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Research Paper No. 2008/45

Enforcing Peace Agreements through Commitment Technologies

S. Mansoob Murshed¹ and Philip Verwimp²

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Abstract

This paper models the instability of peace agreements, motivated by the empirical regularity with which peace agreements tend to break down following civil war. When war provides opportunities for profit to one side, or when other difficulties such as historical grievances exist, peace may become incentive incompatible. The party that has something to gain from surprise warfare may agree to peace, but will later renege on it. It is shown that the levels of conflict chosen by this group are an increasing function of both grievance and greed, but decreasing in the direct costs of war. Peace is achievable via externally devised mechanisms that enhance commitment to peace. Aid and direct military peacekeeping intervention (sanctions) can reduce or eliminate conflict. These sanctions, however, need to be credible. Finally, the independent provision and finance of international sanctions are considered. When these arrangements yield little benefit to financial sponsors, or are very costly to them, the bite of the sanctions can become ineffective.

Keywords: commitment problems, peace treaties, commitment technologies, sanctions

JEL classification: C78, D72, D74, D83

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1 Introduction

One aspect of fragility is the risk of violent internal conflict in a country. Usually when conflicts break out attempts are made to mediate between the warring parties by outside powers. These often result in peace agreements. Why is it so difficult to sustain peace agreements following civil wars in developing countries? Well-known examples of broken peace agreements are the Addis Ababa Agreement (Sudan 1972); the Arusha Agreement (Rwanda 1993); and the Angola Peace Agreements (1991 and 1994). Not only do peace treaties need to be brokered by outside powers (Nordic countries or United Nations agencies, for example), but their continued engagement as financiers and enforcers of the peace is required if the negotiated settlement that is mediated is to last. In other words, most peace agreements between warring factions in contemporary developing-country civil wars are not self-enforcing. Walter (2002) points out the empirical regularity with which peace deals break down, and civil war resumes. She also points out to the fact that it is much more likely that belligerents will agree to a deal if they are able to share power following the agreement, and when a third party guarantees the peace arrangement. But quickly cobbled power sharing deals do not always ensure that the peace will last because of various temptations to renege on current undertakings in the future, see Rothchild (2005). And, in many instances this future period may not be too far away, as is often the case when valuable resource rents are at stake, or if long-standing collective grievances exist, calling into question the credibility of the peace agreement in the first place.

Arguably, therefore, the greatest impediment to sustaining peace agreements is the imperfect or insincere nature of the *commitment* to peace. The theme of commitment in the context of modern conflict can be traced back to the work of Schelling (1960). More generally, a costly commitment problem arises when an agreement or contract may be reneged upon, usually because the undertaking cannot be enforced by a third party or court of law; see, Hart (1995) on commercial applications of contracts that require re-negotiation. If breaches of contract cannot be remedied, the credibility of the agreement is questionable. One side will not be able to successfully 'bribe' another group into always adhering to peace, because the recipient's commitment to the deal is suspect. Therefore, there is no potential political 'coase' theorem because there is no enforcement of the bargain. In political science, for example, an absolute monarch who is not subject to constitutional constraints can never credibly commit to a future course of action, as he can easily go back on his undertaking. Ultimately, a peace treaty is only a piece of paper. It will be self-enforcing as long as it is in the interests of the parties concerned to adhere to its stipulations. If not, it will collapse, unless there is some form of (outside) enforcement.

Peace agreements are unsustainable when it is not in the interests of at least one side entering into the agreement. Stated in another way, the benefits from peace are not incentive compatible. Also, we often see that repeated attempts at peacemaking are often necessary before lasting peace is established. Even when a side in civil war is not ready for peace, it might engage in 'cheap talk' about peace in order to curry favour with donors and international agencies. It has to be borne in mind that many peace conferences, temporary cease-fires and even peace agreements are reached after mediation by well-meaning outside parties such as the governments of Norway, Finland or Switzerland. Furthermore, civil wars are sometimes temporarily halted by outside military peace enforcement as in Liberia (ECOMOG) and Somalia (USA); in other instances peace may be more lasting as with the British intervention in Sierra Leone.

Barring outright military victory by one side, most civil wars cannot be ended without outside intervention, including the use of aid, trade restrictions and peacekeeping efforts to sustain the agreement following the cessation of hostilities.

