

Skaperdas, Stergios

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**Warlord competition**

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## **Warlord Competition**

Stergios Skaperdas\*

August 2001

### **Abstract**

Warlords compete for turf that provides them with rents and 'taxable' resources but they can also offer a semblance of security within their respective territories. This article first examines two economic models of warlord competition. Because such competition takes place through the use of force or the threat of the use of force, more competition typically leads to lower material welfare as resources are wasted on unproductive arming and fighting. This is in contrast to ordinary economic models, in which typically greater competition leads to higher material welfare. Furthermore, rents from oil, diamonds, and even foreign aid crowd out production. In extreme cases this crowding out of ordinary production can be complete, whereby all economic resources can be devoted to the unproductive competition for rents. The article then reviews factors that lead either to actual war or to peace in the shadow of war. Because war is destructive, human beings are typically risk averse, and there exist numerous complementarities in production and consumption, we can expect peace in the shadow of war to be most often preferable by all parties. Actual war can take place because of incomplete information about the preferences and capabilities of the adversaries but also, somewhat surprisingly, when the shadow of the future is long.

Keywords: warlord competition, conflict, cooperative and non-cooperative behaviour

JEL classification: C71, C72, O17

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\* Department of Economics, University of California, Irvine.

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STERGIOS SKAPERDAS  
Department of Economics, University of California, Irvine

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# 1 Introduction

From the earliest recorded wars in history to the present, conflict has been taking place between hierarchically organized groups with emperors, kings, lords or generals at the top and common foot soldiers at the bottom. Nowadays, in many countries from Colombia, to Somalia, to the northern parts of Afghanistan broad swaths of territory are outside the effective control of central governments - if those exist at all - and contested by rival groups, typically headed by what we could fairly characterize as warlords. By linguistic convention, such conflict constitutes competition, and that competition has at least some economic objectives. Evaluating conflict as competition from an economic perspective is not a simple matter, however, for we cannot blindly apply the received economic models without running into problems. Is a greater number of competitors, for example, a good thing when there is conflict as it is taken to be in the case of ordinary competing business firms? With more competitors we would expect more fighting and resource waste, less predictability, and greater difficulties in communication, negotiation, and settlement. Therefore, intuitively at least, it appears that the answer to the question just posed above cannot be 'yes' - more competition can be expected to lead to a worse outcome.

To make sense of this and other related peculiarities of what we call in this paper "warlord competition", we need a model different from the model of ordinary firms competing on price and possibly on other dimensions. Warlords instead compete over rents - oil, diamonds, drugs, foreign aid - as well as over 'taxation' of their subjects by being sufficiently strong to deter and, if necessarily, fight their competitors. We first examine two types of competition, one which is localized and another which is more generalized. We find that rents, by increasing the intensity of competition among warlords, 'crowd out' some of the production under both types of competition. The crowding-out effect though is higher under generalized competition and in some circumstances it can be nearly complete. There are even cases under which all the productive resources and population are diverted toward the unproductive competition for rents.

We then examine the incentives warlords face for going to war compared to those for engaging in 'armed peace', whereby they negotiate and settle under the threat of going to war. Factors that favor armed peace include the degree to which war is destructive, the risk aversion of the warlords, and how complementary or interdependent is the contested surplus with other goods or

services. War can be induced by the factors that have been widely noted - like misperceptions, misunderstandings, absence of communication channels - as well as by characteristic that is normally considered to promote cooperation, not conflict: a long value attached to the future by the adversaries.

## 2 Two Kinds of Competition

Consider an area - district, country, or even more than one country - in which the state is weak or non-existent. In the face of rampant insecurity, individual producers are 'protected' by warlords. In return, warlords receive a fixed share  $\alpha \in (0, 1)$  of each producer's output, which for simplicity we take to be equal to unity. For brevity and analytical convenience we do not model explicitly here how warlords protect producers from individual robbers or bandits. The interested reader is instead referred to Konrad and Skaperdas (1999) or Skaperdas (2001) in which  $\alpha$  is derived from the maximizing choices of producers and warlords - briefly, producers take costly actions to reduce the size of that share, whereas warlords also devote resources to increase the same share. We denote the number of producers by  $P$ . Therefore, the total output received by warlords from producers is  $\alpha P$ :

In addition to producers, the area under consideration has additional rents that can have different sources: natural resources like oil, gas, timber, or diamonds as well as cash, loans, and in-kind contributions from foreign governments, international organizations, NGOs, or foreign diasporas.<sup>1</sup> Let the net size of these rents available to warlords be  $T$ .

