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War and peace: Third-party intervention in conflict

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Abstract

This paper develops a simple sequential-move game to characterize the *endogeneity* of third-party intervention in conflict. We show how a third party's "intervention technology" interacts with the canonical "conflict technologies" of two rival parties in affecting the sub-game perfect Nash equilibrium outcome. From the perspective of *deterrence strategy*, we find that it is more costly for a third party to support an ally to deter a challenger from attacking (i.e., to maintain peace or acquiescence), as compared to the alternative case when the third party supports the ally to gain a disputed territory by attacking (i.e., to create war), *ceteris paribus*. However, an optimally intervening third party can be either "peace-making", "peace-breaking", or neither depending on the characteristics of the conflict and the stakes the third party holds with each of the rival parties.

JEL classification: D44; D74; H56
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1. Introduction

Understanding the role of third parties in conflict is necessary to better comprehend armed confrontation in general. At the forefront of this issue are the assumptions made as to why third parties intervene. For example, Regan (2002) assumes that third parties act in an attempt to limit hostilities. Thus, he takes the role of the third party as that of a "conflict manager". Siqueira (2003) similarly assumes that the short run goal of the intervener is to reduce and suppress the existing level of conflict. The view of intervention posited by the above researchers can be

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described as the liberal or idealist perspective. This view is embodied in the belief that aversion to humanitarian tragedies is the primary reason outside parties become involved in conflict. But is this view of third-party intervention a realistic one? Do third parties care only about creating peace?

Intuitively, the idealist perspective appears to give an incomplete description of third-party intervention. During the Cold War, for example, the Soviet Union intervened militarily on behalf of Afghanistan's ruling Marxist government not to promote peace in the region but to protect its own national security against anti-Soviet forces.[1] Furthermore, empirical research does not complement the view of the idealist perspective. In an empirical investigation that contradicts his main assumption, Regan (2002) found that, on average, third-party intervention tends to increase the duration over which fighting takes place. Given the assumption of the idealist perspective, this result indicates that an intervening third party would better achieve its objective by ignoring the conflict altogether! Obviously, a broader explanation is necessary to better understand the general nature of third-party effect.

Many studies, such as those by Morgenthau (1967), Bull (1984), and Feste (1992), conclude that parties choose to intervene when national interests are at stake. Regan (1996, 1998) describes this view as the "paradigm of realism" and identifies it as the dominant philosophy in international politics. Complementary to realism is the view that ethical issues and domestic politics play a crucial role in third-party decisions to intervene, a perspective supported by Blechman (1995), Carment and James (1995), and Dowty and Loescher (1996). Regan (1998) discusses the United States intervention in Bosnia as an example of domestic politics swaying a country's decision to intervene. He asserts that public outcry in the United States over failure to take action in Bosnia influenced the Clinton administration's policy. Similar examples exist in which an outside party does not intervene due to the high political cost of doing so. A strength of the realist perspective, taken in union with complementary views, is its recognition that national interest can derive from many disparate sources. In a paper addressing the history and nature of third-party intervention, Morgenthau (1967, p. 430) states, "All nations will continue to be guided in their decisions to intervene… by what they regard as their respective national interests." Thus, it is clear that realism views the interests of the third party as self-defined and potentially broad. In other words, success in a territorial conflict on the part of an "ally" can benefit the third party in a number of ways. Potential future benefits to the third party include enhanced access to natural resources and trade, improved national security, ethical fulfillment, and geo-strategic advantage (Moseley, 2006).

In this paper, we consider a scenario in which a third party's welfare depends on the outcome of a territorial conflict between two rival parties. Specifically, the third party receives a greater level of expected payoff when its "ally" gains (or maintains) possession of a disputed territory. As indicated by Vasquez (1993), territorial disputes have been shown to be more salient and more likely to lead to war than conflicts that derive from other issues.[2] Although the specific roots of conflict over territory vary from one land to another, they are directly related to a territory's economic value, nationalist value, or both (Huth, 1996; Wiegand, 2004). We therefore focus our analysis on territorial dispute.

[1] This assessment is based on a top-secret communication between Soviet officials dated December 31, 1979. To view the correspondence, visit the Soviet Archives database at http://psi.ece.jhu.edu.

[2] Social scientists have observed that territorial disputes are the primary cause of war (see, e.g., Goetz and Diehl, 1992; Vasquez, 1993; Kocs, 1995; Forsberg, 1996; Huth, 1996).

In our model, we do not take the third party as valuing peace between the two rival parties in and of itself.[3] Rather, we take the third party as having a “derived demand” for peace between the rival parties in some cases (and a “derived demand” for fighting between the rival parties in other cases), depending upon how its own direct national interests will be affected. Note that none of the aforementioned potential benefits require that the third party place a positive value on peace between a pair of outside parties, in and of itself. Further, none of these motivations require that the third party intervene to increase the likelihood of peace. After all, even a third party seeking ethical fulfillment may require a change in the status quo to achieve its overall goals. Interestingly, our analysis reveals that under certain conditions, even a third party that does not directly value outward peace will cause such a peace in order to maximize its expected payoff function. This peace creation is simply a bi-product of other third-party goals. The assumption that third parties do not directly value outward peace acts to restrict the possible nature of the third party. However, the assumption that all or most third parties directly and primarily value peace is also quite restrictive. Perhaps our assumption can shed additional light on the *general* effect of third-party intervention, as shown by Regan (2002).

Having described the assumptions that incorporate the costs and benefits of intervening, we are able to consider the tradeoffs a third party faces when deciding whether to become involved in a conflict. One interesting and prevalent type of third-party intervention, considered in Siqueira’s (2003) model, is the military subsidy. As subsidies increase, the likelihood that the ally gains or maintains possession of the territory increases as well. Additionally, we assume the cost of supporting an ally is influenced by the degree of military subsidy. In the Siqueira (2003) model of third-party intervention, the third party is treated exogenously and thus does not act as an economic agent in any general sense when choosing a level of intervention. The third party acts strictly as peacemaker, regardless of the stakes involved in a specific conflict. Additionally, Gershenson (2002) studies the effect of third-party sanctions in the case of *civil* conflict. Aside from being an important contribution to our understanding on civil conflict intervention, Gershenson’s scope also precludes an examination concerning the motivations and optimizing behavior of the third party.

We show that modeling a territorial dispute within a *three*-stage game framework allows us to *endogenize* the intervention decision of a third party and, in so doing, to understand the nature and potential effects of third-party intervention in a more comprehensive manner. The timing of the game is as follows. The third party moves first to support its ally, taking into account the impact of its actions in the subsequent leader–follower sub-games played between two rival parties (1 and 2) over a disputed territory. We examine two alternative scenarios for the second and third stages of the three-stage game. In the first scenario, Party 1, as the territorial defender, moves at the second stage to decide on its defensive allocation of military goods, while Party 2, as the challenger, moves at the third and final stage of the overall game played among the three parties.

[3] We use the terms “peace” and “peaceful outcome” interchangeably in this paper to indicate an absence of fighting. In other words, the defending party is able to effectively deter the challenging party from attacking. This definition is consistent with the notion of “acquiescence” or “deterrence” in sequential-move games of conflict as discussed in Grossman (1999), Gershenson and Grossman (2000), and Gershenson (2002), a “nonaggressive equilibrium” in Grossman and Kim (1995), and “peace” in Chang et al. (in press). The term “war,” on the other hand, indicates a presence of fighting (i.e., an attack by the challenging party). This definition is consistent with the notion of “armed confrontation” in conflict analysis as discussed in Gershenson and Grossman (2000), “engagement” in Gershenson (2002), and “war” in Chang et al. (in press).