An illustration of the various mechanisms we model in our paper may be found in the Rwandan case (Verwimp 2004). In 1993, after two-and-a-half years of civil war, the Rwandan President, Major-General J. Habyarimana signed a peace agreement with his opponents, the Rwandan Patriotic Front (RPF) in the Tanzanian town of Arusha. He signed under immense pressure from donors, the domestic opposition and the military threat of the rebel force. Western donors were heavily engaged in the entire peace process, including military support and promises of financial aid. With the economy in subsistence mode, coffee prices down and crop failure hurting the population, the regime was struggling to survive. But one may ask: were the president and rebel army (RPF) genuinely *committed* to peace? The answer must be no. In a speech before his supporters, the president called the agreement ‘just a scrap of paper’. A group of officers and leading administrators from the president’s inner circle were organizing small-scale massacres of Tutsi far from the frontline in which a total of 2,000 people were killed (FIDH 1993) and the presidential clan set up a hate radio station (Radio des Mille Colinnes) that vehemently attacked the peace agreement and the Rwandan Patriotic Front (RPF). The fact of the matter was that the ruling elite around Habyarimana was used to ruling the country on their own, and had no long-term interest in power sharing power with the RPF. Even sharing power with the domestic Hutu opposition was only accomplished after intense pressure from within and outside the country. The campaign of hate ultimately ended in genocide that cost the lives of at least 500,000 Tutsi people. The Rwandan Patriotic Front on their part repeatedly engaged in surprise attacks (January 1991, February 1993) which cast doubts on their commitment to peace as well. With a weak mandate to enforce the peace, the small and under-equipped UN contingent tragically failed to prevent violence as soon as the peace agreement collapsed.

Relating the Rwandan case to the model that we develop in this paper, we can summarize it as follows: (i) the presence of deep-seated historical grievances; (ii) a civil war leading to a peace agreement; (iii) the inability to share power; (iv) the use of surprise attacks; (v) weak and inadequate enforcement of the agreement; (vi) worsening of the civil war and ultimately genocide, which shows that inadequate enforcement of a treaty may make matters worse, and (vii) the reconstruction phase with greater international support in terms of aid and implicit threats of violence.

The theoretical modelling literature on civil war persistence as a failure of commitment to peaceful behaviour is characterized by its paucity. Of the few models that do exist, Addison and Murshed (2002) argue that discounting future costs of renegeing on treaty obligations causes peace agreements to crumble. They also point out that uncertainty about honest/dishonest types of agents engenders extra costs. Azam (1995) models the imperfect credibility of transfers made by a ruling group to potential armed rebels. Azam (2005) also models imperfect commitment to peace treaties and outside intervention to enforce the peace based on incomplete information about the true nature of the protagonists. Fearon (2001) characterizes ongoing civil war as a consequence of the phenomenon that might make the remote possibility of outright military victory a more attractive option to compromise and peace. Wood (2003) analyses the self-enforcing robustness of settlements to civil war, pointing out that one important reason for the breakdown of peace deals is the indivisibility of what is contested, be it the post-

war economic surplus or intrinsic symbols, such as Har'm-al-Sharif or Temple Mount in Jerusalem, or ideological aims such as the abolition of the monarchy in Nepal.

This paper builds an analytical signalling model of a peace agreement based on Addison and Murshed (2002). In section 2, we establish the imperfect credibility of a peace agreement when greed based on the desire to acquire natural resource rents, or equally, deep seated grievances make it incentive incompatible for one side to commit to peace. In our example it is the rebel side, but that role can be assigned to the government or any spoiler group without loss of generality. So why are incentive compatible or self-enforcing peace treaties not arrived at? One reason is that in some cases the parties have intractable differences, and can never agree to a sharing rule in a post-war situation, without outright military victory for one side, or an outside power altering the incentive structure. Second, one party or faction within a party may have such a bad reputation that they cannot credibly commit even if they wish to. There may be no institutions upon which to anchor genuine commitments to peace; most conflict ridden countries experience war because of weak state capacity in the context of a degenerated political system. Third, information may be imperfect. The presence of lootable resource rents, such as those associated with alluvial gemstones, illicit narcotics or fuels, may make it difficult to see through avaricious tendencies to grab more for oneself or the group through the resumption of fighting. Finally, a high rate of discount for future costs. One side or faction may wish to break the agreement in order to satisfy its current impatience to consume, discounting the future consequences of renegeing on a commitment to peace. This paper attempts to address all these considerations.