The  $L$  warlords compete for these rents and the surplus extracted from producers through force or the threat of the use of force. Force is determined by the number of warriors hired by each warlord at a resource cost  $\tau \in (0, 1)$ . Competition is modeled as a contest (e.g., Tullock, 1980; Dixit, 1987) as it also has been done in models of conflict (e.g., Hirshleifer, 1988; Grossman, 1991; Skaperdas, 1992). With more than two warlords, though, there is not a single way of modeling competition between them. We shall therefore examine two different types of competition: one that is more localized and the other one being closer to free-for-all.

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<sup>1</sup>These outside forces could also directly subsidize the cost of fighting and therefore influence warlord competition in other ways. The role of diasporas has been emphasized by Collier & Hoeffler (2001).

## 2.1 Localized Competition

Because of geography, transportation difficulties, and communication costs, warlords possibly could extend their range and pose challenges to those in their immediate vicinity only. To capture that characteristic of limited range, suppose the warlords are equally spaced around a circle. The neighbors of warlord  $I = 2; \dots; L - 1$  are warlords  $I - 1$  and  $I + 1$ ; warlords 1 and  $L$  have one another as neighbors as well as, respectively, 2 and  $L - 1$ .

The rents and other output are evenly distributed around the circle and there is thus a surplus of size  $\frac{T + \textcircled{P}}{L}$  available for distribution among any particular pair of warlords. Each warlord can contest the surplus to either of his sides and can hire warriors who are dedicated to guarding either the left or right 'border'. That is, warlord  $I$  can hire  $w_{I-1}^I$  warriors to contest the surplus on the side of warlord  $I - 1$  and  $w_{I+1}^I$  warriors on the side of warlord  $I + 1$ . The share of the surplus goes to warlord  $I$  when challenging warlord  $I - 1$  is determined by a 'contest success function' that equals:<sup>2</sup>

$$\frac{w_{I-1}^I}{w_{I-1}^I + w_{I+1}^I} \quad (1)$$

All warlords are risk neutral and their payoff functions can thus be defined as follows:

$$\begin{aligned} V^I &= \frac{w_{I-1}^I}{w_{I-1}^I + w_{I+1}^I} \frac{T + \textcircled{P}}{L} - w_{I-1}^I + \frac{w_{I+1}^I}{w_{I+1}^I + w_{I-1}^I} \frac{T + \textcircled{P}}{L} - w_{I+1}^I \\ &= \left( \frac{w_{I-1}^I}{w_{I-1}^I + w_{I+1}^I} + \frac{w_{I+1}^I}{w_{I+1}^I + w_{I-1}^I} \right) \frac{T + \textcircled{P}}{L} - (w_{I-1}^I + w_{I+1}^I) \end{aligned} \quad (2)$$

Because of risk neutrality and the absence of other complications, there is no difference between assuming that  $\frac{w_{I-1}^I}{w_{I-1}^I + w_{I+1}^I}$  represents the share of the local surplus received by warlord  $I$  in competition with warlord  $I - 1$  or the probability of winning the same surplus. Later we shall discuss instances in which settling under the threat of going to war leads to different outcomes

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<sup>2</sup>This is the functional form employed by Tullock (1980) for rent-seeking contests. Hirshleifer (1989) has discussed its properties and Skaperdas (1996) has provided axiomatic derivation of this and other functional forms.

than the one in which actual war takes place and, importantly, why actual war or settlement under its threat would take place.

