

On the Resolution of Conflicts Over Sacred Goods

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We analyze recent proposals from social scientists suggesting that when sacred values are involved in conflicts, progress towards negotiation can be made if the contending parties make symbolic gestures acknowledging the sacred values of their rivals. We incorporate this possibility in a model in which the allocation of a sacred good can be resolved either by direct conflict or by negotiations made possible through (costly) symbolic gestures. We identify conditions under which a negotiated outcome may obtain. When such symbolic gestures are undertaken, the *ex ante* aggregate welfare of the two groups in equilibrium is necessarily higher. Extreme asymmetries in military power and bargaining strength are shown to militate against the possibility of negotiation. Furthermore, for a negotiated solution to be feasible, perceptions regarding the preferences of the organization mediating the negotiations are very important. While isolating some of the root causes for the recalcitrance of conflicts over sacred goods, our model provides cautious optimism for the role of symbolic gestures.

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1 Introduction

Conflict is an outcome that may obtain when negotiations between contending parties fail. Unconstrained rational negotiation should typically lead to efficient outcomes. When the dispute is over values that are deemed sacred, however, conflict seems inevitable. Sacred goods are goods whose valuation depends in part on deontic rather than utilitarian considerations. Deontic refers to concepts such as duty, obligation, and permission. Sacred goods are not tradable for secular goods, or material considerations in general, because moral or ethical restrictions apply to their ownership and disposal. For example, a social group's land that has been held for many generations is apt to become closely bound to the group's sense of identity, and thereby becomes endowed with sacred attributes, typically with restrictions on transfer to non-group parties. If ownership of such land comes into dispute, the sacred nature of the good puts the matter out of the realm of rational, material calculus, and the default option that remains seems to be conflict. In this paper we follow the cue of some recent work done by anthropologists, psychologists, and political scientists which suggests first, that sacredness of land may lead to intractable conflict as suggested by the above. However, the research suggests also that the intractability introduced by sacredness may be alleviated if the parties are willing to acknowledge the mutual sacredness of the contested land and are willing to sacrifice something that is sacred to themselves. This mutual surrender of sacred values may get both parties to the negotiating table [Atran et al (2007), Atran and Axelrod (2008)]. We seek to assess the conditions under which the contending parties can successfully undertake negotiation.

While intergroup conflict is typically assumed to be based on strategic cost-benefit considerations, recent literature has shown that violent conflicts need not be driven by strategic logic but rather by deontic logic—the logic of right and wrong [Ginges and Atran (2011), Ginges et al (2007)]. Insofar as conflict seeks to accomplish ends through means that entail loss of lives and property, negotiations that can potentially avert such Pareto-dominated avenues are clearly desirable. But as long as decisions are in the realm of deontic logic, conflict may be inevitable. This is because deontic logic is ostensibly hardwired in humans [Berns et al (2012)] and the decision to violently confront is the only behavior that is credible. This outcome is altogether too familiar when sacred values are at stake. When two contending parties, for example, value the

same piece of land as sacred, prolonged and bloody conflict may frequently be the outcome. As long as decisions remain in the domain of deontic logic, there appears to be an impasse.

Researchers have recently proposed a potential way around this impasse. The innovative proposal is based on the idea that the problem could be framed in a way that decisions are dislodged from the realm of deontic logic into that of utilitarian logic. If this could be achieved—and it would take some doing—the decisions would no longer be impervious to cost-benefit calculations, and negotiations could yield outcomes that are Pareto efficient. The specific proposal that is offered is that there be symbolic, non-materialistic concessions by *both parties* that are costly to them. For example, in their experiments and survey Ginges et al (2007) find that even Israelis who were absolutist, intransigent hold-outs were willing to consider trade-offs when Palestinians acknowledged the right of Israel to exist. Likewise, the attitudes of Palestinian absolutist, intransigent hold-outs thawed if the Israelis offered an apology to the Palestinians for their displacement in the war of 1948. In the view of the authors of this proposal, these sorts of symbolic gestures have the potential to ease relations and lead the way to a peaceful solution through negotiations.

There is evidence to suggest that the proposal has merit and needs to be taken seriously. What is deemed sacred by a group is not immutable. Sheik et al (2012, 2013) have shown that the preferences of groups can get transformed into the sacred through religious and cultural rituals. Furthermore, this is more likely to happen when the group is under severe threat. Notions of sacredness are intimately tied up with individuals' social identity. These beliefs implicitly define who they take themselves to be; they identify with a particular group which commonly take certain beliefs as sacred. Swann et al (2014a, 2014b) have shown that people whose identities are fused with their groups are open to making extreme sacrifices for the common good of their group.

The emergence of the attribute of sacredness very likely has an evolutionary explanation. If a group is under threat, warding off the enemy would require a concerted effort by all members of the group. When preferences (for land, for example) are made sacred, decisions are relegated to the realm of deontic logic and material considerations are sidelined. This would call forth the

effort required for mounting a defense against the threat. Groups that deemed their land to be sacred would thus have a survival advantage over those that do not. Although this mechanism, which relies on group selection, is as yet not well evidenced, it seems highly plausible. Indeed, the notion of sacred land is not a concept exclusive to the religious.¹ Even non-religious individuals can and do subscribe to notions of “motherland”, or “fatherland”, which needs to be protected as a matter of honor, identity, and cultural survival.² For this reason, the notion of sacredness, which is most relevant when religion is salient is also relevant when religion is not an issue. In other words, wars that are over territory (as the great majority are), often are overtly or tacitly fueled by concepts of the sacred. Wars are not necessarily the outcomes of strategic calculations only [Ginges and Atran (2011)].

If notions of sacredness acquire salience when the group faces threat, when that threat is withdrawn through mutual repudiation of extreme positions, we would expect sacred values to become less salient. What is deemed sacred, therefore, may also exhibit some flexibility. In this manner, sincere overtures that are viewed as symbolic concessions could open the door to negotiation by transferring decision-making from the domain of deontic logic to that of utilitarian logic.

In this paper, we investigate the conditions under which such symbolic gestures can bring contending parties to the negotiating table. These gestures are not costless, however. Since major concessions often go against centuries of cultural beliefs or core values, a concerted campaign would be required by the governments of each group to soften its members’ stands towards their rivals. Would governments have the incentive to undertake such costly campaigns? And, if they do, would the deadweight loss of conflict be eliminated, or would the possibility of conflict still heavily condition the outcome of the negotiations? The reason why the shadow of potential

¹ Our view of what is deemed “sacred” is somewhat broader than that articulated in the political science literature (see Hassner (2003), for example).

² A handful of scholars have recently started approaching conflict analysis by explicitly incorporating other-regarding preferences. Sambanis and Shayo (2013) examine how ethnic identification determines and is determined by conflict. Sambanis et al (2015) show such preferences can be an important instigator of war with other countries. Likewise, Alesina and Reich (2015) examine how dictators and democracies can endogenously promote fragmentation or homogeneity (resulting in nation-building) depending on what is expedient.

conflict may loom over negotiations is that conflict determines the threat point of the bargaining game.³

The determinants of the conflict outcome are many. We focus here on the differential opportunity costs of effort and military capabilities of the two groups. Since the contending groups/countries may be at different stages of development, they would generally differ with respect to opportunity cost and capability. Furthermore, the bargaining outcome will certainly depend on the relative bargaining powers of the two groups as determined, say, by world opinion or, more realistically, by the preferences of an international arbitrator. In anticipation of the extent to which this bargaining power may benefit them, groups will appropriately choose their investments to dislodge or soften some of their core values. We examine the extent to which investment in the possibility of negotiation over sacred goods might eliminate conflict and its deadweight losses. The proposal that mutual acknowledgement of the fact that the disputed good is sacred to both groups would lead to negotiations and thereby eliminate the costs of conflict is an interesting and intriguing one. The framework we develop here is designed to assess the conditions under which these costs might indeed be eliminated.

Our analysis reveals interesting insights that highlight the stark difference between conflicts over secular goods and those that involve sacred values. In the latter case, because concessions are required for negotiations, and because these concessions have to be mutual in order to lead to negotiation, it is the incentives of the weaker side that determine the limit of negotiation possibilities. When the two groups have equal bargaining power, we show that the negotiated distribution of sacred good merely replicates that which would have been obtained in conflict but without the costs of conflict. Despite the fact that the allocation of the sacred good is the same as with conflict, the welfare gain from avoiding conflict is made possible by the investment undertaken to soften core values so that negotiation is feasible. For negotiations to make a difference to the allocation of the sacred good, there needs to be asymmetry in the bargaining powers of the two groups. We show, however, that for negotiation to obtain, the preferences of the arbitrator have to be seen by both parties as not being unduly biased against them. The choice

³ Anbarci et al (2002) examine what sorts of bargaining norms might lead to lower expenditures to influence the threat point.

of the arbitrator is thus crucial to the success of peace negotiations. Our results also suggest that great asymmetries in the military capabilities of contending parties militate against the possibility of their achieving a negotiated outcome. By reducing the surplus that the weaker side can expect from a negotiated settlement, asymmetry dilutes its incentive to undertake the investment required to soften cultural values. This role played by asymmetry is in stark contrast to what our intuition would suggest when the dispute is over secular goods.

A great deal of research has been done on conflict in recent years.⁴ We do not review this literature here because our paper's focus is strictly on identifying the effects of the putative sacredness of the contested goods on conflict. To our knowledge, there has been no formal analysis of the economic consequences in conflict of sacred, as opposed to secular, goods.