The second scenario just reverses the order of moves between 1 and 2 in the last two stages of the overall game. In both scenarios, the third party considers supporting Party 1, its ally.[4]

Our study complements a recent contribution by Amegashie and Kutsoati (in press), who examine the endogeneity of third-party intervention in a civil conflict.[5] They find, among other things, that a third party is likely to intervene and help the stronger faction when success in the conflict is sensitive to effort or when two warring factions are sufficiently close in ability. They show that benefits from "making the playing field unequal" may exceed the cost of intervention. Methodologically, our work differs from theirs in some important aspects. First, we incorporate third-party intervention into the Gershenson and Grossman (2000) framework of conflict in which two rival parties play a sequential-move game, whereas Amegashie and Kutsoati analyze third-party intervention in a setting in which two warring factions play a simultaneous-move game. Second, Amegashie and Kutsoati assume that the third party is a "benevolent social planner" in that it maximizes a weighted sum of the welfare of the warring factions and the non-combatant population when deciding an optimal level of intervention. In our setting, however, the third party is not a social planner but a "selfish" agent who seeks its own interest by maximizing a weighted sum of strategic values associated with a disputed territory, which may be in the "wrong" hands of a non-ally party. Third, we show how "intervention technology" in the form of military assistance (Siqueira, 2003) interacts with the canonical "conflict technologies" of two rival parties in affecting the outcomes of the sequential-move game. This three-stage game framework permits us to examine the role of a third party in supporting its ally, viewed from the perspective of deterrence.

Our model demonstrates that the potential of third-party intervention to maintain peace (i.e., to effectively deter the non-ally from attacking a disputed territory) *or* create war (i.e., to help the ally launch a war to gain the territory) crucially depends on the characteristics of the primary parties in conflict, the value (strategic or intrinsic) held by the third party, and the efficacy of military support provided to the ally. In the analysis, we compare third-party intervention over alternative scenarios in order to examine the relative ability of a third party to create peace as compared to war. From the perspective of *deterrence strategy*, we find that it is more costly for the third party to militarily support its ally to defend than to attack, *ceteris paribus*. That is, for the intervener, it is more costly to create peace than to create a war. However, an optimally intervening third party can be either "peace-making", "peace-breaking", or neither depending on the nature of the conflict and the relationship of the third party with each of the two rival parties.

The remainder of the paper is structured as follows. Section 2 develops a conflict model of third-party intervention in a three-stage game. We examine two alternative scenarios in terms of whether Party 1 or 2 is initially a defender or challenger of a disputed territory. Section 3 presents a comparison between the two scenarios and discusses issues related to relative military costs of creating peace or war. Section 4 summarizes and concludes.

2. Third-party intervention in a three-stage game

Before characterizing the endogeneity of third-party intervention in a conflict between two rival parties (1 and 2), it is necessary to discuss the term "intervention technology". This term reflects the extent to which a third party can affect the capability of an allied party and, in so doing, affect the

[4] The motivation for this structure is addressed within Section 2.

[5] We thank the editor, Arye L. Hillman, and an anonymous referee for drawing our attention to the forthcoming paper by Amegashie and Kutsoati (in press).

overall outcome of the conflict. We assume that Party 3 supports its ally, Party 1, through military subsidy transfers (M), which serve to enhance Party 1's military efficiency by reducing its unit cost of arming. Denote such a cost-reduction function as $s=s(M)$, where $s'(M)=\mathrm{d}s/\mathrm{d}M<0$ and $s''(M)=\mathrm{d}^2s/\mathrm{d}M^2>0$. That is, an increase in M lowers the average cost of arming for Party 1, but the cost-reducing effect is subject to diminishing returns. We will examine how Party 3's intervention technology interacts with the respective conflict technologies of the contending parties to determine a conflict's outcome.

As in the conflict literature, we use a canonical "contest success function" to capture the technology of conflict. That is, the probabilities that Party 1 and Party 2 will succeed in armed confrontation are given respectively by

$$p_1=\frac{G_1}{G_1+\gamma G_2} \quad \text{and} \quad p_2=\frac{\gamma G_2}{G_1+\gamma G_2}, \tag{1}$$

where $G_1(>0)$ is the amount of military goods that Party 1 allocates to defend the territory, G_2 (≥ 0) is the amount of military goods that Party 2 allocates to challenge for the territory, and γ represents the relative effectiveness of a unit of Party 2's military goods to a unit of Party 1's.[6]

The probabilities of success specified above are in a simple additive form of conflict technologies. According to Garfinkel and Skaperdas (2006), a wide class of contest success functions (CSFs) in an additive form has been utilized in many fields of economics. They further indicate one important characterization associated with these CSFs, which is referred to as the *Independence of Irrelevant Alternatives* property. Specifically, Garfinkel and Skaperdas (2006, p. 4) remark that: "In the context of conflict, this property requires that the outcome of conflict between any two parties depend only on the amount of guns held by these two parties and not on the amount of guns held by third parties to the conflict." This property suggests that third parties have no role in a two-party conflict. It is easy to verify that this statement is valid for the case in which the two conflicting parties determine their optimal amounts of guns in a simultaneous-move game. Interestingly, in the multiple-stage sequential-move game we consider, an intervening third party has an important role in affecting the equilibrium outcome of the two conflicting parties, despite the additive form of conflict technologies in (1). This leads us to examine the endogeneity of third-party intervention.

To endogenously characterize Party 3's choice of intervention level, we adopt a three-stage game in our analysis. Party 3 moves first by optimally choosing a level of military subsidy transfers that maximizes its own objective function. In the second and third stages of the game, Parties 1 and 2 move sequentially to determine optimal levels of military goods allocation for the conflict, with the first mover being the territorial possessor. We consider two generic scenarios. In the first case, Party 1 occupies the territory and thus assumes the role of Stackelberg leader during the game's second stage. Party 2, as challenger, then moves in the third and last stage of the game. In the second case, Party 2, as the land's possessor, moves in the second stage while Party 1, as challenger, moves in the third and last stage of the game.

In the game's second and third stages, we follow Grossman and Kim (1995) and others after them in utilizing a Stackelberg framework in which the defender leads in determining its defensive allocation of military goods. Gershenson (2002) defends this structure by assuming that

[6] For alternative forms of contest success functions, see, e.g., Tullock (1980), Hirshleifer (1989), Skaperdas (1996), and Garfinkel and Skaperdas (2006).

the incumbent's institutional framework is relatively rigid; therefore, defensive allocations constitute a commitment on the part of the incumbent. The advantage of this assumption is that it allows for the analysis of a deterrence strategy on the part of the defender. Chang et al. (in press) develop a model to characterize possible outcomes of a land dispute between two rival parties in a Stackelberg game.[7]

Given that Party 3 provides military subsidy transfers (M) to Party 1, we assume for analytical simplicity that the cost-reduction function is $s=1/(1+M)^{\theta}$, where θ measures the degree of effectiveness with which a dollar of subsidy reduces Party 1's unit cost of arming and $0<\theta<1$.

Since Party 3 commits M in stage one, the payoff functions for Parties 1 and 2 in the subsequent stages of the game are given respectively by

$$Y_1 = \left(\frac{G_1}{G_1+\gamma G_2}\right)V_1 - \frac{1}{(1+M)^{\theta}}G_1, \tag{2a}$$

$$Y_2 = \left(\frac{\gamma G_2}{G_1+\gamma G_2}\right)V_2 - G_2, \tag{2b}$$

where $M(\geq 0)$ is the level of military subsidies transferred from Party 3 to Party 1; θ represents effectiveness with which a dollar of subsidy reduces Party 1's unit cost of arming; V_i is total value Party $i(i=1,2)$ attaches to holding the territory in the next period, where a party can value a piece of land for economic and deep intrinsic reasons. Note that the specification in (2a) implies that a third-party intervention is tactically "indirect" in that Party 3's military support does not directly affect the contest success function of Party 1.[8] The incorporation of $\gamma(>0)$ reflects asymmetry in the technology of conflict and has been adopted by several studies in the literature (see, e.g., Gershenson and Grossman, 2000; Grossman and Mendoza, 2003; Grossman, 2004).[9] Note also that a unit of military goods is somewhat of an abstraction. We might think of it as a "composite good" which includes some amount of weapons, trained soldiers, and strategic information.