All warlords choose the number of warriors they allocate to each of their two borders non-cooperatively, so that these choices form a Nash equilibrium. It can be shown that a symmetric equilibrium exists, whereby every warlord chooses to deploy the following number of warriors against each of his neighbors:

$$w^* = \frac{T + \textcircled{P}}{4L} \quad (3)$$

Consistently with intuition, the number of warriors deployed is positively – actually, linearly – related to the surplus available between neighboring warlords,  $\frac{T + \textcircled{P}}{L}$ ; and negatively related to the cost of hiring warriors ( $L$ ). By substituting  $w^*$  into the warlord's payoff function, we obtain the equilibrium profit of a warlord:

$$V_w = \frac{T + \textcircled{P}}{2L} \quad (4)$$

Even though this profit decreases as the number of warlords increases, the total profit by summing up over all warlords equals  $LV_w = \frac{T + \textcircled{P}}{2}$  and is therefore independent of the number of warlords. Given, then, the functional forms we have assumed, half of the total surplus is taken as profit by warlords whereas the remainder becomes dissipated in the hiring of warriors.<sup>3</sup>

The warriors and warlords do not add anything to production - they both play a parasitic role in the economy by competing for the appropriation of the surplus. Whereas in the short-run production is given, in the long-run we could expect it to respond to the level of appropriation. A major way in which production is determined in our context is simply by the number of individuals who decide to become producers. The other option is to become a warrior. (For simplicity, we ignore the possibility of warlords coming from the same population). Let  $N$  denote the total number of individuals in the

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<sup>3</sup>Of course, there is no significance to having the surplus exactly split between warlords and warriors. This property is a consequence of our specific assumption on the contest success function, and other functional forms would yield different splits, which would have a similar qualitative interpretation.



area under consideration and  $W$  the total number of warriors. The producers and warriors exhaust the population so that:

$$N = P + W \quad (5)$$

For individuals who reside in the area to choose to become warriors, they would like to have an income at least as high as that of producers, which as we have seen equals  $1 + \frac{r}{2}$ . Therefore, the cost of hiring warriors from the area,  $\frac{1}{2}$ , must equal or be higher than  $1 + \frac{r}{2}$ . By (3), the total number of warriors under localized competition is  $W^* = 2Lw^* = \frac{T + rP}{2}$ . By substituting this quantity in (5), we can find the induced number of producers under localized competition:

$$P^* = \frac{2 - r}{2 - r} N - \frac{1}{2 - r} T \quad (6)$$

Total production, by the choice of units we have made, also equals  $P^*$ . Note how the presence of higher rents,  $T$ , induces lower production. This occurs because higher rents induce a greater level of appropriative competition which in turn induces the hiring of a greater number of warriors that have to come from the ranks of producers.

The total 'income' of the area, however, should include the rents and would equal:

$$T + P^* = \frac{2 - r}{2 - r} N + \frac{2 - r + r}{2 - r} \frac{1}{2} T \quad (7)$$

Income increases as rents increase, but less than the increase in rents because of the reduction in production induced by the higher rents.

## 2.2 Generalized Competition

The model we have just examined has many idealized properties. Rents and production are not typically uniformly distributed across areas. Mineral wealth is often concentrated in one area and much economic activity is to be found agglomerated in geographically small areas. This characteristic and the ease of communication and movement make plausible that those who, in

the absence of sufficient restraints, contest the rents and output of a given area do so as a whole, and not just some small subset of it that is determined by the accidents of geography. We will therefore examine now a model in which all warlords compete for all the surplus that is available in a 'free-for-all'. Whereas this type of competition is in some ways the other extreme of the localized competition we have already analyzed, and is thus inevitably unrealistic, our objective is to determine how our findings change with the different assumptions. We can then be more confident for the results that do not change and we will have good reason to attribute the results that do change to the type of competition that takes place.

