilibrium solution. The model suggests that states with low

capacity where conflict is not very destructive should experience more conflict.

Our model also introduces a channel through which income reduces the likelihood of conflict, namely

state capacity. This key result reconciles theoretical models of conflict – which have suggested that when

income is high, there should be more conflict as there is more to fight over – with the empirical literature in which conflicts are observed with greater frequency in low-income countries. When we allow for endogenous investments in state capacity, the model demonstrates how investments for peace by both actors can make peace a stable outcome.

We have also allowed for the possibility of asymmetric power relations by explicitly modelling one actor in power as the Government and the other actor out of power, with the Government having an advantage. We do not find qualitative differences from the symmetric case, except for the greater incentive of the Government to invest in state capacity.

Here we have applied the model to post-conflict states. However, these relationships among elites or other spoilers to peace may exist in any conflictual environment, developing and developed countries alike. This model could be extended to explore exactly how actors have invested in state capacity and avoided conflict, especially for conditions which seem otherwise ripe for civil conflict. The model could be tested empirically using measures of post-conflict institution building and post-conflict demobilization and disarmament – *ceteris paribus* we would expect peace to last in environments where institutions improve and arming decreases.

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