In the next section we discuss what is meant by the notion of sacred values and place our paper in the context of the literature. In Section 3 we set up a simple reference model of conflict over a sacred good, and the related Nash bargaining solution if negotiation occurs. In Section 4 we present a model of investment in changing core values in order to allow the possibility of enabling successful bargaining to occur. Finally, in Section 5 we offer some concluding comments.

2 What are Sacred Goods?

Baron and Spranca (1997) have pointed out that deontic, not utilitarian, logic is relevant to considerations involving sacred goods. Deontic logic deals with the rights and wrongs of actions, as opposed to utilitarian costs and benefits of the consequences of such actions. Neuroscience studies using fMRI techniques have shown that the part of the brain which is dedicated to deontic logic is indeed invoked when processing sacred values, whereas other parts of the brain process utilitarian values [Berns et al (2012)]. Utilitarian considerations tend to kick in only when an individual is persuaded that participation in an action passes the test of what is right. When

⁴ Caselli and Coleman (2013), Collier and Hoeffler (2004), Cramer (2003), Esteban and Ray (2008, 2011a, 2011b), Esteban et al (2012a, 2012b), Fearon and Laitin (2003), Horowitz (2000), Miguel et al (2004), Mitra and Ray (2014), and Robinson (2001) constitute an incomplete list. Much of the work has concentrated on the roles played by ethnicity, fragmentation, and inequality in generating conflict.

dealing with scenarios involving taboos against the sacred, it is as if the processing has to first pass through the filter of deontic logic before it can engage the utilitarian. It is for this reason that sacred values have to be taken seriously in negotiation.⁵

One aspect of the nature of a sacred good is that people find it repugnant to consider trade-offs between it and a secular good. A monetary transaction is deemed to devalue the sacred good so that trading off the secular and the sacred is taboo. Nonetheless, experiments by social scientists have shown that, for people who are moral absolutists, sacred values can be traded off against other sacred values (dubbed a ‘tragic’ choice). A survey of such results can be found in Ginges and Atran (2013). Examples of these findings obtain for Jews and Muslims in Palestine with respect to land deemed sacred by both groups [Ginges et al (2007)]. Similar results obtain also for Hindus and Muslims in India on sensitive issues relating to the Babri mosque and, in addition, for the issue of the independence of Kashmir [Sachedeva and Medin (2009)]. Findings such as these reveal that sacred goods cannot be treated as if they were merely special cases of the “endowment effect”, which describes scenarios where an object has greater value to its owner than to others.⁶ Goods exhibiting the endowment effect can be traded, with the required price being higher than what others might be willing to pay. Sacred land, by contrast, cannot be readily traded but will more typically be reallocated by conflict.

Goods deemed sacred can exhibit another feature: if a sacred good conceded by a group elicits a corresponding concession from its rival regarding a different sacred good, it can result in the resolution of a conflict that would otherwise impose considerable material losses on both sides. This is the lesson Ginges et al (2007) draw from their surveys of Palestinians and Israelis in the West Bank and Gaza. A refusal to acknowledge the sacred values that are at stake in a conflict

⁵ One possibility for representing sacred values could be through lexicographic preferences. Such preferences require that these values be held on to at all costs, even to the point of extinction. This may be true of some exceptional individuals who, for example, may be willing to die for a cause. If this is true, negotiations involving sacred values may well be impossible. Generally, however, there is some trade-off between sacred and material values—often implicit—through the cost of conflict. More precisely, there seems to be some fungibility in that if secular values can be couched as sacred values, there is scope for negotiation [Tetlock et al (2000), Tetlock (2003), Baron and Leshner (2000)]. In our view, therefore, using a lexicographic representation of preferences is not the most appropriate way to model sacred values.

⁶ This effect has been typically rationalized in evolutionary terms [Gintis (2007), Eswaran and Neary (2014a)]. Eswaran and Neary (2014a) demonstrate that an endowment effect lowers the probability of others stealing the fruits of one’s labor and so promotes survival.

will ensure that negotiations by competing groups involving secular benefits will not even take place because it would seem to them that they are trading off the sacred for the profane. Thus, in some circumstances, an acknowledgement by each group of what is deemed sacred to the other may be a necessary condition for arriving at a cooperative resolution of a conflict with material benefits. This is the logic of the argument made by Atran and Axelrod (2008).

The concept of sacred goods appears to be often related intimately to the phenomenon of war. Since war is costly to both parties, it makes economic sense for them to negotiate and avoid these costs. Why, then, do wars occur? Fearon (1995) has offered three ‘rationalist’ explanations: (1) when information is private, both sides have an incentive to misrepresent their strengths while negotiating in order to get a better deal and, so, no deal may obtain; (2) there may be commitment issues that lead rivals to renege when there are first-strike advantages; and (3) the object being negotiated may be indivisible.⁷ Recently, Johnson and Toft (2014) have proposed that an evolutionarily hardwired sense of territoriality may go a long way towards explaining wars.⁸ However, even if evolution has hardwired a sense of territoriality in humans as it has in animals, humans do have the capacity to negotiate. Evolutionary forces may indeed instill a sense of ownership, as demonstrated recently by Eswaran and Neary (2014a). It is unclear to us, however, why this would prevent negotiation to avoid costly conflict.

The concept of sacred land can provide a reason. When a group lives on the same piece of land for centuries or millennia, the land appears to acquire the status of being sacred [Rozin and Wold (2008)]. Furthermore, land seems to be instrumental in cementing the notion of group identity [Ledgerwood et al (2007), Johnson and Toft (2014), and Eswaran and Neary (2014b)]. When the rival fails to recognize that a piece of land is sacred to a group the very possibility of negotiation is ruled out because deontological considerations trump utilitarian ones, making conflict inevitable. Furthermore, since the perceived appropriation of one’s land is seen as an assault on the group’s identity, the group applies greater effort than it would were it to attempt an appropriation of someone else’s land. There is an asymmetry in the sacrifices the putative owner and the interloper are willing to make to retain/acquire the property [Eswaran and Neary

⁷ In order to isolate the role played by sacred values, we eschew these considerations in the model we present.

⁸ See also Szulga’s (2014) comment on this paper.

(2014b)]. Part of the asymmetry stems from the endowment effect, but part can also stem from the entrenched feeling that the land in question is sacred to the defenders because their identity is tied up with it.

In this paper we take seriously these features of sacred goods and, building upon the literature cited, incorporate sacred goods into a model of conflict and negotiation. The model has the virtue of laying bare the essential role played by the sacredness of goods and how it interacts with other factors relevant to conflict. In particular, our approach enables us to isolate the conditions under which the presence of sacred values makes a difference to bargaining outcomes.

3 The Model

Suppose there is a sacred good (such as land with deontic significance) that is valued by two contending groups, denoted by A and B . Each group is willing to expend resources to acquire more of the good.⁹ However, because the good is sacred, it is not possible to compensate for it with money [see Ginges et al (2007)]. So, a group cannot be coaxed monetarily into not trying to redress a perceived imbalance in the distribution of land.

Let R denote the total amount of the sacred good, and R^A and R^B the amounts accruing to the two groups, respectively. We posit that the utility derived from the sacred good by each individual of group A is R^A . The Benthamite welfare function of the government of group A is obtained by aggregating these utilities from consumption of the sacred good to $N^A R^A$, where N^A is the population of group A . The individual and Benthamite welfare in group B are analogously, R^B and $N^B R^B$, respectively, where N^B is group B 's population.

Consider a model with potential bargaining in three stages. In Stage 0, the groups decide whether to undertake the investment that would be necessary to dislodge some of the core values of their

⁹ We presume that the good is divisible. In our view, what makes a sacred good seem indivisible are the preferences and strategies adopted by the contending parties. The possibility of softening hardened positions so as to facilitate bargaining is precisely the avenue we investigate here. We agree with Fearon (1995) in that the good under dispute is best treated as divisible.

own members so as to facilitate cooperative decision making. In Stage 1 the two groups, A and B , decide whether they will agree to cooperate in resolving their dispute about the allocation of the (divisible) sacred good. If they do not reach an agreement, the sides non-cooperatively choose their military efforts and the distribution of sacred good is resolved through conflict. If the groups do decide to negotiate, in Stage 2 an arbitrator determines the cooperative resolution in Nash bargaining fashion taking the conflict outcome as defining the threat utilities of the two groups as given.¹⁰ As usual, we have to determine the equilibrium outcome by working backwards from the last stage.

3.1 The Noncooperative (Conflict) Outcome

The outcome of the last, Nash bargaining stage, if arrived at, is conditioned by the threat utilities of the contending groups. These are the utilities obtained in conflict, and in this section we examine the conflict outcome. We use the standard type of conflict model found in, for example, Hirshleifer (1988), Skaperdas (1992), or Dixit (1987).