Each warlord,  $i$ , now chooses a number of warriors,  $w_i$ , that is not aimed against his neighbors but against all other lords. The share of the surplus received by that warlord is determined by the higher dimensional analogue to (1):

$$\frac{w_i}{\sum_{j=1}^L w_j} \quad \text{where } L > 1 \quad (8)$$

The payoff function of warlord  $i$  under generalized competition then becomes the following:

$$V_g^i = \frac{w_i}{\sum_{j=1}^L w_j} (T + \mathbb{P}) - w_i \quad (9)$$

Again, as with the case of localized competition, because of risk neutrality and other assumptions,  $\frac{w_i}{\sum_{j=1}^L w_j}$  can be interpreted as a share or as probability of winning the total surplus. The Nash equilibrium choices of warriors and the induced equilibrium payoff of a warlord are:

$$w^g = \frac{(L - 1)(T + \mathbb{P})}{L^2} \quad (10)$$

$$V_g = \frac{T + \mathbb{P}}{L^2} \quad (11)$$

Each warlord hires more warriors now, provided that  $L > 2$ : Note how the payoff of a warlord is inversely related to the square of the number of

warlords. Thus, contrary to the case of localized competition, the total products of warlords,  $LV_g = \frac{T + \theta P}{L}$ , vary inversely with their number - the more warlords there are, the more intense the competition among them becomes and the lower the total products are.

To determine the number of producers we follow the same method we employed in the case localized competition. The total number of warriors under generalized competition is  $W^g = Lw^g = \frac{(L_i - 1)(T + \theta P)}{L}$ , and the substitution of this number in (5) and rearrangement yields the number of producers (as well as of total output):

$$P^g = \frac{L}{(\theta + \alpha)L_i} N_i \frac{L_i - 1}{(\theta + \alpha)L_i} T \quad (12)$$

In the absence of any rents ( $T = 0$ ) and with more than two warlords, it can be shown that the number of producers in (12) is lower than those under localized competition in (6). As with localized competition, output is decreasing in the size of the rents  $T$ . However, contrary to that other case, production depends on the number of warlords. For a large enough number of lords (and, for example, when  $\alpha = 1$ ), the reduction in output as a result of a given increase in rents is almost the same as the increase in rents itself! Competition is more intense here and any increase in the rents induces a considerably greater demand for warriors who have to come out of the ranks of potential producers. Total 'income' can be similarly calculated by adding the value of the rents to the output in (12). The addition of even large rents can have a negligible effect on income by the aforementioned reduction in output that they can induce.<sup>4</sup>

Equation (12) has been derived on the assumption that the number of producers is positive. In fact, when the rents are high enough it is possible to have the whole population turn into warriors with no one becoming a producer. When  $\alpha = 1$ ; that occurs when  $N < \frac{L_i - 1}{(1 - \alpha)L} T$ : Hence, when rents are high enough relative to the population, there may be no production.

Finally, it should be noted that the number of warlords should be endogenous in the long-run. Whereas under localized competition that number does not affect production, under generalized competition by (12) production

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<sup>4</sup> Parenthetically, the property we have just noted could provide the basis of an alternative explanation of the 'Dutch disease', the commonly noted tendency of some countries becoming poorer following the exploitation of a newly discovered resource like oil.

depends on the number of warlords.<sup>5</sup>

Overall, there are several differences between the types of warlord competition: First, generalized competition is more intense, as measured by the resources devoted to capturing the surplus. Second, production is lower under generalized competition. Third, the presence of rents under localized competition discourages production less than it does under generalized competition; that is, 'crowding out' of ordinary production by rents take place in under both kinds of competition but it is higher under generalized competition.

### 2.3 External Intervention

We shall now briefly interject a note on the effects of external intervention, the participation of players in conflict who would be considered outsiders by the other parties in the conflict. In the current turmoil in the Congo, for example, almost every country from Uganda in the north to Zimbabwe in the south appears to be involved to a lesser or greater extent either in support of Kabila's government or with the forces opposing him. Similarly, in Afghanistan all the neighboring countries, as well as more distant ones, have at one time or another participated on the side of some of the evolving parties to the long civil war there. These are by no means the only examples of conflict that have drawn some form of external intervention; it is the rule rather than the exception.