2.1. Case I: Party 1, the ally, defends a disputed territory

We examine the first scenario, in which Party 1, the defender in the territorial dispute, moves first in the second stage to determine its defensive allocation of military goods and Party 2, the challenger, moves in the third and last stage of the three-stage game.[10] Consistent with backward

[7] More generally, and perhaps more fundamentally, Leininger (1993) shows in an interesting rent-seeking model that players are expected to engage in a sequential-move game. Morgan (2003) further uses a sequential-move game to examine the possibility of asymmetric contests for uncertain realizations of values to rival competitors.

[8] When there is no third-party intervention such that $M=0$, the three-country, three-stage model reduces to a two-country, two-stage model as those examined in Gershenson and Grossman (2000), Grossman (2004), and Chang et al. (in press). Following Hillman and Riley (1989) and Gershenson and Grossman (2000), we consider asymmetric valuations associated with a contested prize which is a disputed territory in our analysis.

[9] To show the independent effect of Party 3's military assistance on Party 1's probability of success, we separate the third party's military assistance (M) from Party 2's military effectiveness (γ). It proves intractable, within the framework of our model, to consider an endogenous third party that simultaneously affects γ and provides military subsidy (M).

[10] We thank an anonymous referee who links this approach to the case of market competition in which an established firm and a potential entrant compete in a Stackelberg fashion. As indicated by the referee, in a typical market entry or barriers to entry game, the incumbent, the one who faces loss of market share is usually modeled as the leader and the entrant, the follower. Please recall Footnote 9 and its related discussions where we indicate the adoption of this sequential-move approach by several studies in the conflict or rent-seeking literature.

induction in game theory, we begin with the game's last stage to analyze Party 2's optimization problem in military goods allocation.

Given Party 2's payoff function in (2a), if $\frac{\partial Y_2}{\partial G_2}>0$ where $G_2=0$, then $G_2>0$. In this case, Party 2 challenges for the territory by choosing an optimal level of arming that satisfies the following Kuhn–Tucker conditions:

$$\frac{\partial Y_2}{\partial G_2}=\left[\frac{\gamma G_1}{(G_1+\gamma G_2)^2}\right]V_2-1\leq 0;\qquad \frac{\partial Y_2}{\partial G_2}<0 \qquad \text{if} \qquad G_2=0. \tag{3}$$

From (3) it follows that

$$G_2=\frac{G_1^{\frac{1}{2}}}{\gamma}\left[(\gamma V_2)^{\frac{1}{2}}-G_1^{\frac{1}{2}}\right]\geq 0 \qquad \text{if} \qquad 0\leq G_1\leq G_1^{\mathrm{c}}, \tag{4}$$

where G_1^{c} is Party 1's *deterrent* level of arming.[11] Using (4), we find that $G_2=0$ when

$$G_1^{\mathrm{c}}=\gamma V_2. \tag{5}$$

Eq. (4) also defines Party 2's best-response function whose slope is

$$\frac{\mathrm{d}G_2}{\mathrm{d}G_1}=\frac{V_2^{\frac{1}{2}}}{2\gamma^{\frac{1}{2}}G_1^{\frac{1}{2}}}-\frac{1}{\gamma}. \tag{6}$$

If $\frac{\partial Y_2}{\partial G_2}<0$ where $G_2=0$, then $G_2=0$. In this case, Party 2 finds it optimal to refrain from arming for attack. That is, $G_2=0$ if $G_1\geq G_1^{\mathrm{c}}$.

When Party 2 chooses a positive amount of arming, the Kuhn–Tucker conditions in (3) imply that $G_1+\gamma G_2=(\gamma G_1 V_2)^{1/2}$. Substituting this expression into the payoff function of Party 1 yields

$$Y_1=\left[\frac{G_1}{(\gamma G_1 V_2)^{\frac{1}{2}}}\right]V_1-\frac{1}{(1+M)^{\theta}}G_1. \tag{7}$$

Given that Party 3 determines M in the first stage, Party 1's optimal level of arming must satisfy the following first-order condition:

$$\frac{\partial Y_1}{\partial G_1}=\frac{V_1}{(4\gamma G_1 V_2)^{\frac{1}{2}}}-\frac{1}{(1+M)^{\theta}}=0. \tag{8}$$

Solving Eq. (8) for Party 1's optimal defense level of military goods allocation yields

$$G_1^{*}=\frac{V_1^2(1+M)^{2\theta}}{4\gamma V_2}. \tag{9}$$

[11] In this scenario, Party 1 has allocated enough defensive arms to conflict such that Party 2 is deterred from attacking. Within the Stackelberg game between Parties 1 and 2, this equilibrium is characterized by "acquiescence" in that there is an absence of fighting (see, e.g., Gershenson and Grossman, 2000).

It is easy to verify that $\partial G_1^*/\partial M > 0$, which indicates that an increase in Party 3's military support raises Party 1's allocation of arming. This shows that Party 1's military goods and Party 3's military assistance are "complements", rather than independent of one another.

Substituting G_1^* into the best-response function of Party 2 in (4), we have Party 2's optimal level of arming as follows:

$$G_2^* = \frac{V_1}{\gamma}\left[\frac{(1+M)^\theta}{2} - \frac{V_1(1+M)^{2\theta}}{4\gamma V_2}\right]. \tag{10}$$

Substituting G_1^* from (9) into the slope of Party 2's best-response function in (6) yields the following:

$$\frac{\mathrm{d}G_2}{\mathrm{d}G_1} = \frac{V_2}{V_1(1+M^\theta)} - \frac{1}{\gamma}. \tag{11}$$

This will be a useful equation when interpreting comparative-static derivatives.

Considering Eqs. (5), (9) and (10), we can say that Party 2 strategically reacts to Party 1 in the following manner:

(i) If Party 1 chooses the critical level of arming such that $G_1^* = G_1^c = \gamma V_2$, then $G_1^* = \gamma V_2$ and $G_2^* = 0$.[12] It is then clear that $p_1^* = 1$ and $p_2^* = 0$.
As in Gershenson and Grossman (2000), Party 1 has deterred Party 2 from attacking, and no fighting occurs in this scenario (i.e., a peaceful outcome).

(ii) If Party 1's optimal level of arming is less than the deterrent level of arming such that $G_1^* < G_1^c = \gamma V_2$, then $G_2^* > 0$.
As also in Gershenson and Grossman (2000), Party 1 has failed to deter Party 2 from attacking, and fighting occurs in this scenario (i.e., war or armed confrontation).[13]

Using the CSFs in (1) and the equilibrium levels of arming $\{G_1^*, G_2^*\}$, we calculate the probabilities that Party 1 and Party 2 will succeed in armed confrontation as follows:

$$p_1^* = \frac{V_1}{2\gamma V_2}(1+M)^\theta \quad \text{and} \quad p_2^* = 1 - \frac{V_1}{2\gamma V_2}(1+M)^\theta. \tag{12}$$

[12] The expression $G_1^c = \gamma V_2$ is derived in the three-stage game when Party 2, as Stackelberg follower, moves in the third and last stage of the game. Using the backward induction approach to solve for the subgame-perfect equilibrium, we begin with Party 2's choice of arming. Because Party 2 does not receive military assistance from Party 3, M does not enter into the objective function of Party 2. This explains why M does not appear in the expression $G_1^c = \gamma V_2$. The term G_1^c shows the *minimum* level of arming that Party 1 should have for deterring Party 2. As indicated by the best-response function in (6), Party 2's choice of arming depends on that of Party 1 which, in turn, depends on Party 3's military assistance M.