While the stock of the sacred good is fixed at R , the groups are willing to expend resources to acquire shares of it. The only resource in the model other than the sacred good is leisure. We denote the aggregate effort of group g by X^g , $g \in \{A, B\}$. This effort can be thought of as irretrievable effort used in conflict. Both group's activities with regard to the sacred good are determined by their respective governments. We posit that the shares of the sacred good that accrue to groups A and B after conflict, S and $(1 - S)$ respectively, are given by the standard forms

$$S = \frac{X^A}{X^A + \theta X^B}; \quad 1 - S = \frac{\theta X^B}{X^A + \theta X^B}. \quad (1)$$

¹⁰ We use the Nash bargaining solution as the cooperative resolution of the conflict because the asymmetric Nash bargaining problem conforms well to the real-world scenario where external arbitrators mediate but with preferences of their own.

where $\theta > 0$ denotes the efficiency of B 's conflict effort relative to A 's. If $\theta = 1$, the groups are equally efficient in conflict; if $\theta > 1$, it means that group B 's effort is more efficient in the sense that one unit of B 's effort is equal to more than one efficiency unit of A 's.

We presume that each group entertains Nash conjectures with regard to their rival's effort. The optimization facing the government of group A is to choose X^A to maximize

$$W^A := N^A(RS - c^A X^A), \quad (2)$$

where $c^A := C^A/N^A$ is the per capita opportunity cost of group effort, X^A . And similarly, group B chooses X^B to maximize

$$W^B := N^B(R(1 - S) - c^B X^B). \quad (3)$$

The Nash equilibrium solution values for group efforts, denoted by \bar{X}^A and \bar{X}^B , are

$$\bar{X}^A = \frac{c^B/\theta}{(c^A + c^B/\theta)^2} R; \quad \bar{X}^B = \frac{c^A/\theta}{(c^A + c^B/\theta)^2} R. \quad (4)$$

Substituting the solution into (1), the equilibrium value, \bar{S} , of the share can be written as

$$\bar{S} = S(\bar{X}^A, \bar{X}^B) = \frac{c^B/\theta}{c^A + c^B/\theta}. \quad (5)$$

Finally, plugging the solution values into (2) and (3) and using (1) to simplify gives these conflict welfare outcomes as

$$\bar{W}^A = N^A R \left(\frac{c^B/\theta}{c^A + c^B/\theta} \right)^2 = N^A R \bar{S}^2; \quad \bar{W}^B = N^B R (1 - \bar{S})^2. \quad (6)$$

The key parameters are c^A and c^B/θ , the per capita (effective) opportunity costs of effort of the two groups. The ratio c^B/θ is the *effective* per capita opportunity cost of group B , after having accounted for the relative efficiency of its military effort relative to A ; A 's opportunity cost is simply c^A . If A is the poorer group (lower opportunity cost of effort), it would exert the higher conflict effort and would emerge with a larger share of the sacred good; this can be overturned if group B has more productive conflict effort (that is, θ is sufficiently greater than 1). In turn, the relative equilibrium effective effort levels determine the equilibrium shares. We summarize these observations in proposition 1.

Proposition 1: *In equilibrium, $\bar{X}^A \leq \theta \bar{X}^B$ and $\bar{S} \leq 1/2 \Leftrightarrow c^A \geq c^B/\theta$.*

There is a strategic interdependency between \bar{X}^A and \bar{X}^B that is key to determining the comparative static effects of the parameters (c^A, c^B, θ) on the solution values $(\bar{X}^A, \bar{X}^B, \bar{S})$ (see, for example, Dixit (1987)).

Lemma: *At any point (X^A, X^B) :*

- (i) *if $X^A < \theta X^B$, then X^A is a strategic substitute for X^B ($dX^B/dX^A < 0$), and X^B is a strategic complement for X^A ($dX^A/dX^B > 0$);*
- (ii) *if $X^A > \theta X^B$, then X^A is a strategic complement for X^B ($dX^B/dX^A > 0$), and X^B is a strategic substitute for X^A ($dX^A/dX^B < 0$);*
- (iii) *if $X^A = \theta X^B$ then both best-response functions have a zero slope at that point.*

Inter alia, this lemma implies that, in equilibrium, if A has a cost advantage relative to B in efficiency units, an exogenous increase in A 's effort induces B to reduce its effort given its cost disadvantage. On the other hand, an exogenous increase in B 's effort induces A to follow suit given its cost advantage. An analogous result applies when B has the cost advantage.

We now state comparative static responses on $(\bar{X}^A, \bar{X}^B, \bar{S})$ with regard to the exogenous parameters c^A, c^B , and θ .

Proposition 2:

- (i) $\partial \bar{X}^A / \partial c^A < 0$ and $\partial \bar{X}^B / \partial c^B < 0$;
- (ii) $\partial \bar{X}^B / \partial c^A > 0$ and $\partial \bar{X}^A / \partial c^B < 0 \iff c^A < c^B / \theta$;
- (iii) $\partial \bar{X}^A / \partial \theta > 0$ and $\partial \bar{X}^B / \partial \theta > 0 \iff c^A < c^B / \theta$;
- (iv) $\partial \bar{S} / \partial c^A < 0$ and $\partial \bar{S} / \partial (c^B / \theta) > 0$.

An increase in the cost parameter of a group reduces the own conflict-effort, as expected, but the cross effect on the rival group's effort depends on whether the efforts are strategic substitutes or complements. For example, suppose that A has the lower effective per capita costs, $c^A < c^B / \theta$. If A 's cost rises then \bar{X}^A naturally falls, and \bar{X}^B rises because \bar{X}^A is a strategic substitute for it. Conversely, if B 's cost rises then \bar{X}^B falls and \bar{X}^A also falls because \bar{X}^B is a strategic complement for it. These results are reversed when B has the lower effective per capita costs, $c^A > c^B / \theta$. The cross-partial effects are zero when the effective per capita costs are equal. The effect of a change in θ on the equilibrium effort levels also depends on the sign of $(c^A - c^B / \theta)$; if this term is negative both efforts increase with θ (because \bar{X}^B is a strategic complement of \bar{X}^A), while if it is positive both decrease with θ (because \bar{X}^B is a strategic substitute of \bar{X}^A). This pattern is consistent with equations (4) which imply that the ratio \bar{X}^A / \bar{X}^B be *invariant* with respect to changes in θ .

3.2 The Bargaining Solution

We look at the possibility that in Stage 1 the two groups might agree to resolve their dispute cooperatively. We model the negotiations as a Nash bargaining problem. Thus, we interpret negotiations as taking place under the aegis of an arbitrator. It is extremely common that disputes between countries are settled using the intervention of a third party. This might be a single power that has the trust of both parties, or it might consist of a wider diplomatic conference that included potential patrons of each side.¹¹ Insofar as the arbitrator may have preferences or

¹¹ For example, during the Cold War, disputes between countries within the sphere of influence of the respective superpowers tended to be settled under the aegis of the relevant superpower. In the Golden Age of Diplomacy (1814-1914) numerous disputes or potential disputes about territory were discussed in international conferences

exhibit a bias as between the two groups, this can be captured through a bargaining-power parameter in the modelling.¹² In the particular case of Israel and the Palestinians, for example, many resolutions of the UN General Assembly that have tended to favor the Palestine cause have been vetoed in the UN Security Council by the U.S. The General Assembly and the U.S. can each be seen as a potential arbitrator between the parties, but having seriously opposed biases. The fact that potential arbitrators may have their own biases, derived perhaps from strategic interests or cultural affinities, will clearly bear on the willingness of disputing parties to accept their intervention. For example, in the sequence of disputes and tensions between Serbia and the Austro-Hungarian Empire that led eventually to the First World War, Serbia often sought the intervention of Russia, while Austria-Hungary sought support from Germany [Clark, 2013].

In this bargaining model the natural threat option is the non-cooperative conflict equilibrium just characterized in Section 3.1. The total welfare value of resources expended in the conflict equilibrium is

$$TC := N^A c^A \bar{X}^A + N^B c^B \bar{X}^B \quad (7)$$

This social waste can potentially be avoided through bargaining since the two groups can either engage in conflict over the good, or agree on a sharing of the good that would allow them to set conflict expenditures to zero. Each party's benefit in the bargained outcome is the conflict effort avoided. This increase in each group's welfare allows the possibility that bargaining might also involve a reallocation of the sacred good between the groups. The relative bargaining power of the two groups is crucial to this possibility. The bargaining outcome will be individually rational of course, *but it may not be acceptable under the deontic scenario*. In the next section we return to this issue. For the moment we examine the Nash bargaining outcome, should that be opted for.

consisting of regional powers. The most famous may be the Congress of Vienna (1814-1815), which gave initial national shape to post-Napoleonic Europe. The U.N. is turned to frequently in the modern world as an arbitrator.

¹² The question of mediator bias and its potential role in conflict bargaining has been raised by Kydd (2003), and further discussed by Crescenzi et al. (2011) and Wallenstein and Svensson (2014), for example. In specific bargaining situations where incomplete information is central, a biased mediator may be a more credible transmitter of information than an unbiased one. We retain the concept of bias, but have no incomplete information concerns that might make bias desirable.

Since, in the bargained outcome no effort is devoted to conflict, if the sacred good allocation to groups A and B is R^A and $R - R^A$, respectively, the corresponding welfares are given by $N^A R^A$ and $N^B (R - R^A)$. As noted, we interpret asymmetric bargaining power of the two groups as resulting from the attachment by the arbitrator of different weights to the surpluses of the two groups. If arbitrator bias gives rise to the relative bargaining powers of A and B being, respectively, γ and $(1 - \gamma)$, where $0 < \gamma < 1$, the Nash bargaining solution will solve

$$\begin{aligned} \max_{R^A} & [N^A R^A - \bar{W}^A]^\gamma [N^B (R - R^A) - \bar{W}^B]^{1-\gamma} \\ \text{s. t.} & N^A R^A \geq \bar{W}^A; \quad N^B (R - R^A) \geq \bar{W}^B, \end{aligned} \quad (8)$$

where the threat welfares, \bar{W}^A and \bar{W}^B , have been computed above in Section 3.1.