The role of externally imposed commitment technologies (mechanism design) to make peace more likely to last are considered in section 3. In particular, it is shown that sanctions (such as a peacekeeping force) imposed by outside powers can only work if they too turn out to be credible. This result is the analytical counterpart of the all too often observed phenomenon of failed and imperfect peacekeeping. For example, peacekeeping is considerably more robust in the Balkans than in many parts of Africa. Larger and better equipped forces patrol smaller territories in the former region. Former conflict afflicted regions in the Balkans, such as Bosnia-Herzegovina, receive more external assistance per capita than their counterparts in Africa. The efficacy of the sanctions imposed by peacekeepers is also a function of their mandate. UN peacekeepers may be less empowered to intervene compared to NATO forces or the militaries of unilaterally imposed peacekeepers. Ultimately, sanctions that enforce the peace cost money. To this end, we also consider the 'production' of sanctions in section 4, where the sanction is financed by an outside power but executed by another, closer, party. For instance, peacekeeping in the Darfur in the Sudan is being carried out by African Union members, but financed by western donors such as the European Union. When these arrangements in distant lands yield little utility to outside sponsors, or are very expensive, the sanction and bite of the peacekeeping operation can become largely ineffective. Finally, section 5 concludes.

2 The imperfect credibility of peace agreements

The basic setup of the model involves two sides, referred to as government and rebels. One side is either tired of fighting or it has an interest in peace. This group is the government in our example. The other side, the rebels, may have something to gain

from the resumption of fighting. Note that, the roles played by the government and rebels in the games that follow can be reversed without altering the results. Both sides have entered into a peace deal. The government side derives no benefit from breaking this agreement. Consider the utility function of the rebel group (U^R):

$$U^R = -(1/2)c_1w^2 + E\theta c_2(w - w^e) + Iw \quad (1)$$

$$c_1 > 0, \quad w, w^e, \theta, c_2 \geq 0.$$

$$\theta = B + \varepsilon, B \geq 0, \dots \varepsilon = \varepsilon_{t-1} + \eta, \eta(0, \sigma^2)$$

In Equation 1 and what follows, the utility functions correspond to expected utilities. The expectation operator (E) is introduced for the value of a random variable within the function, and a superscript e is used for an expectation of a variable on which information is (or may be) incomplete. The first term on the right-hand side of Equation (1) is the pure cost of conflict in quadratic (squared) form, where w represents warfare or belligerent behaviour¹ and c_1 is the parameter measuring the direct cost of warfare. The negative sign before it is to indicate the cost or disutility from fighting. The quadratic form of the cost illustrates that the costs of war rise more than proportionately as the level of w rises. The parameter (1/2) is introduced for analytical tractability.

The second term on the right hand side of (1) indicates the gains to the rebels from renegeing on a peace agreement, or the benefit from a ‘surprise’ war, where the level of actual conflict (w) exceeds the level of conflict expected by the opposition, the government in our example (w^e). In other words, the spoils of war (capturable rents) can only be wrested via the ruse of peaceful intentions. The parameter c_2 captures the magnitude of this desire, the higher c_2 is, the greater the gain from feigning to make peace first and looting later. It may also be viewed as a subjective measure of *greed*. In addition to this, the greater the abundance of lootable resources, or rents to be extracted, the higher is the gain from surprise war. This is measured by the expected value (E) of the parameter θ which captures the rent (B) from disputed natural resources such as oil, diamonds, drugs and so on. The rent or booty is subject to random shocks (ε) with a first-order auto-regressive process resulting in shocks persisting for some time. The purely random component (η) has zero mean and constant variance. Random shocks could arise from terms of trade fluctuations or sudden increases in outside contributions to the war chest.

The third term in Equation (1) represents an intrinsic motivation (I) on the part of the rebels to fight the government based on deep-seated historical grievances (such as between Hutu and Tutsi), ideological differences (land reform, monarchy), or intractable indivisible stakes such as the control of a city/shrine (see Wood 2003), or secessionist tendencies. Note that both greed and grievance are incorporated into the utility function for the rebels.

¹ The variable w may be measured in terms of chosen military expenditure and other costs of war broadly defined. We omit aspects of ‘conflict technology’ considered by authors such as Hirshleifer (1995), dealing with the trade-offs between peaceful and military production and the probability of winning influenced by decisiveness, as they are of marginal interest to issues addressed in this paper.