Within the framework we have just examined the generalized kind of competition would perhaps be more appropriate. One effect of outside parties would work through the subsidization of some of the contestants, or simply by becoming one of the contestants themselves. In either case the effect would be to increase the resources devoted to capturing the surplus and therefore to increase the intensity of conflict

There is, however, another type of external intervention, by those who, by circumstance, interest, or even altruism, contribute to the increase in rents in the affected area. Foreign investments in natural resource extraction and various forms of foreign aid, including possibly humanitarian, contribute to

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<sup>5</sup>We could determine that number by equating the warlord's equilibrium payoff in (11) to a 'fixed cost' of entry into the business of war; the resultant equation along with equation (12) would determine the number of warlords and the number of producers as functions of

the rents contested by the different warlords and therefore increase the intensity of conflict. Moreover, such externally generated rents crowd out some domestic production, and especially in the case of generalized competition crowding out can be nearly complete.

External forces can of course play another, more positive, role by facilitating conflict management and cooperation, an issue to which we now turn.

### 3 Why not Cooperate?

In both models we have examined, there is no effective distinction between, on the one hand, actual, overt conflict according to which one side emerges as winner and the others are defeated and, on the other hand, the condition of 'armed peace' or 'armed cooperation', whereby the warlords divide up the rents under the threat of overt conflict.<sup>6</sup> In general, we can expect, overt conflict and armed peace to have different welfare consequences. We will now first examine the forces that generate a difference between overt conflict and armed peace and then discuss why, despite the seeming superiority of armed peace over overt conflict, we observe so much overt conflict. At the end of the section, we will briefly discuss how institutions of conflict management and peace could emerge to mediate disputes between warlords.

#### 3.1 Overt Conflict versus Armed Peace

For simplicity of presentation, suppose there are just two warlords. Then, the two types of competition lead to the same payoff functions and equilibrium. In addition, suppose the two warlords choose first their respective number of warriors and then they have the option of either inducing overt conflict or negotiating and settling under the threat of conflict. If both were to choose negotiation, then they would settle in an armed peace; otherwise, overt conflict would occur. We are interested in what occurs in this second phase - whether and under what circumstances, once they have chosen their warriors, the two sides would negotiate and settle. As we shall next see there are several seemingly compelling reasons for not engaging in overt conflict.

The question that might be raised, however, is: If the warlords can negotiate and make binding agreements on other things, why can't they make

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<sup>6</sup>I would like to thank Jack Hirshleifer for having suggested in conversation the term 'armed peace'.

binding agreements on the number of warriors and thus disarm? The problem with making a contract on the number of warriors is that such a contract would need warriors to be enforceable – there is no higher authority over the warlords – and, therefore, would not be binding. With warriors at hand, though, each side would have the force, the ‘threat’, to make a contract enforceable on other things, including the division of the surplus. That is, there is incomplete contracting on arming but not on other types of contracts that can be enforced through reversion to fighting.<sup>7</sup>

### 3.1.1 Destruction

Overt conflict rarely takes place without destroying people and material goods. Suppose then that if conflict were to occur a constant proportion  $\mu$  of the surplus would be destroyed, thus leaving a net surplus of  $\mu(T + P)$  to be contested between the two adversaries ( $0 < \mu < 1$ ). In the event of overt conflict, the winner would receive this surplus whereas the loser would receive nothing. The payoff of warlord  $i = 1, 2$  under conflict would then be:

$$V_c^i = \frac{w_i}{w_1 + w_2} \mu(T + P) - w_i \quad (13)$$

Without conflict, the surplus remains intact. Therefore, if warlord  $i$  were to receive a share  $\frac{w_i}{w_1 + w_2}$  of total surplus his payoff would be  $\frac{w_i}{w_1 + w_2}(T + P) - w_i > \frac{w_i}{w_1 + w_2} \mu(T + P) - w_i = V_c^i$ . Consequently, each warlord would prefer to settle rather than engage in overt conflict regardless of the number of warriors he or his opponent possesses. The division of the surplus in accordance with  $\frac{w_i}{w_1 + w_2}$  is not however the only possible division that Pareto-dominates conflict. In fact, there is a continuum of such possible divisions yielding a typical bargaining problem to be dealt with by the two warlords. As is well known, there is not a single plausible bargaining rule (or, bargaining solution) that can be universally considered superior, but the Nash Bargaining solution enjoys much support in the economic theory literature. (For an overview of bargaining solutions, Roth, 1979; for a noncooperative justification of the Nash solution, see Binmore, Rubinstein, & Wolinsky, 1986.) In