To be clear here, this bargaining model has no deontic element embedded in it. It allows R to be allocated across the parties without constraint, whereby the allocation of R is traded off between the parties to allow the elimination of the dead-weight loss of conflict effort. In reality, such a bargained outcome is impossible without an investment in changing core values (considered in the next section) that could bring the contending parties to the bargaining table in the first place. This idea is the focus of the next section.

Returning to (8), ignoring the constraints which are automatically satisfied, the first order condition is

$$\frac{\gamma N^A}{N^A R^A - \bar{W}^A} = \frac{(1 - \gamma) N^B}{N^B (R - R^A) - \bar{W}^B}$$

and the associated solution value, \hat{R}^A , is

$$\hat{R}^A = \gamma R + \left(\frac{(1 - \gamma) \bar{W}^A}{N^A} - \frac{\gamma \bar{W}^B}{N^B} \right) = R \bar{S} (\bar{S} + 2\gamma(1 - \bar{S})); \quad (9)$$

the second equality here follows from substitution for the equilibrium values (\bar{W}^A, \bar{W}^B) from (6).

The utilities in the Nash bargaining solution are respectively

$$\widehat{W}^A = N^A \widehat{R}^A; \quad \widehat{W}^B = N^B (R - \widehat{R}^A).$$

Using (6) and (9), the respective welfare mark-ups over the conflict outcome are then seen to be

$$\begin{aligned} \widehat{W}^A - \bar{W}^A &= 2\gamma \bar{S}(1 - \bar{S})N^A R \\ \widehat{W}^B - \bar{W}^B &= 2(1 - \gamma)\bar{S}(1 - \bar{S})N^B R. \end{aligned} \tag{10}$$

(These expressions are positive for all allowed parameter values, so that the constraints in the Nash bargaining problem (8) are always satisfied at the solution.)

Now, from (9), compare the bargained solution for A 's share of the sacred good, with the share that A would receive in the conflict outcome. The two may differ specifically because of the bargaining power parameter γ . A 's share in the bargaining solution is

$$\frac{\widehat{R}^A}{R} = \bar{S} (\bar{S} + 2\gamma(1 - \bar{S})). \tag{11}$$

This bargained share is at the minimum value of \bar{S}^2 when γ is zero, is increasing in γ , and approaches a maximum value $\bar{S}(2 - \bar{S})$ as γ approaches 1. When $\gamma = 1/2$, the two shares are equal to their values in the conflict equilibrium.

Since this is fundamentally a model of arbitration, as noted before, we interpret the bargaining-power parameter γ as representing the arbitrator's weighting of group A 's welfare relative to group B 's. When the weighting is symmetric, $\gamma = 1/2$, the allocation of sacred good in the bargaining solution is exactly the same as it would be in the conflict outcome. Bargaining here involves no trade-off between the sacred good and the conflict efforts; the bargaining solution raises utilities merely by eliminating the conflict effort that would be incurred in the threat (conflict) outcome. From expression (11) above we see that for $\gamma > 1/2$, the arbitrator's preferences favour group A , and the group receives a larger share of sacred good in the bargained

outcome than in the conflict outcome; conversely when $\gamma < 1/2$. We summarize this observation in the following proposition.

Proposition 3: *A's share of the sacred good in the bargained outcome is larger than or equal to its share in the conflict outcome, if and only if the arbitrator's preference involves a greater weight on A's welfare than on B's: that is, γ is greater than or equal to 1/2. Conversely, B's share in the bargained outcome is larger than its conflict share when γ is less than 1/2.*

Insofar as a mediated approach is taken to the problem of allocating the sacred good between groups, the groups must take into account the possibility that the sacred good may be reallocated relative to the conflict allocation depending on the arbitrator's preferences. If the good in question were not sacred then the bargained outcome for any value of $\gamma \in (0, 1)$, *however lopsided*, would be rationally preferred by each of the groups. That is, each group receives a positive mark-up of bargained welfare over conflict welfare for any allowed value of $\gamma \in (0, 1)$, and so it would always be rational to accept the proffered allocation, skewed though it might be, given that the participation constraints in (8) are always satisfied.

We may doubt that this rationality will operate when the good in question is sacred, in the sense that preferences for it are deontic in character. In this case, the group from which the sacred good is reallocated may refuse to accept the arbitrator's ruling. The more skewed the arbitrator's preferences are in favor of one group the less likely is it that the disfavored group will accept the reallocation of sacred good away from itself. Atran et al (2007) and Atran and Axelrod (2008) recognize and address precisely this difficulty in inducing the groups to enter into a negotiation. They suggest that each group may be more willing to give up something sacred if the other group is required to also give up something sacred. This sacrifice is usually in the nature of giving up some of a group's core beliefs so as to allow concessions to be made to their rivals. We model this possibility in the next section by setting up a sacrifice game where each side must give up something sacred to induce the other group to enter bargaining rather than settle for a conflict outcome. This would enable us to ask whether the requirement of an initial sacrifice imposes some constraints that might stymie a cooperative resolution of the dispute.

4 Investment in Changing Core Values

We are now ready to step back to consider the decision-making in Stage 0, which will be undertaken with full awareness of the equilibria that will follow in Stages 1 and 2. In this stage the governments of the two groups decide how much effort they should devote towards campaigning to dislodge the core values of their groups so as to facilitate negotiations. This effort is in the nature of an investment designed to modify received cultural values and so we refer to it here as “cultural investment”. Let K^A and K^B denote the cultural investments of groups A and B , respectively. As Ginges et al (2007) found, while contending groups may spurn monetary compensations as an attempt to solve their disputes, they are more accepting of costly concessions in their rival’s core values. The investments or sacrifices needed to bring about such concessions are what the variables K^A and K^B are intended to capture. Denote by $P(K^A, K^B)$ the probability that the groups will agree to settle by negotiation. We would expect that this probability is non-decreasing in the investment levels. In fact, since the decision to negotiate has to be mutual, these investments are likely to be complementary in their effect on $P(\cdot)$ – it is useless for one group to invest if the other does not. The requirement that K^A and K^B be complementary also follows from the work of Ginges et al (2007): the concessions have to be *mutual*.

Recall that we denoted by \bar{W}^A and \bar{W}^B the welfares of groups A and B , respectively, in the conflict equilibrium. This outcome is realized with the probability $[1 - P(K^A, K^B)]$. Recall also that we denoted by \hat{W}^A and \hat{W}^B the groups’ respective welfares in the negotiation equilibrium, if one were to obtain. This outcome is realized with a probability $P(K^A, K^B)$. We assume that the cultural investments K^A and K^B are determined in Nash fashion. In Stage 0, the governments of the respective groups maximize their respective expected welfares¹³

¹³ The Ginges and Atran research indicates that actual conflict may be ended if groups are willing to make mutual, perhaps symbolic, compromises over their respective sacred values. That is, real resource costs may be eliminated as an indirect result of sincere but symbolic gestures. In modelling welfares in the context of symbolic gestures it is not clear what costs to ascribe to these gestures. For simplicity, we suppose that the costs associated with investments K^A and K^B are commensurate with those of real resources X^A and X^B .

$$\max_{K^A \geq 0} (1 - P(K^A, K^B))\bar{W}^A + P(K^A, K^B)\widehat{W}^A - C^A K^A, \quad (12)$$

$$\max_{K^B \geq 0} (1 - P(K^A, K^B))\bar{W}^B + P(K^A, K^B)\widehat{W}^B - C^B K^B. \quad (13)$$

The first derivatives for these optimization problems are:

$$K^A: (\widehat{W}^A - \bar{W}^A) \partial P / \partial K^A - C^A,$$

$$K^B: (\widehat{W}^B - \bar{W}^B) \partial P / \partial K^B - C^B.$$

We restrict attention in what follows to parameter values for which these derivatives are positive when evaluated respectively at $K^B > K^A = 0$ and $K^A > K^B = 0$.

As already noted, the investments K^A and K^B are likely to be very complementary inputs into the probability function, P . A reasonable functional form for the probability that embodies this property and yet offers analytical tractability is:

$$P(K^A, K^B) = 1 - \exp[-\lambda \min\{K^A, K^B\}], \quad \lambda > 0. \quad (14)$$

The perfect complementarity built in by the $\min\{K^A, K^B\}$ function ensures that $K^A = K^B$ in any Nash equilibrium in these effort levels.¹⁴ We may interpret the parameter λ as a measure of the productivity of the cultural investment in changing core values. If the two groups subscribe to different religions and have a long and bloody historical dispute, we would expect the parameter λ to be relatively small: a great deal of cultural investment would be required to attenuate entrenched feelings of hostility.

¹⁴ This, of course, renders the function $P(K^A, K^B)$ non-differentiable at $K^A = K^B$, but this poses no problem in what follows.