Equation (1) is the utility function of the rebel leaders and their followers whose participation and incentive compatibility constraints have to be satisfied to induce them to follow their commanders. Note also that the cost of fighting and gains from war are additive separable.

The pecuniary component of the rebel utility function (the second term in Equation 1) may be characterized by the following process of income generation (y^R):

$$y^R = y^N + E\theta(w - w^e) \quad (2)$$

Here the income of rebels is equal to some fixed rate (y^N), plus an additional component arising from surprise warfare. The income associated with the fixed rate is the certain income received by the rebels as a result of the peace treaty, and is therefore omitted from (1). It may incorporate the pecuniary value of power sharing with the government. In contrast, the gains from the second term in (2) are based upon driving a wedge between actual and expected levels of belligerence on the part of the rebel group's opponents. This implies gains from surprise warfare (reneging on a peace agreement), when there is something to gain based on expected θ which measures the rent from capturable natural resources: oil, diamonds, drugs and so on. More importantly, these rents remain contestable even after the peace settlement and can only be captured through belligerent action. The rebel group wants more than what is considered fair and acceptable in the peace settlement; it gets it through surprise war because of weak institutions of restraint.

The rebels maximize their utility in (1) subject to w , which leads to optimal w^* :

$$w^* = (E\theta c_2 + I) / c_1 \quad (3)$$

Proposition 1: From (3), the equilibrium choice of warfare is greater the higher the element of pure avarice, c_2 , the higher the expected availability of lootable resources and other sources of finance, θ , the greater the grievance or intrinsic motivation to fight (I), and the smaller the direct cost of fighting, c_1 . Both greed and grievance have been incorporated into the rebel decisionmaking calculus.

As far as the government (G) is concerned, a simple version of their utility function is:

$$U^G(w^e / w) = -(w - w^e)^2 \quad (4)$$

The meaning of (4) is that government's utility is declining in surprise warfare, when w diverges from w^e . In case actual fighting levels are in excess of the government side's expectation, it is clearly caught less than fully prepared for war. In the event that actual fighting is less than expected, the disutility arises because the government has to engage in unforeseen military expenditure that diverts income from other types of public expenditure or increases its borrowing/aid requirement. Maximizing (4) with respect to w^e yields:

$$w = w^e \quad (5)$$

The government reacts at the same time as the rebels. Substituting (3) into (1) for the rebel group, and (5) in to (4) for the government, gives us:

$$\begin{aligned} U^R &= [-(E\theta c_2 + I)^2 + 2I(E\theta c_2 + I)] / 2c_1 \\ U^G &= 0 \end{aligned} \quad (6)$$

This is the outcome when the rebels have an incentive to renege on an announcement of complete peace, but it does not have a first mover advantage. The only positive term in the rebel utility function emanates from grievance. Both announcements by the rebels and expectations formation by the government take place simultaneously. If the rebels pursue a policy of no warfare, with $w = 0$, the payoffs in (6) become:

$$\begin{aligned} U^R_p &= 0 \\ U^G_p &= 0 \end{aligned} \quad (7)$$

This is the Pareto optimal outcome and superior to the result in (6). In the optimal state there is no war, and $y^R = y^N$.

Now, consider a situation where the rebels enjoy a first mover advantage and send signals of peaceful intentions, and then engage in surprise warfare. If their signal is believed, the actual and expected levels of warfare would diverge, $w = (E\theta c_2 + I)/c_1$ and $w^e = 0$ in equation (1). This involves cheating on a pre-announced commitment and the rebel payoff becomes:

$$U^R_c = (E\theta c_2 + I)^2 / 2c_1 \quad (8)$$

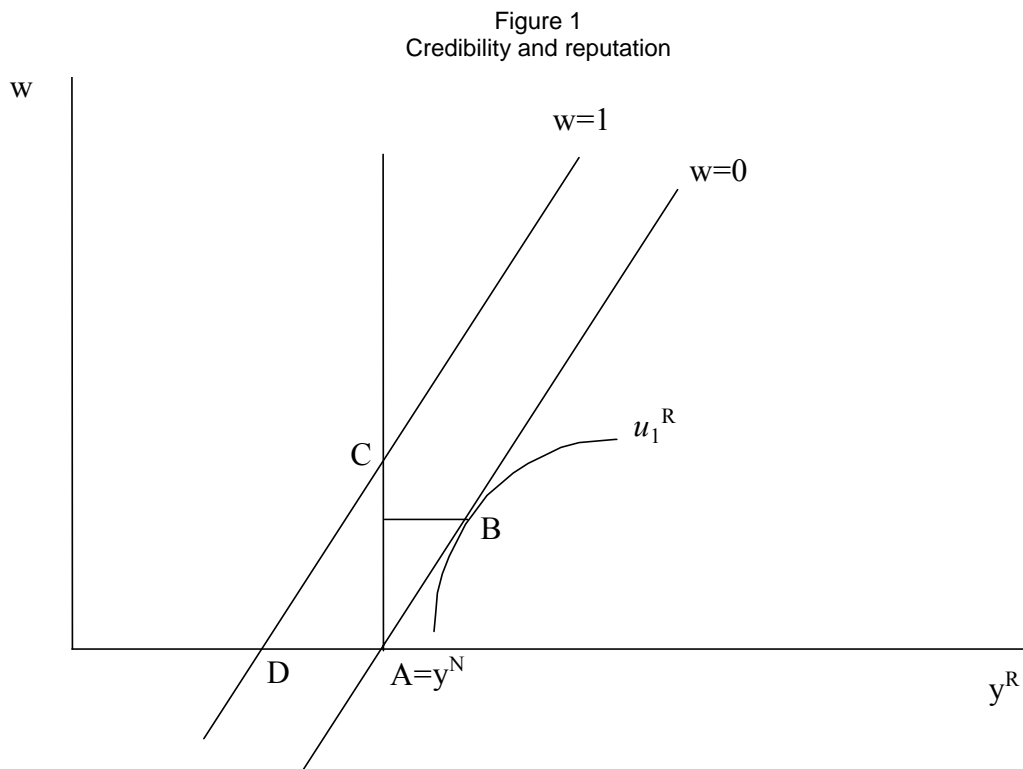
Note that the rebels' utility is greater in this case than under (6) if we discount the intrinsic gain from warfare. As in Barro and Gordon (1983) the reputation of the rebels is all or nothing (0,1), hinging on past behaviour. Consider the following rule. The government believes the announcement if the rebels acted honestly in the previous period and kept its commitments, otherwise it is not believed. This implies that there is a future cost of cheating. The cost (C) is equal to the loss of reputation and the inability to create future surprises, and is given by:

$$C = -((E\theta c_2 + I)^2 / 2c_1) \quad (9)$$

Hence, the penalty for cheating (loss of reputation) is exactly equal to the gain from cheating in (8). But the punishment *always* comes at some future period. If rebel leaders discount this *future* loss, the cost of cheating in (9) is always less than the gain from renegeing on a fixed commitment in (8). Typically in conflict situations, which primarily occur in low-income developing countries, the future is heavily discounted. The upshot is that the socially optimal policy of zero warfare ($w = 0$) is *time inconsistent* or incentive incompatible, and thus will not be a possible outcome. The optimal policy of no conflict is infeasible, as it is inconsistent with the incentives and expectations of the concerned parties.

Furthermore, there will be a range of possible conflict intensities that are feasible equilibrium outcomes. Multiple equilibria are possible. The results are depicted in

Figure 1 in y^R and w space. The upward sloping linear aggregate supply curve has a slope exactly equal to $E\theta$ from equation (2), and is steeper the greater the spoils of war. The rebels' preferences are shown by the concave indifference curves with a slope = $(E\theta c_2 + I)/c_1$, obtained from (1). The greedier the group (the greater is θc_2), the steeper the indifference curve is. Similarly, the more intrinsically motivated they are to fight the government, the deeper the grievance and the steeper the indifference curve. The rebels could announce zero conflict at point A. It could then cheat on its commitment and try to move to point B. The aggregate supply curve schedule would shift leftwards because of the process of expectations formation. The vertical distance between B and C gives the range of multiple equilibria depending on the time horizon of the game and the discount rate used to obtain the present value of future reputation losses. The point B defines the lowest feasible rate of conflict. It is the *best self-enforcing outcome*, without outside intervention, and given the objectives of the rebels and the expectations of the government. To reiterate, a no war situation (point A) is simply not incentive compatible for the rebels, or credible to the government. An increase in the expected spoils of war, $E\theta$, shifts the aggregate supply function leftwards and makes the indifference curves steeper pointing to an expansion in the zone of feasible equilibrium warfare. Also, the incentive for conflict cannot be eliminated without removing intrinsic grievances.