[13] The justification of such terminology lies in the purpose of defensive arming for a conflict (security over a territory one already possesses), as compared to the purpose of offensive arming for a conflict (forcible acquisition of a territory). We can envision the assumption within a sequential move game. The defender allocates armed soldiers to defend the border of the disputed territory. The potential challenger assesses this defensive allocation. If there are too few soldiers, they attack and fighting commences. If there are an adequate number of soldiers, they find it in their interests not to attack and fighting does not commence.

It also follows from $\{G_1^*, G_2^*\}$ in (9) and (10) that Party 1 effectively deters Party 2 from challenging for the territory if $G_2^*=0$ or

$$\frac{V_1}{2\gamma V_2}-\frac{1}{(1+M)^\theta}\geq 0. \tag{13}$$

Other things being equal, the "effective deterrence" condition (13) is more likely to hold when M rises, V_1 rises, θ rises, V_2 falls, or γ falls. Conversely, if $G_2^*>0$, i.e.,

$$\frac{V_1}{2\gamma V_2}-\frac{1}{(1+M)^\theta}<0, \tag{14}$$

then the "deterrence strategy" is incomplete and Party 1 fails to prevent Party 2 from challenging. In this scenario, the probabilities that Party 1 and Party 2 will succeed in conflict are given by p_1^* and p_2^* in (12). From Eqs. (7), (9), and (12), we have the following comparative-static results:

$$\frac{\partial p_1^*}{\partial \gamma}<0,\quad \frac{\partial p_1^*}{\partial M}>0,\quad \frac{\partial p_1^*}{\partial V_1}>0,\quad \frac{\partial p_1^*}{\partial V_2}<0,\quad \frac{\partial p_1^*}{\partial \theta}>0,\quad \frac{\partial Y_1^*}{\partial M}>0,\quad \text{and}\quad \frac{\partial Y_2^*}{\partial M}<0. \tag{15}$$

Thus, the probability that Party 1 maintains the land increases in the value of military subsidies transferred from Party 3 to Party 1, decreases in the relative military effectiveness of Party 2 compared to Party 1, increases in the value Party 1 places on the land relative to Party 2, and increases in the effectiveness with which a dollar of military transfers reduces Party 1's unit cost of military goods. Furthermore, Party 1's expected payoff increases, and Party 2's expected payoff decreases, as the value of military subsidies transferred to Party 1 rises.

The above analysis has an interesting implication. Intervention by Party 3 to help the defender may create peace between the two primary parties when armed confrontation would otherwise have occurred. Using the effective deterrence condition (13), we find that Party 3 has the effect of *preventing war* if its choice of military subsidy level, M, satisfies the following condition:

$$M\geq M^{\mathrm{c}}>0,\qquad \text{where}\quad M^{\mathrm{c}}\equiv\left(\frac{2\gamma V_2}{V_1}\right)^{\frac{1}{\theta}}-1. \tag{16}$$

Note that $M^{\mathrm{c}}(\geq 0)$ defines the *critical* level of military subsidies such that Party 1 effectively deters Party 2. For the special case in which $M^{\mathrm{c}}=0$, Party 1 deters Party 2 from attacking in the absence of third-party intervention. If Party 3's military subsidy is such that $M=M^{\mathrm{c}}(\geq 0)$, we can be sure that Party 2 is deterred from attacking. Additionally, $M^{\mathrm{c}}>0$ on the right-hand side of the expression assures that, had Party 3 not intervened ($M=0$), war would have occurred.

Next, we proceed to the first stage of the three-stage game to examine the optimal subsidy allocation problem of Party 3. There are potential benefits to an intervening third party should its ally possesses the land. Denote S_i as the benefit or strategic value Party 3 will derive from the land should Party $i(i=1,2)$ hold possession. It is postulated that $S_1>S_2\geq 0$, i.e., Party 3 will be better off if Party 1, its ally, holds the land.[14] We assume that the objective of Party 3 is to maximize the

[14] Given this assumption, it can be shown that Party 3 would never subsidize Party 2 if "allowed" the opportunity within the framework of the model. This is due to the fact that victory in the conflict by Party 2 constitutes the less preferred outcome from Party 3's perspective.

expected benefits or strategic value associated with the disputed territory net of its military subsidies to the allied Party 1. Specifically, this objective function is taken as

$$U_3 = p_1 S_1 + p_2 S_2 - M, \tag{17}$$

where p_1 and p_2 are the probabilities that Party 1 and Party 2 will succeed in armed confrontation as given in (12).

Party 3 provides military subsidies only when it is able to *increase* the probability that Party 1 will hold the land. In other words, Party 3 stops intervening either before Party 1 becomes deterrent or at the point in which Party 1 becomes deterrent. Also, Party 3 never intervenes when Party 1 will achieve deterrence independently. Hence, the range [0, M^c] constitutes its relevant subsidy choice set. The Kuhn–Tucker conditions for Party 3's optimal choice of military subsidies are:

$$\frac{\partial U_3}{\partial M} = \frac{\theta(S_1 - S_2)}{2\gamma}\frac{V_1}{V_2}(1+M)^{\theta-1} - 1 \leq 0; \qquad \frac{\partial U_3}{\partial M} < 0 \qquad \text{if} \qquad M = 0.^{15} \tag{18}$$

It follows from (18) that

$$\frac{\partial U_3}{\partial M} < 0 \qquad \text{if and only if} \qquad 0 < S_1 < \frac{2\gamma V_2}{\theta V_1}(1+M)^{1-\theta} + S_2.$$

This result indicates that Party 3's military subsidies to Party 1 will be zero when the strategic value of the disputed land to the third party, S_1, is critically low. To examine implications of third-party intervention, we assume that S_1 is sufficiently high in value such that the necessary condition for expected payoff maximization, $\partial U_3 / \partial M = 0$, has an interior solution. This condition implies that, in equilibrium, the expected marginal benefit (mb_1) of allocating one dollar to military subsidies,

$$\text{mb}_1 \equiv \frac{\theta(S_1 - S_2)}{2\gamma}\frac{V_1}{V_2}(1+M)^{\theta-1},$$

is equal to marginal cost (i.e., one dollar).[16] Solving for the sub-game perfect equilibrium subsidy yields[17]

$$M^* = \left[\frac{\theta(S_1 - S_2)}{2\gamma}\frac{V_1}{V_2}\right]^{\frac{1}{1-\theta}} - 1. \tag{19}$$

It is easy to verify the following comparative-static derivatives:

$$\frac{\partial M^*}{\partial S_1} > 0, \quad \frac{\partial M^*}{\partial S_2} < 0, \quad \frac{\partial M^*}{\partial \gamma} < 0, \quad \frac{\partial M^*}{\partial V_1} > 0, \quad \text{and} \quad \frac{\partial M^*}{\partial V_2} < 0.$$

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[15] We thank an anonymous referee for suggesting that we use Kuhn–Tucker conditions to characterize the solution of Party 3's optimization problem. This approach allows us to examine the conditions under which outsiders may or may not be involved in a two-party conflict.

[16] For the special case in which $S_1 = S_2$, we have a solution where the optimal third-party military subsidy is zero.

[17] See Appendix A1 for a detailed derivation of the optimal military subsidy.

Thus, Party 3's optimal military assistance to Party 1 increases with the strategic value S_1, decreases with the strategic value S_2, decreases with the relative effectiveness γ of Party 2's military goods to these of Party 1's, and increases with the intrinsic value Party 1 places on the land relative to Party 2, V_1/V_2.