For example, when Ireland left the United Kingdom in 1922, Northern Ireland was created as a state remaining within the United Kingdom that was territorially specific enough to contain a majority British-Unionist population; it also contained a minority Irish-Nationalist population. The constitution of the Irish Free State (later Republic of Ireland) claimed the territory of Northern Ireland as being self-evidently part of Ireland.¹⁵ Thus, both Ireland and the UK claimed sovereignty over the same territory. Within Northern Ireland, mutual ideological antipathy between the two populations, and Unionist political hegemony, led to substantial political tension and occasional violence. When the modern “Troubles” began in the 1969/71 time frame, political violence eventually led to the proroguing of the Northern Ireland parliament and direct rule of the province from Westminster. The long-term political objective became a return to local government in Northern Ireland, but through a set of institutions that would ensure power-sharing, government participation by the hitherto-excluded Nationalist population. Unionists and Nationalists could not negotiate such institutions on their own. Unionists did not wish to countenance Nationalist involvement in government for fear that it could lead to denial of their ideology and culture, and potentially could lead to unification with the Republic. Nationalists felt that the UK, as arbitrator of a new system, would be biased against their positions. This impasse was broken initially by the Anglo-Irish Agreement of 1985, which involved the UK and Ireland each choosing to back away from key ideological positions. Briefly, Ireland dropped its constitutional claim to the territory of Northern Ireland, and agreed to the proposition that reunification of the two states could occur only with the express consent of the majority in Northern Ireland. For its part, the UK recognized that the Irish government had a legitimate interest in being involved in internal Northern Irish affairs, despite this territory being under British sovereignty; (this latter effectively included Ireland as an arbitration partner, shifting λ towards the Nationalist pole). The power-sharing arrangements immediately associated with these ideological investments were not successful, indicating an insufficiently large value of λ . Nevertheless, these investments have served as the foundation for subsequent negotiation between the parties that led to the current system of devolved government established by the Belfast Agreement of 1998 and the St. Andrew’s Agreement of 2006.

¹⁵ Article 2 of the original constitution of 1937 declares simply: “The national territory consists of the whole island of Ireland, its islands and the territorial seas.”

The Israeli-Palestinian conflict provides examples of core-value surrender leading to peace negotiations. Egyptian President Anwar Sadat's public statement in November 1977 that, if invited, he would visit Israel in pursuit of peace, was followed swiftly by an invitation from Israeli Prime Minister Menachim Begin for Sadat to address the Israeli Knesset, which he did 6 days later. This public dialogue was the dramatic overture to the eventual first Camp David Accords and the permanent Egypt-Israel peace treaty signed in 1979. Sadat's willingness to sign a bilateral peace treaty with Israel ruptured the core value of Arab solidarity, however, and Sadat was assassinated in 1981 by domestic extremists.

A second example of core-value exchange to prompt negotiations involves the Oslo Accords of 1993. The start of a long but ultimately unsuccessful negotiation aimed towards the creation of a Palestinian state that would enjoy normalized relations with Israel, the process began after secret negotiations resulted in the recognition by the Palestine Liberation Organization (PLO) of the state of Israel, and the recognition by Israel of the PLO as the representative of Palestinians and as a negotiation partner. These mutual surrenders of core values enabled the beginning of the peace process, which, however, ultimately failed at the Camp David II summit in 2000; we interpret this failure as indicating an insufficiently high value of λ .¹⁶

On the other hand, if the groups have a history of shared culture and values, we would expect λ to be relatively large: little effort would be required to dislodge or alter core values. Alternatively, if the dispute is not over land whose ownership is disputed but about the appropriation of some third party's land, then too we would expect λ to be large. For example, the Agadir crisis of 1911 began with the military takeover of Morocco by France, despite the existence of a Franco-German Morocco Agreement of 1909. Initially, chauvinism and intransigence on each side led to a crisis where the possibility of war was raised, but eventually each country backed down from its uncompromising initial position. At one point the U.K. government issued a potentially deontic warning to Germany, that peace at the price of acquiescence to German demands "would be a humiliation intolerable for a great nation like ours

¹⁶ Like Sadat, the Israeli President Yitzak Rabin was subsequently assassinated by a domestic extremist.

to endure.”¹⁷ This intervention might also be thought of as an attempt to play the role of a biased arbitrator.

So long as the first derivatives, presented above after (13), are both positive, each group has an incentive to raise the value of its investment above zero to match an opponent with higher investment. There is a continuum of possible Nash equilibria (K^A, K^B) defined by $K^A = K^B > 0$.¹⁸

We focus on a particular Nash equilibrium, the one for which the associated probability of a negotiated settlement is highest. Define (\hat{K}^A, \hat{K}^B) as follows. If group B 's choice is not constraining, the optimal choice of the government of group A is the solution to

$$(\hat{W}^A - \bar{W}^A)\lambda e^{-\lambda K^A} = C^A \quad \Leftrightarrow \quad \Delta W^A \lambda = e^{\lambda K^A},$$

where

$$\Delta W^A := \frac{\hat{W}^A - \bar{W}^A}{C^A} \tag{15}$$

is the surplus of group A in the negotiation outcome relative to the conflict, measured in units of the opportunity cost of effort. The solution is given explicitly by

$$\hat{K}^A = (1/\lambda) \ln[\Delta W^A \lambda] \tag{16}$$

for which $\hat{K}^A \geq 0$ if and only if

$$\Delta W^A \lambda \geq 1. \tag{17}$$

Likewise, if A 's choice is not constraining, the optimal solution for group B is

¹⁷ David Lloyd George, quoted in Clark (Ch. 4, 2013).

¹⁸ If $K^A = K^B < 0$, however, the set of Nash equilibria will obviously be the singleton $K^A = K^B = 0$, since P must be non-negative.

$$\hat{K}^B = (1/\lambda) \ln[\Delta W^B \lambda] \quad (18)$$

where $\Delta W^B := (\widehat{W}^B - \bar{W}^B)/C^B$ is B 's surplus in the negotiation relative to the conflict outcome, measured in units of its opportunity cost of effort. Once again, this solution has $\hat{K}^B \geq 0$ if and only if

$$\Delta W^B \lambda \geq 1.$$

The solutions for \hat{K}^A and \hat{K}^B are unique. Define $K^* = \min\{\hat{K}^A, \hat{K}^B\}$. The Nash equilibrium that is most desirable is clearly the one with $K^A = K^B = K^*$ since this maximizes the payoff to the party that determines K^* in this pre-negotiation game. Looking at the expressions for \hat{K}^A and \hat{K}^B we see that this best scenario is determined by the group that achieves the *lower surplus* in negotiation equilibrium relative to conflict equilibrium; that is, $\hat{K}^A \geq \hat{K}^B$ if and only if $\Delta W^A \geq \Delta W^B$. This is as expected, for the group that receives a smaller surplus in the negotiated outcome has less incentive to undertake the cultural investment. Given the complementarity of these investments, the group with the lower investment will determine the best possible outcome. This is an important implication of the fact of sacredness of the good: only mutual sacrifices are acceptable. Since the side that has less to gain is less incentivized to incur the needed investment, this is the side that determines the limits of what is feasible.

From (16) and (18), we see that positive investment to allow subsequent bargaining will be made in Stage 0 for parameter values at which the inequalities

$$\Delta W^A \geq 1/\lambda \quad \text{and} \quad \Delta W^B \geq 1/\lambda$$

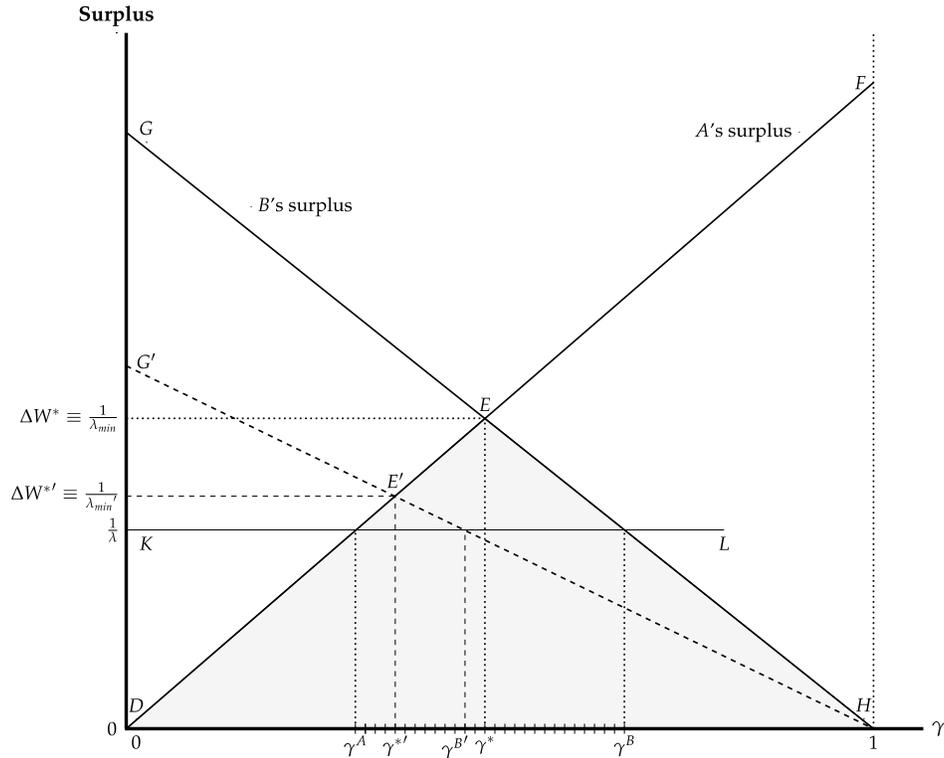
are simultaneously satisfied. Conversely, no investment in subsequent bargaining will be made if either of these inequalities is strictly reversed.