3 Commitment technologies for the rebel group

Since peace between warring groups is not self-enforcing, let us consider an externally devised mechanism design to reduce conflict. Much of this implies manipulating the attitudes of the rebel leadership via sanctions, arms controls, trade restrictions and foreign aid. Consider a reformulated version of the rebel utility function where we

embed external conflict prevention policy parameters, and an additional cost component associated with an international agreement:

$$U^R = -(1/2)c_1(M)w^2 + E\theta c_2(T)(w - w^e) - c_3(S)[(w - w^e) + Iw] \quad (10)$$

where: $c_1 > 0, c_2 \geq 0, c_3 \geq 0$; $c_{11}, c_{31} > 0$; $c_{21}, c_{22} < 0$

Also: $c_1(M) \geq c_1 \forall M, c_2(T) \geq c_2 \forall (T), c_3(S) \geq 0 \forall S^e \geq 0, c_3(S) < 0 \forall S^e < 0$

In Equation (10) the *behavioural* parameters of the rebel group, c_1 , c_2 and c_3 are now functions of actions undertaken by external actors. The final term in (10) represents an institutional innovation, a deep intervention or mechanism design in the sense of Dixit (1996). The objective function of the external actor is not yet explicitly modelled, except that their own domestic security interests will motivate their actions.

Trade sanctions (T) on items such as ‘conflict’ diamonds, money laundering and the activities of foreign entrepreneurs (in supplying arms and finance) may be utilized by a foreign power to reduce greedy attitudes, c_2 . International controls on arms transfers (M) and/or sympathetic assistance from non-residents could be utilized to raise the direct cost of war, c_1 . In either case, the indifference curve in Figure 1 will flatten out, and lower equilibrium ranges of fighting will emerge. These interventions are, however, shallow (Dixit 1996) as they do not alter the rules of the game.

Another way of reducing conflict is through an international agreement or understanding. This must also work on *intrinsic grievances*, provide a peace dividend and also hold out a forceful sanction in the event of deviations from agreements. Participation in these agreements implies a strategic pre-commitment to peace by delegation to a treaty or outside adjudicator. Although this method does not always eliminate conflict, it does raise the costs of war and renegeing on peace deals. The last term in (10) represents such a *commitment technology* or *delegation* via mechanism design, and c_3 measures the costs of renegeing on peace agreements as a function of sanctions (S) imposed by other signatories or parties to the agreement. Sanctions consist of the carrot of conditional aid, and the stick which militarily enforces adherence to the peace treaty. The sanction works if and only if its expected value (S^e) is positive; it must not be perceived as ‘cheap talk’ (a signal without commitment). When the sanction works, $S^e > 0$, and it could be the force or delegated sanction imposed on warring parties by some outside power, such as an effective UN or another multinational peacekeeping force. To take an example each of effective versus ineffective peacekeeping, the peace enforcement works better in Kosovo with nearly 100,000 troops compared to the Congo, where a group of mere 16,000 troops police a state the size of western Europe.

Maximizing (10) with respect to w yields the level of w with commitment (w_c^*):

$$w_c^* = [E\theta c_2 - c_3(1+I)]/c_1 \quad (11)$$

Proposition 2: The presence of external commitment technologies in the form of sanctions, conditional aid and controls in international trade lowers the optimal level of belligerency amongst rebels, if and only if $S^e > 0$.

The proposition can be verified by noting that w_c^* in (11) is less than w^* in (3) if $c_3 > 0$ when $S^e > 0$. If so, these commitment technologies lead to lower levels of warfare when compared to (3). Even though the commitment technologies and sanctions are independent of actual w in (10) for simplicity, our result will hold through if T , M and S are increasing in w . First, there is a *direct* effect of the external sanction or outside commitment technology innovation when it works, c_3 . Then we have the *indirect* effects emanating from the manipulation of the behavioural parameters of the rebels (shallow interventions). Chiefly, this involves restrictions on the export/import of the rebels' international revenue/financial sources, which lower c_2 . Also, controls on arms transfers and financial flows from sympathetic outsiders raise c_1 . Note, however, that the sanctions and policies are a result of external intervention, and involve costs to outside parties, which is something we turn to in the next section.