For clarity, let us focus on the latter three comparative-static derivatives, which are not immediately intuitive. As Party 2 becomes relatively stronger than Party 1 (as γ rises, V_2 rises, or V_1 falls), Party 2 reacts more heavily, as follower, to each additional military good that Party 1, as defender, allocates to defense. It follows from (11) that

$$\frac{\partial}{\partial\gamma}\left(\frac{\mathrm{d}G_2}{\mathrm{d}G_1}\right)>0,\quad \frac{\partial}{\partial V_2}\left(\frac{\mathrm{d}G_2}{\mathrm{d}G_1}\right)>0,\quad \text{and}\quad \frac{\partial}{\partial V_1}\left(\frac{\mathrm{d}G_2}{\mathrm{d}G_1}\right)<0.$$

This, in turn, implies that the subsidy becomes less marginally effective in increasing the probability that Party 1 wins the conflict as Party 2 becomes relatively stronger. That is, Eq. (11) implies that

$$\frac{\partial}{\partial\gamma}\left(\frac{\mathrm{d}p_1}{\mathrm{d}M}\right)<0,\quad \frac{\partial}{\partial V_2}\left(\frac{\mathrm{d}p_1}{\mathrm{d}M}\right)<0,\quad \text{and}\quad \frac{\partial}{\partial V_1}\left(\frac{\mathrm{d}p_1}{\mathrm{d}M}\right)>0.$$

Thus, Party 3 derives less expected marginal benefit (mb_1) with each dollar of military transfer as Party 2 becomes relatively stronger. That is,

$$\frac{\partial(\mathrm{mb}_1)}{\partial\gamma}<0,\quad \frac{\partial(\mathrm{mb}_1)}{\partial V_2}<0,\quad \text{and}\quad \frac{\partial(\mathrm{mb}_1)}{\partial V_1}>0.$$

It then follows that

$$\frac{\partial M^*}{\partial\gamma}<0,\quad \frac{\partial M^*}{\partial V_2}<0,\quad \text{and}\quad \frac{\partial M^*}{\partial V_1}>0.$$

Using (16) and (19), we find, in terms of the exogenous parameters, the necessary and sufficient condition under which Party 3 creates peace when war would otherwise have occurred,

$$\left[\frac{\theta(S_1-S_2)V_1}{2\gamma V_2}\right]^{\frac{\theta}{1-\theta}}\geq\frac{2\gamma V_2}{V_1}>1. \tag{20}$$

The first inequality relation in (20) is more likely to hold as a dollar of subsidy becomes more effective in reducing Party 1's cost of arming or as Party 3 places more value on the land not changing hands (i.e., (S_1-S_2) increases). The second inequality relation in (20) requires that $2\gamma V_2>V_1$.[18] In other words, Party 1 should not be able to deter Party 2 in the absence of intervention if Party 3 is to create peace.

The findings of the analysis lead us to establish the following proposition:

Proposition 1. *Given that the outcome of the conflict (whether peaceful or otherwise) can be altered through a third party's intervention, Party 3 will not support Party 1 (its ally) in defending*

[18] In view of Eq. (16) that $M^c>0$, we have $(2\gamma V_2/V_1)^{1/\theta}>1$ which implies that $2\gamma V_2>V_1$.

a disputed territory unless the territory's strategic value to the intervening party is sufficiently high. After having decided to intervene by supplying military subsidies to the ally, the third party is more likely to create peace in this case: (i) as its alliance with Party 1 becomes stronger (i.e., (S_1-S_2) is sufficiently large), (ii) as Party 2 becomes relatively weaker in terms of military effectiveness, and (iii) as Party 2 becomes weaker in terms of relative land valuation.

2.2. Case II: Party 1, the ally, challenges for gaining the disputed territory

Next, we examine an alternative scenario in which the disputed territory is initially in the "wrong" hands of Party 2, viewed from the standpoint of the intervening Party 3. In this scenario, Party 2 becomes the territorial defender (i.e., an incumbent) whereas Party 1, hoping to gain the territory, is the challenger. In terms of the timing of the sequential game, Party 2 moves in the second stage to decide its defensive allocation of military goods and Party 1 moves in the third and final stage of the three-stage game. We continue to examine possible military subsidy allocations (M) from Party 3 to its ally, Party 1, in the first stage of the three-stage game. We use backward induction to solve for the subgame-perfect Nash equilibrium. Given Party 3's commitment in military assistance in stage one, we begin with the game's third stage to analyze Party 1's optimization problem in military goods allocation.

Given Party 1's payoff function (see (2a)), if $\frac{\partial Y_1}{\partial G_1}>0$ where $G_1=0$, then $G_1>0$. With military subsidies M from Party 3, Party 1's optimal choice of military goods allocation satisfies the following Kuhn–Tucker conditions:

$$\frac{\partial Y_1}{\partial G_1}=\left[\frac{\gamma G_2}{(G_1+\gamma G_2)^2}\right]V_1-\frac{1}{(1+M)^{\theta}}\leq 0;\qquad \frac{\partial Y_1}{\partial G_1}<0 \quad \text{if} \quad G_1=0. \tag{21}$$

It follows from (21) that

$$G_1=(\gamma G_2 V_1)^{\frac{1}{2}}(1+M)^{\frac{\theta}{2}}-\gamma G_2\geq 0 \quad \text{if} \quad G_2^{c}\geq G_2>0, \tag{22}$$

where G_2^c is Party 2's deterrent level of arming and is given as $G_2^c=\frac{V_1(1+M)^{\theta}}{\gamma}$. That is, $\frac{\partial Y_1}{\partial G_1}<0$ when Party 2's arming is set at the critically high level of G_2^c. In this case, Party 1's best decision is to not challenge, i.e., $G_1=0$. Eq. (22) defines the best-response function of Party 1's allocation in military goods to Party 2's arming. The deterrent level of arming, G_2^c, is higher in the presence of third-party intervention ($M>0$) than in its absence ($M=0$). This finding implies that third-party intervention to support Party 1 (the challenger) makes it more costly for Party 2 (the defender) to achieve a deterrent strategy.

Next, we examine Party 2's optimization problem in stage two. Substituting G_1 from (22) into Party 2's payoff function yields

$$Y_2=\left[\frac{\gamma G_2}{(\gamma G_2 V_1)^{\frac{1}{2}}(1+M)^{\frac{\theta}{2}}}\right]V_2-G_2.$$

The objective of Party 2 in stage two is to maximize Y_2 by choosing its optimal defensive level of military goods allocation, which is given as follows:

$$G_2^{**}=\frac{\gamma V_2^2}{4V_1(1+M)^{\theta}}. \tag{23}$$

It is straightforward that $\partial G_2^{**}/\partial M<0$, which indicates the effect of third-party intervention through military support in lowering Party 2's defensive allocation of arming.

Substituting G_2^{**} from (23) into (22) yields Party 1's optimal level of arming:

$$G_1^{**}=\frac{\gamma^{\frac{1}{2}}V_2}{2}-\frac{(\gamma V_2)^2}{4V_1(1+M)^\theta}. \tag{24}$$

It is clear that $\partial G_1^{**}/\partial M>0$, which indicates the effect of third-party intervention through military support in raising Party 1's offensive allocation of arming.

Using Eqs. (23) and (24), we determine the probabilities that Party 1 and Party 2 will succeed in armed confrontation as follows:

$$p_2^{**}=\frac{\gamma^{\frac{3}{2}}V_2}{2V_1(1+M)^\theta}\quad\text{and}\quad p_1^{**}=1-\frac{\gamma^{\frac{3}{2}}V_2}{2V_1(1+M)^\theta}. \tag{25}$$

We thus have the following comparative-static derivatives:

$$\frac{\partial p_1^{**}}{\partial\gamma}<0,\quad \frac{\partial p_1^{**}}{\partial M}>0,\quad \frac{\partial p_1^{**}}{\partial V_1}>0,\quad \frac{\partial p_1^{**}}{\partial V_2}<0,\quad \frac{\partial p_1^{**}}{\partial\theta}>0,\quad \frac{\partial Y_1^{**}}{\partial M}>0,\quad\text{and}\quad \frac{\partial Y_2^{**}}{\partial M}<0.$$

In Case II, as in Case I, we find that parameters affect Party 1's optimal probability of success in terms of qualitative results.