<sup>7</sup>There is a whole literature in economics that allows for such incomplete contracting and bargaining that is mostly associated with the theory of the firm. Grossman and Hart (1986) is a first paper in a long line in which incomplete contracting in on the level of relationship-specific investments that parties make, although a contract can be signed on the division of the surplus once these investments have been made.

cases of risk neutrality, as it is in our model here, the Nash solution also coincides with other symmetric solutions. Without going into the details, if the adversaries were to follow such a symmetric solution at the negotiation and settlement stage, the payoff function of warlord I would be the following:

$$V_p^I = \left( \frac{w_1}{w_1 + w_2} \mu + \frac{1}{2} \mu \right) (T + \theta P) - w_1 \quad (14)$$

Note that the 'division rule' is  $\frac{w_1}{w_1 + w_2} \mu + \frac{1}{2} \mu$  and how the effect of destruction enters into the determination of this payoff under armed peace. The more destructive conflict is (that is, the lower is the value of  $\mu$ ), the less important are the warriors in determining the division of the surplus. The equilibrium choice of warriors for both warlords turns out to be:

$$w^p = \frac{\mu(T + \theta P)}{4} \quad (15)$$

Again, note how the greater the possibility of destruction is, the lower is the equilibrium choice of warriors. It turns out that this is also the equilibrium number of warriors if the two sides expected overt conflict to take place under the payoffs in (12). Perhaps the more basic point, then, is that peace and the degree of cooperation involved under such conditions simply require arming that does not have to be lower than the arming that would be undertaken by the adversaries if they were expecting overt conflict. Moreover, in more complex environments than the one just examined, different sharing 'norms,' different bargaining solutions, can have very different effects on arming and the welfare of the adversaries (see, Anbarci, Skaperdas & Syropoulos, forthcoming).

### 3.1.2 Risk Aversion

Another feature of conflict situations that is important for whether adversaries engage in overt conflict is their attitudes towards risk. Since there are winners and losers in wars, conflict is risky even if no destruction were to take place. But risk is disliked by most people, even those like generals and warlords who might be preparing their whole lives for it. For some risks in life there is insurance available but there is not any insurance available against losing a war. What can be done instead is for the adversaries to choose not

to go to war, negotiate and settle their differences in a fashion similar to the way we have just seen in the case of destructive conflict.

To be more precise, suppose conflict is not destructive but both warlords are risk averse and both have a von Neuman-Morgenstern utility function  $U(c)$ : Then the payoff of warlord 1 under overt conflict would equal (the payoff of warlord 2 is similarly defined):

$$V_{c:risk}^1 = \frac{W_1}{W_1 + W_2} U[\mu(T + \textcircled{P})_i - w_1] + \frac{W_2}{W_1 + W_2} U[i - w_1] \quad (16)$$

Again, following the logic in the case of destructive conflict, suppose the two adversaries were to divide the surplus in accordance with their winning probabilities. That is, suppose warlord 1 receives  $\frac{W_1}{W_1+W_2}(T + \textcircled{P})$  as his share of the total surplus, thus ensuring a sure payoff of  $U[\frac{W_1}{W_1+W_2}(T + \textcircled{P})_i - w_1] = U[\frac{W_1}{W_1+W_2}((T + \textcircled{P})_i - w_1) + \frac{W_2}{W_1+W_2}(0_i - w_1)]$ , which by the concavity of  $U(c)$  implies that this sure payoff is strictly higher than the expected utility payoff under conflict in (16).<sup>8</sup>

Given that there is always an incentive to negotiate under risk aversion, the question is how many warriors and resources are the warlords going to expend in jockeying for a better negotiating position. As with the case of destructive conflict, much depends on the rule of division the adversaries expect to use at the negotiating phase of their interaction.