Corollary 1: If sanctions are expected to be ineffective, because the level of force and developmental aid is inadequate making them cheap talk, $S^e < 0$, and $c_3 < 0$ in (10) and (11). A half-hearted sanction package will be a complete failure, and the levels of conflict that ensue are greater than without the cheap talk sanction.

4 The finance and production of sanctions

Typically the policies considered in the previous section, especially sanctions, S , will involve costs to outside powers and agencies, as it is they who initiate them. The external powers could be the United States, the European Union or an international organization like the United Nations. By sanctions, we mean the enforcement of a peace deal via peacekeeping forces.² Normally, it also includes some conditional development assistance or aid. Either way, the production of sanctions and the aid that accompanies it cost money. This section considers the benefit of sanctions to outside sponsors. It also looks at it in a situation where the finance and production of the sanction, S , is not carried out by the same party. The separation of finance and enforcement of peace deals is not uncommon. Often the financiers of peace treaties, especially the aid component, are donors such as Norway and Finland without a direct security interest in the conflict zone. An organization like the African Union, through the armed forces of its member states, may actually enforce a peace deal, whereas the funding and logistical support for the operation may be provided by western donors like the European Union, as is practiced in Darfur at the time of writing of this paper. Even UN peacekeeping mandates are carried out by the military forces of member states, who are paid for their pains in this regard. The idea here is that the sponsor or financier of peacekeeping derives some utility from peace in other parts of the world due to security considerations (terrorism, refugee influxes), humanitarian considerations or because promoting peace enhances the sponsors international prestige. But how much is the external sponsor of the peace willing to pay, and how far are they willing to go in this respect?

In many ways, the sponsor or financier of the sanction can be regarded as the principal, and the implementer of the sanction the agent, in a principal-agent framework of the

² It is beyond the scope of this paper to dwell upon various nuances of peacekeeping including disarmament, demobilization and reintegration.

type considered by say, Laffont (2005). Consider the utility function (V) of the external sponsor (principal):

$$V = D(S) - SP(S) - (1 + \lambda)u \dots S' > 0, S'' < 0, \lambda < 1 \quad (12)$$

Here D represents the benefit from the sanction in deterring the onset of war to the external sponsor, $P(S)$ is the inverse demand function for sanctions given its price or cost which is paid to the agent, P^3 , u represents the transfer made to the agent to carry out the task, λ captures the cost of distortionary taxation needed to finance the transfer. There are diminishing returns to the benefits of the sanction, which means that as expenditure is increased, the utility for each additional amount starts to decline.

From the standpoint of the agent, let us postulate a utility function, H :

$$H = u + SP(S) - (h - a)S - F - f(a) \dots f' > 0, f'' > 0 \quad (13)$$

On the right-hand side of (13) we have the transfer to the agent from the principal, u , the revenue from the sanction, $SP(S)$, F represents a fixed cost of sanctions production, the production of the sanction (S) depends on the qualitative type of the agent, h and the effort exercised by him (a) and $f(a)$ represents the cost or disutility of effort to the agent. Note that a higher value of h implies a more productive agent, his cost of producing sanctions is correspondingly lower; greater effort, which is costly to the agent, also elicits more output. Since the principal takes into account the agent's objectives, we need to solve for the value of u in (13) and substitute it into (12), obtaining:

$$V = D(S) + \lambda SP(S) - (1 + \lambda)[(h - a)S + F + f(a)] - (1 + \lambda)H$$

We add the utility of the agent, H , to the above function to obtain the grand utilitarian welfare function, $W = V + H$:

$$W = V + H = D(S) + \lambda SP(S) - (1 + \lambda)[(h - a)S + F + f(a)] - \lambda H \quad (14)$$

Maximizing the above with respect to S :

$$D'(S^*) + \lambda[P'(S^*)S^* + P(S^*)] = (1 + \lambda)(h - a^*) \quad (15)$$

In the above, asterisks (*) indicate optimal values. The solution in (15) refers to a full informational outcome where the agent's type and effort levels are fully observable and verifiable, ruling out adverse selection and moral hazard problems.⁴ Equation (15)

³ As the price or cost, P , increases, the quantity of sanctions, S , demanded by the financial sponsor falls.

⁴ When the agent's efforts are non-verifiable, even when final output is observable, we have moral hazard. When the sponsor or principal cannot observe the intrinsic type of the agent we have adverse selection. The better type agent will extract a private informational rent (see Laffont 2005) to carry out the optimal level of sanctions. This is because he can always produce at the level of the unproductive type of agent with a saving in effort, necessitating a side payment to him to increase output.

implies that the world marginal utility of sanctions production is equated to its world marginal cost.