It is instructive to discuss deterrent conditions for the sequential-move game of conflict. (i) If $\frac{\partial Y_1}{\partial G_1}\leq 0$ where $G_1=0$, then $G_1^{**}=0$. In this case, Party 2 deters Party 1 from challenging. In view of the Kuhn–Tucker conditions in (21), we have $G_1^{**}=0$ if $G_2=G_2^c=\frac{V_1(1+M)^\theta}{\gamma}$.[19] (ii) If $\frac{\partial Y_2}{\partial G_2}\geq 0$ where $G_2=G_2^c$, then $G_1^{**}=0$. Party 2 effectively deters Party 1 in this case. It follows from (24) that $G_1^{**}=0$ when

$$\frac{\gamma V_2}{2V_1(1+M)^\theta}-1\geq 0. \tag{26}$$

Thus it is more likely that Party 2 will deter Party 1 when V_2 rises, V_1 falls, M decreases, and γ increases.

Conversely, Party 2 fails to deter Party 1 from challenging when the following condition is satisfied:

$$\frac{\gamma V_2}{2V_1(1+M)^\theta}-1<0. \tag{27}$$

We use the above inequality to find the condition under which Party 3's support causes Party 1, the challenger, to attack Party 2 when peace would otherwise have occurred (i.e. Party 3

[19] The expression $G_2^c=V_1(1+M)^\theta/\gamma$ is derived in the three-stage game when Party 2, as the Stackelberg leader, moves before Party 1. Using the backward induction approach to solve for the subgame-perfect equilibrium, we begin with Party 1's choice of arming. Because Party 1 receives military assistance from Party 3, M directly enters into the objective function of Party 1. This explains why M directly appears in the expression $G_2^c=V_1(1+M)^\theta/\gamma$, where G_2^c is the *minimum* level of arming that Party 2 should have for deterring Party 1.

creates war). Party 3 acts as a peace-breaker when its choice of military subsidy level is such that

$$M > M^{cc}, \qquad \text{where} \qquad M^{cc} \equiv \left(\frac{\gamma V_2}{2V_1}\right)^{\frac{1}{\theta}} - 1 \geq 0. \tag{28}$$

The inequality assures that Party 3's military subsidy level is sufficient to induce Party 1 to attack when they would not have otherwise done so.

Finally, we examine the first stage of the three-stage game, in which Party 3 chooses its optimal level of intervention to support its ally. As defined previously, Party 3's payoff function is $U_3 = p_1S_1 + p_2S_2 - M$, but p_1 and p_2 are given by the probabilities of success in (25) for Case II. Substituting these probabilities of success into the payoff function, the Kuhn–Tucker conditions for Party 3's optimal choice of military subsidy are

$$\frac{\partial U_3}{\partial M} = \left[\gamma^{3/2}\frac{\theta(S_1 - S_2)}{2}\frac{V_2}{V_1}\right](1+M)^{-(1+\theta)} - 1 \leq 0; \qquad \frac{\partial U_3}{\partial M} < 0 \quad \text{if} \quad M = 0. \tag{29}$$

It follows from (29) that

$$\frac{\partial U_3}{\partial M} < 0 \quad \text{if and only if} \quad 0 < S_1 < \frac{2V_1(1+M)^{(1+\theta)}}{\gamma^{3/2}\theta V_2} + S_2.$$

This result indicates that Party 3's military subsidies to Party 1 will be zero when the strategic value of the disputed land to the third party, S_1, is critically low. To derive the implications of third-party intervention for territorial conflict, we assume that the value of S_1 is sufficiently high such that the necessary condition for expected payoff maximization, $\partial U_3/\partial M = 0$, has an interior solution. Solving for the sub-game perfect equilibrium subsidy yields[20]

$$M^{**} = \left[\gamma^{\frac{3}{2}}\frac{\theta(S_1 - S_2)}{2}\frac{V_2}{V_1}\right]^{\frac{1}{1+\theta}} - 1. \tag{30}$$

It is easy to verify the following comparative-static results:

$$\frac{\partial M^{**}}{\partial S_1} > 0, \quad \frac{\partial M^{**}}{\partial S_2} < 0, \quad \frac{\partial M^{**}}{\partial \gamma} > 0, \quad \frac{\partial M^{**}}{\partial V_1} < 0, \quad \text{and} \quad \frac{\partial M^{**}}{\partial V_2} > 0.$$

Notice that the last three derivatives have changed signs from Case I to Case II. We will explain the signs of these derivatives as, again, they may not be immediately intuitive. As Party 1 becomes relatively stronger than Party 2 (γ decreases, V_1 increases), Party 1 as follower naturally allocates more military goods to attack Party 2 (G_1 increases). That is,

$$\frac{\partial G_1}{\partial \gamma} < 0, \quad \frac{\partial G_1}{\partial V_1} > 0, \quad \text{and} \quad \frac{\partial G_1}{\partial V_2} < 0.$$

[20] See Appendix A2 for a detailed derivation of the optimal military subsidy.

As G_1 increases, Party 1's marginal expected benefit from an additional unit of G_1 declines. $\frac{\partial}{\partial G_1}\left(\frac{dU_1}{dG_1}\right)<0$. Hence, as Party 1 becomes stronger, a dollar of military subsidy becomes less effective in increasing the probability that Party 1 will take the land. That is,

$$\frac{\partial}{\partial \gamma}\left(\frac{\partial p_1}{\partial M}\right)>0, \quad \frac{\partial}{\partial V_1}\left(\frac{\partial p_1}{\partial M}\right)<0, \quad \text{and} \quad \frac{\partial}{\partial V_2}\left(\frac{\partial p_1}{\partial M}\right)>0.$$

Therefore, Party 3 derives less expected marginal benefit from providing a dollar of subsidy as Party 1 becomes relatively stronger. That is,

$$\frac{\partial(\mathrm{mb}_2)}{\partial \gamma}>0, \quad \frac{\partial(\mathrm{mb}_2)}{\partial V_1}<0, \quad \text{and} \quad \frac{\partial(\mathrm{mb}_2)}{\partial V_2}>0, \qquad \text{where} \qquad \mathrm{mb}_2 \equiv \frac{\gamma^{\frac{3}{2}}\theta(S_1-S_2)V_2}{2V_1(1+M)^{1+\theta}}.$$

This explains why we have $\frac{\partial M^{**}}{\partial \gamma}>0$, $\frac{\partial M^{**}}{\partial V_1}<0$, and $\frac{\partial M^{**}}{\partial V_2}>0$ in Case II.

Lastly, we find the necessary and sufficient condition under which Party 3 creates war (i.e., Party 3's support causes Party 1 to attack Party 2 when peace would otherwise have occurred). From Eqs. (28) and (30), the "peace-breaking" condition is:

$$\left[\gamma^{\frac{3}{2}}\frac{\theta(S_1-S_2)V_2}{2V_1}\right]^{\frac{\theta}{1+\theta}}>\frac{\gamma V_2}{2V_1}. \tag{31}$$

This inequality becomes more likely to hold (i) as Party 3 places more value on the land changing hands in the next period or (ii) as a dollar of military subsidy becomes more effective in reducing Party 1's cost of arming.[21]

Based on the above analyses, we have

Proposition 2. *Given that the outcome of the conflict (whether peaceful or otherwise) can be altered through a third party's intervention, Party 3 will not support Party 1 (its ally) to gain a disputed territory unless the additional strategic value associated with such a change of possession (S_1-S_2) is significantly high. The third party is more likely to support the ally to launch a war in this case: (i) as its alliance with Party 1 becomes stronger (i.e., (S_1-S_2) is sufficiently large), (ii) as Party 2 becomes relatively stronger in terms of military effectiveness, and (iii) as Party 2 becomes stronger in terms of relative land valuation.*

3. A comparison between the two cases

In this section, we compare Case I, in which the ally is a territorial defender, to Case II, in which the ally is a territorial challenger. As shown in the previous section, the conflicting nature of a territorial dispute, whether it is peaceful or not, can strategically and militarily be altered through third-party intervention. We wish to understand whether it is more costly (requires more resources) for Party 3 to support Party 1 to deter (Case I) or for Party 3 to support Party 1 to launch an attack (Case II), *ceteris paribus*. In other words, is it more expensive for Party 3 to help its ally maintain peace defensively or create war offensively?