### 3.1.3 Complementarities in Production and Consumption

The contestable rents and production could be complementary to other goods that are deemed useful by producers and warlords alike but which are not contestable. The leisure or even labor of producers, for example, cannot be appropriated by the warlords but it is usually complementary in utility (for the case of leisure) or in production (for the case of labor). If one were to lose the complementary contestable surplus in conflict, however, these other goods would typically be worth a lot less. The winner, on the other hand, might have too much of the contestable surplus and too little of the other non-contestable goods. Without going into the technical details,<sup>9</sup>

<sup>8</sup>With risk-seeking warlords, of course, the opposite would be true and overt conflict would be preferable.  $U(c)$  in such a case would be convex and therefore the payoff under overt conflict in (16) would be higher.

<sup>9</sup>See Anbarci, Skaperdas & Syropoulos (forthcoming) for a formal specification and derivation of the incentives to negotiate under such complementarities.



conflict distributes resources inefficiently and therefore the adversaries could instead negotiate for a peaceful, and more efficient, division of the contestable resources.

As we have just seen, then, there are plenty of reasons for settling in the shadow of conflict in a 'balance of power' state in which the adversaries arm in order to maintain their negotiating position. The level of arming itself, however, depends on the 'norm' or rule of division the adversaries expect to adopt, with some rules being more sensitive to arming than others. A limiting case of a rule is the one that is completely insensitive to arming and according to which the two sides maintain a fixed portion of the surplus. That is the case that the adversaries completely trust one another, property rights are completely specified and enforceable, as they are supposed to be in ordinary economic environments. However, despite the variety of incentives that may exist for armed peace, we still observe not just arming but overt conflict as well. We then next discuss some of the reasons that may induce overt conflict.

## 3.2 Why Overt Conflict Occurs

Against the incentives to negotiate there are others that could actually precipitate conflict. One clear incentive would be that of risk-loving (or, risk-seeking) preferences by warlords. In such a case, if destruction were not too high, the adversaries would prefer to take the risk of war over the sure bet of dividing up the surplus. While this can be a factor in inducing conflict under some circumstances, it is a cheap way of trying to understand why overt conflict occurs; attributing a phenomenon to a preferential parameter should probably be a last resort. For the case of conflict we can find alternative, plausible sets of explanation, one more well-known within economics and another less so.

### 3.2.1 Incomplete Information

In the models we have examined, the adversaries know the exact size of the rents and the level of production; the number of their adversaries and their preferences; the exact nature of the contest success function that determines the disposition of the surplus; and in the case of negotiation and settlement they are supposed to share a norm about how to divide up the surplus. In

short, they face what economists and game theorists refer to as complete information about all aspects of the game.

In reality of course adversaries face incomplete information in at least one of the above dimensions. They might have only a general estimate of the size of the surplus, the strengths and preferences of their adversaries, the nature of the contest, and they might have no shared norms, or at least they are not sure about them, in the event of negotiations. If the beliefs of the adversaries about any of these dimensions deviate significantly from one another, then it would be perfectly possible to have equilibria (in appropriately defined games) in which overt conflict is the outcome despite the presence of incentives to negotiate and settle. Bester and Warneryd (2000) examine such an environment where there is war because at least one side underestimates the strength of the other. There is much other research that shows how suboptimal outcomes occur under incomplete information in many different contexts, but Brito and Intriligator (1985) is another paper that specifically considers the possibility of war.

Many wars can at least partly be attributed to the presence of incomplete information. World War I, for example, has been described to have occurred after a series of misunderstandings, miscalculations, and even inattention to details by some leaders at a time that trade and other interdependencies among the future combatants made war unthinkable in the minds of opinionmakers on both sides (see Joll, 1992, pp.10-41 ). If war could occur, then, between the great powers of Europe that had established channels of communication, regular diplomatic exchanges, and norms of conduct that had been evolving for centuries, it would be far easier to take place between warlords who face a far less predictable environment, possibly without regular channels of communication and without established norms of conduct to guide many of their critical moves.