Proposition 3: From (15), the lower the marginal utility of sanctions to the sponsor $D'(S)$, the more expensive the aid cum military sanctions package is in terms of 'price', $P'(S)$, the greater the shadow cost of the distortionary tax, λ , that has to be levied to finance it and the greater the effort levels (a) needed to produce a unit of sanction are, the lower the optimal level of sanction chosen.

This outcome relates to the 'cheap talk' result in proposition 2 and corollary 1 above. If the optimal level of sanctions and aid produced are low in (15), then the peacekeeping force's sanction is cheap talk or ineffective, as $S^e < 0$. This is likely to happen if the conflict is in a distant land, which lowers both the marginal utility of the sanctions-aid package and raises the cost of doing so because of the endemic poverty in the country in question, as well as logistical difficulties. Also, the financing of such projects through taxation might be hard to sell to the ordinary median voter in the sponsoring country. Finally, the effort level required on the part of the sponsor's agent might just be too great to make it worthwhile, and the probability of the agent's success in this regard may be too uncertain. Perhaps, the result above helps to explain the security dilemma in African civil wars. There is just not enough will in the west to finance security in far away war torn places, in contrast to problems at their back door, say in the former Yugoslavia, which are considerably more menacing. Arguably, an incipient civil war was prevented in FYR of Macedonia. In ex-conflict zones in the Balkans, aid per capita is very high, and those regions are policed by high quality, well motivated and adequately mandated western and NATO forces. Yet, at the same time, lip-service is paid to the need to end civil wars in Africa, and weak and ineffectual forces are despatched there from inside and outside the continent, usually under the aegis of virtually impotent Security Council sanctioned UN mandates. Hence, the saliency of the expression, 'cheap talk', meaning that in the absence of a willingness to pay by external sponsors, many of the peace deals brokered in far flung places of the world like in Africa are doomed to failure.

5 Summary and conclusions

We have analysed the non-self-enforcing nature of peace treaties caused by imperfect commitment. Where war provides economic gains to one side or there are deep-seated grievances, peace is not incentive compatible, and peace agreements will necessarily degenerate. Socially optimal policies of no conflict may become time inconsistent. A range of equilibrium conflict levels may appear, implying the existence of multiple equilibria. The levels of conflict are an increasing function of grievances and pure greed over lootable resources, but decreasing in the direct costs of war. Externally devised commitment technologies (mechanism design) could be key to ending conflict where the peace treaty is otherwise not self-enforcing. Sanctions, aid and trade restrictions, if effective, might eliminate conflict. These include controls on the sale of 'blood' diamonds and restrictions on arms transfers to combatants. Foreign aid can play a pivotal role in reducing poverty and lowering the pecuniary and intrinsic incentive to fight via growth and income re-distribution (pro-poor growth). It might also be used to make credible promises of redistributive reconstruction that close the gap in living standards between rebels and government supporters, thereby reducing the intrinsic

incentive to fight. There is also a role for the use of *force majeure*, military intervention mandated by regional alliances along with the UN. In order for this threat to work, military force must be credible, as is sadly not the case in many contemporary civil wars. In summary, conflict prevention by outside parties involves manipulating the utility function of combatants and their leaders so as to make fighting a less attractive proposition, and imposing settlements when they are otherwise not self-enforcing. But, external military sanctions, in particular, must not be perceived by potential combatants as ‘cheap talk’. This can make matters worse, and warfare might resume at a higher level of intensity. We also examine the production of sanctions, where in accordance with contemporary practice, the finance and execution of the sanction are made independent of one another. If the cost of effective sanctions is too high, or it yields little security benefit to the sponsor, as is likely to be the case for conflicts in distant lands, there is under-production of the sanction, making it more likely that it really is ineffective cheap talk. Perhaps, that is why we do not see a speedy end to many civil wars in Africa. In the ultimate analysis, credible commitments to peace must be found in effective domestic solutions that involve constitutional restraints and delegation of power. As discussed in Rothchild (2005), mechanisms leading to the *separation of powers*, and where decisions on different issues are taken by diversely constituted bodies, may prove more durable in sustaining the peace when compared to cruder quick-fix power sharing arrangements between warring parties.

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