The objective now is to identify regions of parameter space in which, respectively, either investment in negotiation will be made in Stage 0, or, no such investment will be made. In the latter case, the default conflict outcome at Stage 1 occurs, settling the allocation of the sacred good. There are five exogenous parameters in the model, c^A, c^B, θ, γ , and λ . On using $c^i =$

C^i/N^i for $i \in \{A, B\}$, equations (10), the definitions of the surplus functions ΔW^A and ΔW^B , and simplifying, we obtain explicit expressions for the surpluses in terms of γ and the equilibrium conflict efforts, which encapsulate the influence of (c^A, c^B, θ) :

$$\Delta W^A = 2\gamma \bar{X}^A; \quad \Delta W^B = 2(1 - \gamma)\bar{X}^B. \quad (19)$$

Figure 1: The set of γ values for which investment in negotiation can occur, for given λ , and given the parameters (c^A, c^B, θ) that underlie (\bar{X}^A, \bar{X}^B) . Two possibilities for B 's surplus are shown, at GEH , and at $G'E'H$. The latter scenario, for which $c^A < c^B$ illustrates that the bias interval $[\gamma^A, \gamma^{B'}]$ may exclude an unbiased arbitrator, for whom $\gamma = 1/2$.



The welfare surpluses ΔW^A and ΔW^B are each linear in γ , with ΔW^A being zero at $\gamma = 0$ and rising to $2\bar{X}^A$ at $\gamma = 1$, and with ΔW^B running from $2\bar{X}^B$ at $\gamma = 0$ down to 0 at $\gamma = 1$. These surpluses are shown as functions of γ in Figure 1 as DF and GH for groups A and B respectively. The two curves must intersect at a point, which is indicated as E in the figure. Here γ^* is the

value of γ for which A and B receive identical surpluses from negotiation: $\Delta W^A = \Delta W^B$. Denote by ΔW^* the common value of this surplus. For the algebraic model these values are

$$\Delta W^* = \frac{2 \bar{X}^A \bar{X}^B}{\bar{X}^A + \bar{X}^B}; \quad \gamma^* = \frac{\bar{X}^B}{\bar{X}^A + \bar{X}^B}. \quad (20)$$

It is clear from Figure 1 that, given a conflict equilibrium pair of values (\bar{X}^A, \bar{X}^B) —which depends on the underlying parameter set (c^A, c^B, θ) —the negotiation-investment requirement that both ΔW^A and ΔW^B be at least as large as $1/\gamma$ is satisfied by every point in the (shaded) triangle DEH . Thus, there always exist values of γ and λ that would enable investment in negotiation. Equally, for all parameter values outside DEH , no investment would be made in negotiation. *Thus, whereas actors with rational valuations of the good R would agree to a bargained solution immediately, actors with deontic valuations may agree to negotiations only following mutual investments in changing core values.* Agreeing to negotiate occurs only for a subset of parameter values for which the probability of negotiation success is relatively high, and the arbitrator's bias is not too asymmetric; negotiation carries just a probability of success. Otherwise, agreement to negotiation will not occur, and the conflict resolution with its attendant waste will persist. This brings out the importance of accounting for the fact that the contentious good is deemed sacred by both parties.

4.1 The interaction of core-value investment and arbitrator bias

Consider the productivity of cultural investment in negotiation, λ . High values of λ indicate a high probability that negotiation will be successful if investment is made, and conversely. For an arbitrary value of λ , Figure 1 shows a horizontal line KL at the value of the reciprocal, $1/\lambda$. As drawn, this line intersects the ΔW^A and ΔW^B schedules at γ^A and γ^B respectively. If the actual, exogenously-given value of γ , which measures the arbitrator's bias, is less than γ^A , then $\Delta W^A < 1/\gamma$ and A will not invest in negotiations. Similarly, if actual γ is greater than γ^B then $\Delta W^B < 1/\gamma$ and B will not invest in negotiations. It follows that, given λ , equilibrium investment in negotiation will take place only if the arbitrator's actual parameter value γ falls within the closed, convex interval $[\gamma^A, \gamma^B]$ and it will not take place if the actual value of γ falls outside

this interval. Recall that γ measures the relative bargaining weight of group A in the Nash bargaining solution. The weights for the two groups are symmetric for $\gamma = 1/2$. If the bargaining weight unduly favors one player over the other, the disfavored player will cease to be interested in negotiation.

As we can see from Figure 1, different values of λ give rise to different sized intervals of γ that will elicit the cultural investment required for negotiations to begin. For example, as λ rises (reducing $1/\lambda$), the constraints on investment are relaxed somewhat, allowing them to occur for an ever-wider interval of γ values. Intuitively, higher λ , which corresponds to a higher productivity of cultural negotiation-investment, elicits such investments even in the presence of more biased weighting by the arbitrator in the bargaining solution.

On the other hand, lower values of λ restrict the interval of possible γ values until, at the critical value, λ_{min} given by

$$\lambda_{min} := \frac{1}{\Delta W^*}, \quad (21)$$

for which the horizontal line at $1/\lambda_{min}$ cuts the curves at their intersection point E , only the coincidental value $\gamma = \gamma^*$ could make investment in negotiations occur. For any value of the productivity of investment below the critical value, that is, for $\lambda < \lambda_{min}$, the requirement that both groups' surpluses not fall short of $1/\lambda$ can never be satisfied, and so the only equilibrium involves neither group investing in negotiation. We can summarize the foregoing observations in a proposition.

Proposition 4: *Given the exogenous parameters of the model, investment in opening the negotiation process requires*

- (i) *that the productivity of cultural investment be equal to or larger than a critical value λ_{min}*
- (ii) *that the exogenously given arbitrator's parameter γ have a value in an interval $[\gamma^A, \gamma^B]$, which depends on the productivity of investment, λ , and is strictly contained in $[0,1]$.*

If γ lies outside this interval, or if λ is lower than the critical value λ_{min} , there will be no investment in negotiation and conflict is inevitable.

This proposition is true for all values of (c^A, c^B, θ) . It shows that, while investment in the possibility of negotiations will not inevitably occur, it can happen as long the arbitrator's bias is contained within an appropriate subset of values. If international opinion, for example, is too largely in favor of one group, no investment may be made by the other group. As mentioned previously, the U.N. General Assembly has demonstrated a value of γ over time that would make it unacceptable to Israel as an arbitrator. Similarly, in the pre-Anglo-Irish Agreement period, devolution of power-sharing political institutions to Northern Ireland was prevented in part by a lack of engagement on the part of Nationalist politicians, who viewed the U.K. government as a biased arbitrator. This insight stands in sharp contrast to what would be expected in bargaining over secular goods. In the latter case, a bargaining outcome would be assured for any value of $\gamma \in (0,1)$.

While the bias of the arbitrator will play a crucial role in whether the groups will find it worthwhile to make the effort to dislodge entrenched core values, the range of values of γ for which cultural investment occurs clearly depends nontrivially on the cost parameters (c^A, c^B, θ) . For example, note that a strictly unbiased arbitrator ($\gamma = 1/2$) may not be the most desirable in terms of ensuring that investment towards negotiations occurs. As the productivity parameter λ decreases and approaches the minimum value, $1/\Delta W^*$, at which positive cultural investments will be chosen, the range of allowable arbitrator biases will approach the associated value

$$\gamma^* = \frac{\bar{X}^B}{\bar{X}^A + \bar{X}^B} = \frac{c^A}{c^A + c^B}. \quad (22)$$

This key value will be $1/2$ if and only if $c^A = c^B$; otherwise it is shifted towards the group with the higher opportunity cost of effort. This point is illustrated more generally in Figure 1 by the alternative, dashed surplus line for B , denoted $G'E'H$. For this case $c^B > c^A$, giving a relatively low surplus for B . The allowable interval for the arbitrator's bias is illustrated as $[\gamma^A, \gamma^{B'}]$, which indicates that B will invest in negotiations only if the arbitrator chooses from a bias set that strictly favors B . This kind of situation, in which investment in negotiation might occur only if

there is a strict arbitrator bias, suggests one reason why conflicts involving sacred goods may be so resistant to resolution. Investment in altering core values in order to make negotiation viable is only feasible when the weaker group expects to achieve a surplus that warrants the investment.

4.2 The Role of Asymmetry in the Cost Parameters

Now, we look briefly at how the entire set of (γ, λ) pairs that gives rise to equilibrium investment in negotiation, itself varies with changes in the other parameters, (c^A, c^B, θ) . This set is the shaded triangle DEH in Figure 1. Asymmetry of the groups' respective opportunity costs and the conflict-effectiveness parameter tend in general to make an equilibrium with positive investment in negotiation more difficult to achieve. Except coincidentally, parameter asymmetry leads to payoff asymmetry; this will tend to reduce the incentive of the group with the smaller payoff to invest in negotiation. This effect can be seen in a number of ways.