### 3.2.2 How a Long Shadow of the Future Can Induce Conflict instead of Cooperation

It has become a rather common belief in economics and political science that conflict typically yields to cooperation as adversaries value the future more highly, or, as the shadow of the future becomes longer (Axelrod, 1984). This belief is based on folk-theorem type of arguments in conditions of repeated interaction. A long shadow of the future encourages long-term relationships and the development of a live-and-let-live attitude between the adversaries.

However, there is a different effect a long shadow of the future can have. A warlord by pursuing war now could weaken his adversaries permanently or even possibly eliminate them and become 'king' well into the future. Therefore, a warlord who values the future highly could indeed take the chance of war instead of pursuing negotiation, despite the short-term benefits of negotiation, because the expected long-run profits could be higher in case the opponents become permanently weakened or eliminated. In environments in which those who win gain an advantage well into the future, both the intensity of conflict, as measured by the amount of resources devoted to it, increases (Skaperdas and Syropoulos, 1996) and the choice of overt conflict over negotiation becomes more common (Garman and Skaperdas, 2000) as the future becomes more important.

The argument of many parties that initiate wars is that they are forced to do so because otherwise they would lose any advantage they might have and thus have a lower probability of winning as a result. Again, during the fateful summer of 1914, Germany felt that, to have any chance of swiftly defeating France before Russia fully mobilized, it would have to call for general mobilization as early as possible and before the intentions of the Entente powers became fully known. But the call for mobilization by Germany would certainly hasten war as it actually did. Thus, both the various forms that incomplete information takes and the attempts by adversaries to gain a permanent strategic advantage over their opponents by initiating war are factors that induce conflict, despite the presence of incentives in the short-run to negotiate.

### 3.3 Conflict Management in the Long-Run

The visitor to the Northern Italian city of Bologna today cannot miss the tall, skinny towers that define its skyline. They were built during the twelfth and thirteenth centuries when the city was wracked by clan warfare. The fact that about 60 of the original 200 towers still stand is testament to how enduring conflict can be. Other Italian cities had similar experiences to those of Bologna at about the same time. To the people living then, that was the only possible state of the world they could imagine. It was a state of what we have called armed peace, punctuated by outright warfare when conditions changed and one or more sides thought it could gain an advantage over the others. Some periods were a lot more peaceful than others and the sides to the conflict could relax and go about their business without feeling threat-

ened. Informal and formal understandings would develop until some internal or external force would change the apparently fragile equilibrium. This condition did not end with the end of the thirteenth century. It continued in different forms. The fifteenth to the sixteenth centuries, for example, was the world in which Machiavelli lived and the Tuscan countryside was guest to French and German troops, Swiss papal guards, and the multitude of condottieri - the various warlords offering their services to cities who at the end of their designated service would more often than not sack the homes of their former employers. Italy did not unify until the second half of the nineteenth century, and of course since then the country has not been completely free of foreign troops or domestic contention.

Compared to other places, Italy has not been especially conflictual. After all, this is the country in which the Renaissance and the commercial revolution occurred. In closing with the example of Italy, we would like to underscore the tremendous difficulties in building the trust, the commitment, and the institutions that will allow for disarmament and the elimination of overt conflict. The transition from settling scores in the battle-field to settling them in courts and parliaments is a process that has only begun to be investigated by economists. It takes a very long time to build institutions and not much to destroy them. Only recently have economists come to recognize the central importance of institutions of conflict management for economic development. (Recent prominent examples of this recognition are Rodrik, 1999, and Oslon, 2000.) Though we cannot expect to find a recipe for ending the many civil wars that are still taking place and those that are sure to erupt in other countries, economists could complement the long-standing efforts of other social scientists in identifying more direct paths than those known to building institutions of conflict management.

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- STERGIOS SKAPERDAS, b. 1959, PhD in Economics (Johns Hopkins, 1989). Associate Professor, University of California, Irvine (1996-); area of research: political economy. Co-editor of *The Political Economy of Conflict and Appropriation* (Cambridge University Press, 1996).