To answer the question, note that M^c in Eq. (16) is the critical level of military subsidies that creates peace when Party 3's ally is the defender. Furthermore, $(M^{cc}+\varepsilon)$, or a value marginally

[21] In view of Eq. (28) that $M^{cc}\geq 0$, we have $(\gamma V_2/2V_1)^{1/\theta}\geq 1$ which implies that $\gamma V_2 \geq 2V_1$.

above M^{cc}, is the critical subsidy level that creates war when Party 3's ally is the challenger.[22] A comparison between M^{c} and $(M^{cc}+\varepsilon)$ reveals that[23]

$$M^{c}>(M^{cc}+\varepsilon).$$

We thus have

Proposition 3. *From the perspective of deterrence strategy, it is always more costly for Party 3 to create peace when a conflict would otherwise result in war (Case I) than to create war when a conflict would otherwise result in peace (Case II), ceteris paribus.*

The crucial factor for the findings in Proposition 3 is the difficulty or cost with which the deterrence condition is achieved, from the standpoint of intervention. It turns out to be much easier to break a deterrence (i.e., cause an ally to attack in Case II) than to create a scenario of deterrence (i.e. cause an ally to deter its rival in Case I). The reason for this is that, technically, it requires an increase in G_1 of ε to cause Party 1 to attack in Case II. In other words, in a Gershenson–Grossman style sequential game of armed confrontation, the state of attack is a spectrum of which the challenging party is on the brink. On the other hand, in Case I, it requires a $(G_1^{c}-G_1^{*\prime})$ increase in G_1, where $G_1^{*\prime}$ represents Party 1's level of arming if no outside intervention were to occur, to cause Party 1 to become deterrent. The latter increase is sufficiently greater than the former to assure that creating an attack in Case II is always less costly than creating a state of deterrence in Case I.

In an alternative approach to war or peace, Cai (2003) examines a two-stage game of conflict in which two players allocate resources between arms and domestic production in stage one and engage in peace negotiations trying to avoid war in stage two. He finds conditions under which the two players will build up more arms in the peace equilibrium than in the war equilibrium. Although Cai's analysis does not allow for third-party intervention, his finding suggests that it is more costly to create peace than to create war.

Next, we compare the optimal intervention level of Case I, when Party 3 supports the defender, to that of Case II, when Party 3 supports the challenger. Given that M^{*} in Eq. (19) is the optimal subsidy level for Case I and M^{*} in (30) is the optimal subsidy level for Case II, we have $M^{*}<M^{**}$ when

$$(S_1-S_2)<\gamma^{\frac{5-\theta}{4\theta}}\frac{2}{\theta}\left(\frac{V_2}{V_1}\right)^{\frac{1}{\theta}}. \tag{32}$$

Condition (32) implies that Party 3 is providing more military subsidies to its ally in Case II than in Case I, *ceteris paribus*. Furthermore, Proposition 3 indicates that it is less costly, in terms of military subsidy level, to create war in Case II than to create peace in Case I. Therefore, when condition (32) holds, it is clear that Party 3 is more likely to cause war in Case II than to maintain peace in Case I, *ceteris paribus*.

Conversely, we have $M^{*}>M^{**}$ when

$$(S_1-S_2)>\gamma^{\frac{5-\theta}{4\theta}}\frac{2}{\theta}\left(\frac{V_2}{V_1}\right)^{\frac{1}{\theta}}. \tag{33}$$

[22] To re-examine the term M^{cc}, please see expression (28). The term epsilon (ε) represents an arbitrarily small, positive number and is added to our Case II critical value due to the strictness of the left-hand side inequality in (28).

[23] See Appendix A3 for a derivation of this result.

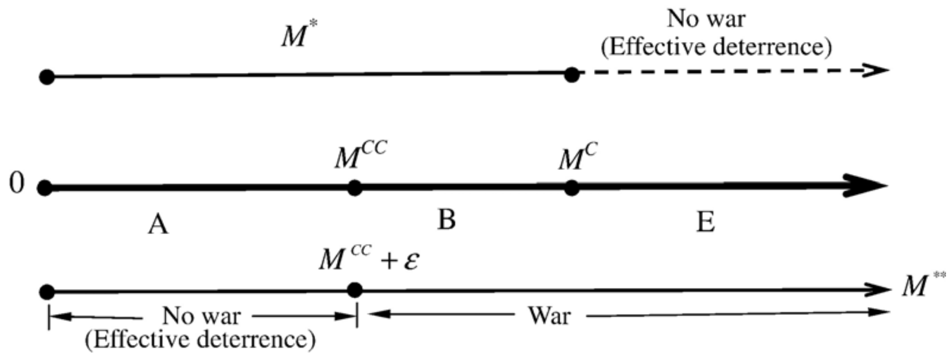

Fig. 1. The possible ranges of third-party military subsidy for the two cases.

In this scenario, Party 3 provides more military subsidies in Case I than in Case II. However, as Proposition 3 indicates, it always requires a greater level of military subsidies for Party 3 to support its ally to create peace in Case I than create war in Case II. Therefore, all else being equal, Party 3's relative likelihood of creating peace in Case I and creating war in Case II cannot be determined unambiguously when condition (33) holds.

The above findings allow us to establish the following proposition.

Proposition 4. *When Parties 3 and 1 are sufficiently weak allies (i.e., (S_1-S_2) is sufficiently small such that (32) holds), Party 3 optimally chooses a greater subsidy in Case II than in Case I. Furthermore, in this scenario, Party 3 is more likely to create war in Case II than to create peace in Case I, other things equal.*

In an opposite scenario where Parties 3 and 1 are sufficiently strong allies (i.e., (S_1-S_2) is sufficiently large such that (33) holds), Party 3 chooses a greater subsidy in Case I. However, in this latter scenario, Party 3's relative effectiveness in peace-making (Case I) and peace-breaking (Case II) is ambiguous.

The ambiguity in Party 3's relative effectiveness as peace-maker or peace-breaker arises from the fact that the ranking of the optimal subsidy choice across cases is ambiguous and subject to the parameters of the conflict. Fig. 1 presents a graphical ordering of possible subsidy allocations on a number line. Three intervals on the line are defined as follows: $A=[0, M^{cc}]$, $B=(M^{cc}, M^{c})$, and $E=[M^{c}, \infty)$. For the case in which $M^{*}\leq M^{**}$, the following possibilities are of interest. (i) If $M^{**}\in$A, Party 3 does not create war in Case II. Since $M^{*}\leq M^{**}$, Party 3 does not create peace in Case I either. (ii) If $M^{**}\in$B, Party 3 creates war in Case II but does not create peace in Case I. (iii) If $M^{**}\in$E, Party 3 creates war in Case II. Since $M^{*}\leq M^{**}$, Party 3 may or may not create peace in Case I. Thus, if Party 3 creates peace in Case I, then it also creates war in Case II. The converse of the statement, however, is not true. These results suggest that, *ceteris paribus*, Party 3 is more likely to be peace-breaking when $M^{*}\leq M^{**}$.