4.2.1 The Extremal Values of γ for Viable Negotiation

For a given value of the productivity parameter λ , the interval $[\gamma^A, \gamma^B]$ varies with the cost parameters c^A, c^B and θ in a straightforward way. In Figure 1 the vertical value at the end-point, F , of A 's surplus function is $2\bar{X}^A$. As this value increases or decreases, rotating the line DF around D , the intersection value γ^A will decrease or increase. Similarly, γ^B will increase or decrease as the vertical value at G of B 's surplus function ($2\bar{X}^B$) increases or decreases. For example, an increase in A 's opportunity cost of effort will decrease A 's equilibrium effort, and will increase or decrease B 's equilibrium effort according as A 's effort is a strategic substitute or complement for B 's (see the Lemma). Thus, an increase in A 's opportunity cost always raises γ^A while it may raise or lower γ^B according to the sign of the strategic effect.

Likewise, an increase in the effort-efficiency parameter, θ , will increase or decrease both equilibrium efforts together (see Proposition 2). In the former case both lines, DF and GH of Figure 1 will rotate upwards, widening the $[\gamma^A, \gamma^B]$ interval, and in the latter case, both lines will rotate downwards, narrowing the interval. The measure of the interval is maximized at symmetry, $c^A = c^B / \theta$.

We summarize these observations as

Proposition 5: *The interval $[\gamma^A, \gamma^B]$ of the arbitrator's bias for which there is investment in equilibrium varies with the exogenous, cost parameters (c^A, c^B, θ) as follows*

- (i) *an increase in A's opportunity cost raises γ^A , and will raise or lower γ^B according to the strategic relationship between A's and B's efforts in equilibrium; and analogously for an increase in B's opportunity cost.*
- (ii) *the measure of the interval $[\gamma^A, \gamma^B]$ increases with θ to a maximum at the value $c^A = c^B / \theta$, and decreases as θ continues to rise thereafter.*

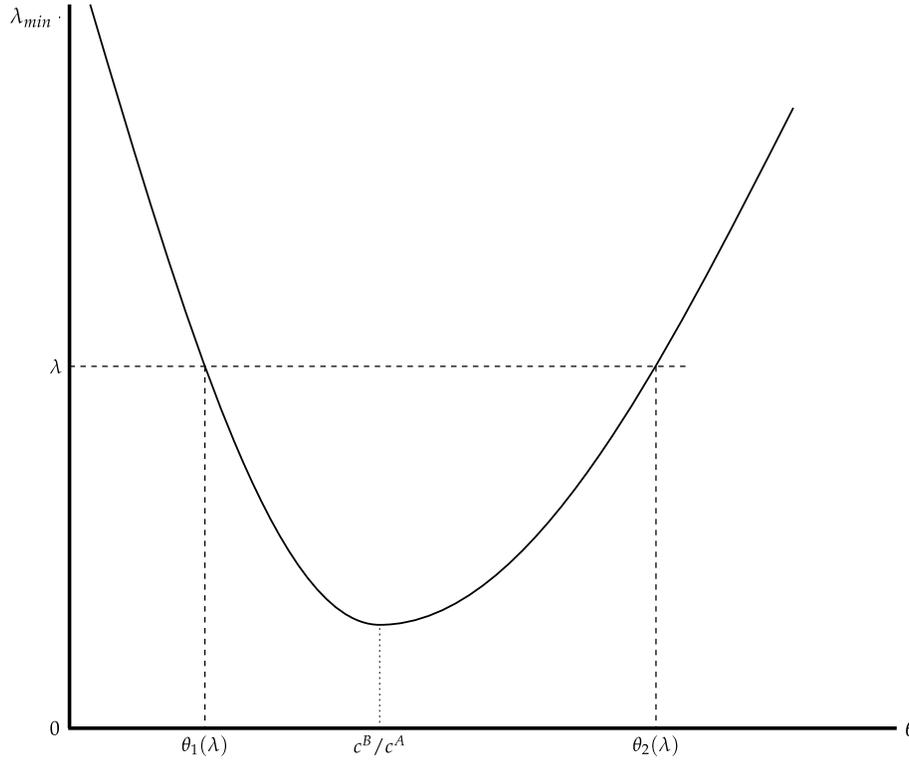
The latter result is interesting because it indicates one facet of the role of symmetry. Investments in negotiations have the greatest scope to occur, in terms of the arbitrator's bias, when the players are symmetric in their effective opportunity costs. Asymmetry in effort-efficiency militates against the possibility of a negotiation investment by reducing the surplus the weaker side can expect from negotiation.

4.2.2 The Maximal Feasible Bargaining Surplus ΔW^*

Now consider ΔW^* , the importance of which derives from the fact that it determines the minimum value, λ_{\min} that the productivity of cultural investment can take for a negotiation-investment equilibrium to be achieved.

Proposition 6: *Given values for c^A and c^B , the minimal productivity of cultural investment λ_{\min} that is required for cultural investment towards a negotiated settlement to be feasible is decreasing in θ for $\theta < c^B / c^A$, achieves its lowest value when $\theta = c^B / c^A$, and is increasing in θ for higher values of θ .*

Figure 2: The relationship between λ_{min} and θ . Given values for c^A and c^B , the minimal productivity, λ_{min} , that is required for cultural investment towards a negotiated settlement to be feasible is decreasing in θ for $\theta < c^B/c^A$, achieves its lowest value when $\theta = c^B/c^A$, and is increasing in θ for higher values of θ .



Intuition for the proposition can be garnered from Figure 2. At low values of θ , when $c^A < c^B/\theta$, group A 's effort would greatly exceed that of group B and the latter would obtain a smaller share of the resource in conflict. Since the conflict outcome nontrivially influences the bargaining outcome, group B 's surplus from negotiation is smaller than group A 's. Because the cultural investment in facilitating a negotiated outcome is constrained by the group that receives a lower surplus, this investment will obtain only if the productivity of cultural investment is large. An increase in θ will lead to an increase in group B 's conflict effort. Since, when $c^A < c^B/\theta$, X^B is a strategic complement of X^A the latter will rise too but not by as much. Both effort levels rise but there is a tendency towards convergence (in efficiency units), which occurs fully at $\theta = c^B/c^A$. At this value of θ both groups have the same opportunity cost of effort per

person in efficiency units. Further increases in θ confer an effective-cost advantage to group B and so it is now group A that receives a lower surplus in negotiation and hence constrains the possibility of a negotiated solution. Thus, λ_{min} is U-shaped as a function of θ . Values above this curve imply investment in negotiation, while those below it rule out such investment.¹⁹

Notice that for a given value of the productivity of cultural investment (as long as it is above the value at bottom of the U in Figure 2), a negotiated outcome will obtain as an equilibrium only if θ falls in a convex interval $[\theta_1(\lambda), \theta_2(\lambda)]$ which clearly depends on λ . In other words, if either group has a very large technological advantage over its rival in the efficacy of its conflict effort, cultural investment to support negotiation will not take place.

The above result is interesting. It shows that the likelihood of reaching a negotiated solution is highest when the two groups are symmetric in the effective cost of their conflict effort, for it is in this scenario that they both have large surpluses to garner from negotiation. Asymmetry reduces the surplus of the weaker group, thereby diluting its incentive to embark on the cultural sacrifice that would facilitate negotiation. This result stands in sharp contrast to what may be expected—in accord with standard intuition—when the good involved is secular. In that case, it is when the two groups are very asymmetric in the effective cost of their conflict effort that one might expect a swift negotiated outcome. For the more powerful group can easily buy out the weaker group for a paltry sum of money. But this avenue is not open when the good is sacred; there has to be a negotiated solution, and this may not be forthcoming if either group figures that the cultural sacrifice needed by way of softening their belief system is disproportionate to the prospective gains. Describing the failure of the Camp David II summit in 2000 Bunton (2013, Ch. 6) writes: “Not only did the Israeli and Palestinian leaders face huge challenges in bridging the chasm between them, they also had to negotiate the growing gulf that separated them from large segments of their populations at home. Neither leader had made much effort to prepare their people for the agonizing compromises that would be needed to achieve a historic reconciliation in the final status negotiations.” In other words, insufficient political preparation resulted in too low a value of λ , too weak a link between sacrifice and potential negotiating success.

¹⁹ Since the result above turns on the relative values of c^A and c^B/θ we can see that analogous results will obtain when either c^A or c^B vary.

This section has demonstrated that there is much to recommend the interesting proposal made by Atran and Axelrod (2008) and Ginges et al (2007). Directly addressing the possibility of compromises in sacred values is potentially very fruitful. Nevertheless, governments should recognize that there are limits to what they can achieve. First, there needs to be a firm commitment to invest in softening the position of hardliners in their own group. Second, the investment has to be mutual; expecting unilateral investment by the other group in the absence of efforts on one's own group will yield no benefit. Third, the possibility of a satisfactory resolution of conflicts involving sacred values will depend heavily on the perceived fairness of the international organization burdened with arbitrating the negotiation. If groups are very asymmetric in their opportunity costs of effort, a negotiated outcome is unlikely even when the arbitrator is unbiased. Finally, asymmetry in military capability between the groups diminishes the possibility of a negotiated settlement, in sharp contrast to what we might expect when the contested good is purely secular.

4.3 Comparison of Ex Ante Welfare between the Conflict Regime and the Regime with Investment in Changing Core Values

To compare the welfare impact of investment in changing core values begin by noting that the expected sum of utilities in this regime, net of costs, is given by

$$\ddot{W} := P[\widehat{W}^A + \widehat{W}^B] + (1 - P)[\bar{W}^A + \bar{W}^B] - (N^A c^A + N^B c^B)K^*, \quad (23)$$

where the third term is the total material cost of investment in core-value change. The sum of utilities is $(\bar{W}^A + \bar{W}^B)$ in the absence of such investment in changing core values.

The welfare impact of investment in changing core values is then the difference between these two expressions:

$$\begin{aligned} \Delta \ddot{W} &:= \ddot{W} - (\bar{W}^A + \bar{W}^B) \\ &= P[\widehat{W}^A - \bar{W}^A + \widehat{W}^B - \bar{W}^B] - (N^A c^A + N^B c^B)K^*. \end{aligned} \quad (24)$$

If this expression is positive it indicates that expected welfare is higher in the equilibrium with core-value-change investment than in the pure conflict equilibrium; and conversely. The first term in the right-hand-side expression can be interpreted as the expected value of welfare gains given the probability that negotiation succeeds, whereas the second term is the cost of investing in the possibility of negotiation taking place.

We complete the formal analysis in this paper with the following result proved in the Appendix on the welfare effect of investments in changing core values.

Proposition 7: *The regime in which investments in changing core values are undertaken in equilibrium provides a higher ex ante expected sum of utilities than does the conflict regime: that is, $\Delta \dot{W} > 0$.*

5 Conclusions

This paper takes seriously and models an intriguing and potentially fruitful proposal put forward by anthropologists, psychologists, and political scientists [Atran and Axelrod (2008), Ginges et al (2007), Ginges and Atran (2013)]. The argument has its basis in survey and experimental findings on attitudes towards concessions regarding sacred values. Hard line ideologues are unwilling to trade-off sacred values against secular values but may be willing to make concessions on sacred values if similar concessions are forthcoming from the rival group [Ginges et al (2007)]. This rules out monetary compensations as a recompense for concessions on sacred values. Nevertheless, as we have argued, there is an implicit trade-off between sacred and secular values because groups engage in conflicts over sacred values using resources that have alternative secular uses. The proposal we investigate is one that espouses a mutual acknowledgement of the sacred values of the contending parties as a route to a negotiated resolution of disputes.

Mutual concessions leading to a negotiated outcome is only possible, however, when governments of contending parties undertake concerted investments to soften the ideological

stance of their own group members. If no such investment is undertaken, a negotiated resolution is out of the question, and the outcome is determined by direct conflict. In this paper, we have sought to identify in a bargaining framework when we might expect a negotiated outcome if sacred values are involved. The outcome of the negotiation in any reasonable bargaining framework depends on the threat point defined by the conflict that follows in the event that negotiations fail, and so the conflict outcome casts a shadow on the negotiated outcome (if one obtains).

There is usually much scope for resource saving through a negotiated outcome. However, this requires restrictions on the bias that might be exhibited by the arbitrator. If the organization overseeing the negotiations is perceived to be partial to the rival group, the required investment for softening cultural or ideological positions will not be forthcoming and conflict will be the equilibrium that obtains. On the other hand, we have also seen that if the groups' opportunity costs differ, there will always be parameter values for which no investment will be undertaken even when the arbitrator is strictly unbiased.

Our results also demonstrate that too much asymmetry in the opportunity cost or the military capabilities of the two groups works against the possibility of a negotiated outcome. In general, the probability of a negotiated outcome crucially depends on the incentives to undertake cultural investments that facilitate mutual concessions. When one side has little surplus to expect from a negotiated solution, it has little incentive to undertake such investment---and conflict is the default outcome. For this reason, too much asymmetry either in political clout or in military strength is not conducive to negotiation. If the stronger party considers the potential of providing incentives of the stick or the carrot variety to the other, the power of symmetry would suggest that carrots rather than sticks would be much more productive.

We have shown that when investments in changing core values are undertaken in equilibrium, the *ex ante* aggregate welfare of the two groups is higher than in the conflict equilibrium. Our analysis thus provides reasons to be optimistic about negotiated settlement when sacred goods are involved. It also cautions us about the sort of scenarios that would admit such optimism and what governments and mediators should be aware of if a negotiated settlement is to be realized.

Our formal analysis is consistent with, and offers theoretical support for, the claim of Atran and Axelrod (2008, p. 242):

Finding ways to reframe core values so as to overcome psychological barriers to symbolic offerings is a daunting challenge. But meeting this challenge may offer greater opportunities for breakthroughs to peace than hitherto realized. The difficulty in creatively reframing sacred values may provide a key to unlocking the most deep-seated conflicts.

Appendix

Proof of Proposition 1: Immediate from inspection of (4) and (5). ■

Proof of Lemma: Denote by W_{ij} and S_{ij} , for $i, j \in \{A, B\}$, the respective derivatives of W and S with respect to X^i and X^j . The slope of A 's best-response function is derived from the first-order condition as $dX^A/dX^B = W_{BA}/(-W_{AA}) = S_{BA}/(-S_{AA})$, while for B it is $dX^B/dX^A = -W_{AB}/W_{BB} = -S_{AB}/S_{BB}$. In each case the denominator is positive since $S_{AA} < 0$ and $S_{BB} > 0$; thus, the slopes of the best-response functions are either opposite in sign or are both zero. The sign of S_{AB} is determined by the sign of $(X^A - \theta X^B)$. Note also that, from Proposition 1, in equilibrium the sign of $(\bar{X}^A - \theta \bar{X}^B)$ is opposite to the sign of $(c^A - c^B/\theta)$. Therefore, in equilibrium these strategic dependencies can be characterized by the sign of $(c^A - c^B/\theta)$. ■

Proof of Proposition 2: These results follow directly by taking the derivatives of the solutions expressed in (4). ■

Proof of Proposition 5: Algebraically, the values γ^A and γ^B are defined respectively where $2\gamma^A\bar{X}^A = 1/\lambda$ and $2(1 - \gamma^B)\bar{X}^B = 1/\lambda$.

(i) The associated comparative static expressions with respect to c^A are $d\gamma^A/dc^A =$

$$-(\gamma^A/\bar{X}^A)(d\bar{X}^A/dc^A); \quad d\gamma^B/dc^A = ((1 - \gamma^B)/\bar{X}^B)(d\bar{X}^B/dc^A);$$

(ii) analogously for the comparative static expressions with respect to c^B ;

and (iii) with respect to θ they are $d\gamma^A/d\theta = -(\gamma^A/\bar{X}^A)(d\bar{X}^A/d\theta)$; and $d\gamma^B/d\theta =$

$$((1 - \gamma^B)/\bar{X}^B)(d\bar{X}^B/d\theta).$$

These expressions can be signed using Proposition 2. ■

Proof of Proposition 6: The sign of the comparative static effect on ΔW^* with respect to change in θ is given by differentiating (20) to get

$$\text{sgn} \left[\frac{\partial \Delta W^*}{\partial \theta} \right] = \text{sgn} \left[(\bar{X}^A)^2 \frac{\partial \bar{X}^B}{\partial \theta} + (\bar{X}^B)^2 \frac{\partial \bar{X}^A}{\partial \theta} \right]. \quad (25)$$

We know from Proposition (2) that the signs of the derivatives on the right-hand side are either both positive (when $c^A < c^B/\theta$), both zero (when $c^A = c^B/\theta$), or both negative (when $c^A > c^B/\theta$). It follows that the equilibrium value of ΔW^* increases with θ until $\theta = c^B/c^A$ and decreases thereafter. This also alters the key value of the smallest λ needed to allow investment in negotiation to take place. Since $\lambda_{min} = 1/\Delta W^*$, we have the result. ■

Proof of Proposition 7: To evaluate the sign of $\Delta \dot{W}$ first assume, without loss of generality, that $\Delta W^A < \Delta W^B$, so it is group A that determines the value of K^* and P^* ; then

$$K^* = \frac{\ln(\Delta W^A \lambda)}{\lambda}; \quad P(K^*, K^*) = \frac{\Delta W^A \lambda - 1}{\Delta W^A \lambda}; \quad \frac{K^*}{P^*} = \frac{\ln(\Delta W^A \lambda)}{\Delta W^A \lambda - 1} \Delta W^A. \quad (26)$$

Substituting these values, those from (10), and the fact that $\Delta W^A = 2\gamma \bar{X}^A$ into (24) allows the welfare differential to be rewritten succinctly as

$$\Delta \dot{W} = 2P^* R \gamma \bar{S} (1 - \bar{S}) \left[N^A + N^B \frac{1 - \gamma}{\gamma} - \left(N^A + N^B \frac{c^B}{c^A} \right) \frac{\ln(\Delta W^A \lambda)}{\Delta W^A \lambda - 1} \right]. \quad (27)$$

The term in brackets determines the sign of the welfare differential. Since $\Delta W^A \lambda > 1$ for an equilibrium to exist, and the term $\ln(\Delta W^A \lambda)/(\Delta W^A \lambda - 1)$ is positive and always less than 1. Therefore, the term in brackets is positive if the term $(N^A + N^B (1 - \gamma)/\gamma)$ is no less than the term $(N^A + N^B c^B/c^A)$.

Note that the specification $\Delta W^A < \Delta W^B$ implies from (4) and (19) that

$$\frac{1 - \gamma}{\gamma} > \frac{\bar{X}^A}{\bar{X}^B} = \frac{c^B}{c^A}. \quad (28)$$

It is immediate from this inequality that

$$N^A + N^B \frac{1 - \gamma}{\gamma} > N^A + N^B \frac{c^B}{c^A}. \quad (29)$$

and hence that $\Delta \ddot{W}$ in (27) is positive. ■

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