For the case in which $M^{*}>M^{**}$, there are three possibilities of interest. (i) If $M^{*}\in$A, Party 3 does not create peace in Case I. And since $M^{*}>M^{**}$, Party 3 does not create war in Case II either. (ii) If $M^{*}\in$B, Party 3 does not create peace in Case I. Given that $M^{*}>M^{**}$, Party 3 may or may not create war in Case II. (iii) If $M^{*}\in$E, Party 3 creates peace in Case I. However, Party 3 may or may not create war in Case II. The result is that, when $M^{*}>M^{**}$, Party 3's relative effectiveness as peace-maker or peace-breaker cannot be determined a priori.

4. Concluding remarks

In this paper, we develop a simple three-stage sequential-move game to characterize explicitly the *endogeneity* of third-party intervention in a territorial conflict. In the first stage of the game, a third party determines its mode and level of intervention (referred to as an "intervention technology") with the purpose of increasing its ally's (Party 1's) military goods production efficiency. In the second and third stages of the game, the aligned party and its opponent move sequentially to determine optimal allocations of military goods to maximize their respective payoffs in conflict. We examine how the third party's "intervention technology" interacts strategically with the canonical "conflict technology" of the two primary parties in determining the sub-game perfect equilibrium outcome. In contrast to the *Independence of Irrelevant Alternatives* property in the conflict literature, which suggests that third parties have no role in affecting the outcome of a two-party conflict for an additive form of contest success functions, we find conditions under which third-party intervention is relevant.

The model shows that an expected-payoff maximizing third party can intervene to create peace *or* to upset an existing peace, depending on the nature of the conflict and the values held by the third party. Therefore, according to our analysis, third parties can be either "peace-making" or "peace-breaking". This finding contradicts the liberal/idealist perspective that the goal of the intervener is always to reduce the existing level of conflict. In general, our findings suggest that there is a theoretically ambiguous relationship between third-party intervention and outcome of conflict (whether peaceful or violent). Thus, there is a valid theoretical explanation for Regan's (2002) empirical finding that third-party intervention, on average, does not induce peace. Obviously, a more detailed empirical study, which accounts for party characteristics for a particular conflict, is needed to comprehensively understand third-party intervention and its effect.

One caveat should be mentioned: This paper does not intend to be in any way prescriptive. Our contribution should be regarded from a purely positive perspective concerning endogenous effects of third-party intervention on the outcome of a two-party conflict. Some other comments are in order. First, our three-stage game is one shot in that we do not examine third-party intervention within the framework of a dynamic or repeated game. Second, our paper does not model direct conflict or fighting between a third party and its non-allying party involved in territorial dispute. Although it would complicate the analysis of third-party intervention, such a conflict with the third party may also affect the intervention decision as well as the outcome of a disputed territory.[24] One possible extension of the three-stage model is to consider a type of third party that places positive value on the realization of a peaceful outcome. Further research might explain how a peace-valuing, unbiased third party affects the theoretical conclusions of this paper. Additionally, other third-party mechanisms that alter conflict outcomes can be explored. For example, as in Siqueira (2003), the third party could provide negative incentives to their enemy, perhaps by raising the cost of the enemy's military goods.

[24] We thank an anonymous referee for this point. As in Siqueira (2003) and Rowlands and Carment (2006), we do not consider possible effects on an intervening third party. In our analysis, we assume that the "battlefield" is on a disputed land directly related to the two primary conflicting parties.

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Appendix A

A.1 The optimal military subsidy in Case I

Substituting the contest success functions of Party 1 and Party 2 from (12) into Party 3's objective function in (17), we have

$$\begin{aligned} U_3 &= p_1 S_1 + p_2 S_2 - M \\ &= \left[\frac{V_1(1+M)^\theta}{2\gamma V_2}\right] S_1 + \left[1 - \frac{V_1(1+M)^\theta}{2\gamma V_2}\right] S_2 - M \\ &= \frac{V_1}{2\gamma V_2}(1+M)^\theta (S_1 - S_2) + S_2 - M. \end{aligned}$$

Assuming that the value of S_1 is sufficiently high such that there is an interior solution for M, the partial derivative of U_3 with respect to M is

$$\frac{\partial U_3}{\partial M} = \frac{\theta(S_1 - S_2)}{2\gamma}\frac{V_1}{V_2}(1+M)^{\theta-1} - 1 = 0,$$

which implies that $(1+M^*)^{1-\theta} = \frac{\theta(S_1-S_2)}{2\gamma}\frac{V_1}{V_2}$ or that $(1+M^*) = \left[\frac{\theta(S_1-S_2)}{2\gamma}\frac{V_1}{V_2}\right]^{\frac{1}{1-\theta}}$. Solving for the optimal subsidy yields

$$M^* = \left[\frac{\theta(S_1-S_2)}{2\gamma}\frac{V_1}{V_2}\right]^{\frac{1}{1-\theta}} - 1.$$

The second-order condition for expected payoff maximization is satisfied at the optimal solution because

$$\frac{\partial^2 U_3}{\partial M^2} = -\frac{(1-\theta)\theta(S_1-S_2)}{2\gamma V_2}(1+M^*)^{\theta-2} < 0,$$

given that $0 < \theta < 1$ and $S_1 > S_2 \geq 0$.

A.2. The optimal military subsidy in Case II

Substituting the contest success functions of Party 1 and Party 2 from (25) into Party 3's objective function, we have

$$\begin{aligned} U_3 &= p_1 S_1 + p_2 S_2 - M \\ &= \left[1 - \gamma^{\frac{3}{2}} \frac{V_2}{2V_1(1+M)^{\theta}}\right] S_1 + \left[\gamma^{\frac{3}{2}} \frac{V_2}{2V_1(1+M)^{\theta}}\right] S_2 - M \\ &= S_1 - \left[\gamma^{\frac{3}{2}} \frac{(S_1 - S_2)}{2} \frac{V_2}{V_1}\right] (1+M)^{-\theta} - M. \end{aligned}$$

Assuming that the value of S_1 is sufficiently high such that there is an interior solution for M, the partial derivative of U_3 with respect to M is

$$\frac{\partial U_3}{\partial M} = \left[\gamma^{\frac{3}{2}} \frac{\theta(S_1 - S_2)}{2} \frac{V_2}{V_1}\right] (1+M)^{-(1+\theta)} - 1 = 0,$$

which implies that $(1+M^{**})^{1+\theta} = \left[\gamma^{\frac{3}{2}} \frac{\theta(S_1-S_2)}{2} \frac{V_2}{V_1}\right]$ or that $(1+M^{**}) = \left[\gamma^{\frac{3}{2}} \frac{\theta(S_1-S_2)}{2} \frac{V_2}{V_1}\right]^{\frac{1}{1+\theta}}$. Solving for the optimal military subsidy yields

$$M^{**} = \left[\gamma^{\frac{3}{2}} \frac{\theta(S_1 - S_2)}{2} \frac{V_2}{V_1}\right]^{\frac{1}{1-\theta}} - 1.$$

The second-order condition for expected payoff maximization is satisfied at the optimal solution because

$$\frac{\partial^2 U_3}{\partial M^2} = -\frac{\gamma^{3/2}(1+\theta)\theta(S_1 - S_2)V_2}{2V_1(1+M^{**}})^{\theta+2} < 0.$$

A.3. Cost of peace-making versus that of peace-breaking

Let $M^{c} > M^{cc} + \varepsilon$. Show that this must hold. If $M^{c} > M^{cc} + \varepsilon$, then

$$\left(\frac{2\gamma V_2}{V_1}\right)^{\frac{1}{\theta}} - 1 > \left(\frac{\gamma V_2}{2V_1}\right)^{\frac{1}{\theta}} - 1 + \varepsilon.$$

Thus, $\left[1 - \left(\frac{1}{4}\right)^{\frac{1}{\theta}}\right] \left[\frac{2\gamma V_2}{V_1}\right]^{\frac{1}{\theta}} > \varepsilon$, where $0 < \theta < 1$. That is, there is always a sufficiently small, positive value for epsilon such that this is true. Hence, $M^{c} > M^{cc} + \varepsilon$.

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