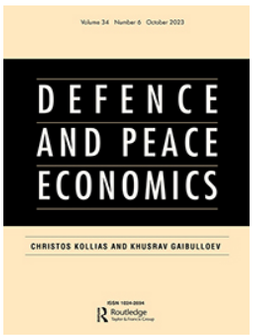

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Conflict with Third-Party Intervention and Revenge: A Game-Theoretic Exploration

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ABSTRACT

Most real-world conflicts are characterised by the presence of third-party interventions as well as prolonged and revengeful violent interactions between the conflicting parties. However, most of the conflict literature studies the impact of each of these forces – third-party intervention and revenge motivations – on the conflict, in isolation from each other. This paper attempts to fill in this gap and aims to explore the impact of these two forces acting in conjunction with each other on a conflict situation. In fact, we also endogenise the intervention decision of the third party and explore parametric restrictions under which a third party decides to intervene (either as an ally of one of the conflicting parties or as an 'idealist' aiming to reduce overall conflict levels) and its repercussions on associated conflict levels. We also present narrative evidences of some real-life conflicts that amply exhibit the two forces of third-party intervention and revenge.

Peace is the only battle worth waging. – Albert Camus

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Revenge; Third-party intervention; conflict; military subsidy; subgame perfect Nash equilibrium

Introduction

'Should a third party's intervention decision be different when warring factions have a desire to seek revenge relative to when they do not have such a desire?', question Amegashie and Runkel in the concluding lines of their paper, 'The Paradox of Revenge in Conflicts' (Amegashie and Runkel 2012). This paper is a direct attempt to answer this. It tries to explore two potent forces – third-party intervention and revenge – acting in conjunction with each other, on a conflict. We not only analyse what happens to conflict levels but also shed light on the third party's decision, as to whether or not it intervenes in the first place. Hence, we endogenise the intervention decision of the third party and thereafter explore its repercussions on ongoing, potentially revengeful, conflict situations.

Real-world conflicts are often characterised by the presence of both third-party interventions and revenge motivations of the conflicting parties. Third parties are often assumed to mediate and reduce conflict (see Regan (1996) and Siqueira (2003), for example). However, third-party intervention may also be in the form of acting as an ally of one of the parties, hence exacerbating conflict (see Chang, Potter and Sanders (2007), for example). Similarly, revenge motivations are also believed to potentially increase and prolong conflicts. Though, as Amegashie and Runkel (2012) show, it is possible that conflicts actually fall when players are revenge motivated. In short, therefore, when both the forces of third-party interventions and revenge motivations act on conflictual players, it is a priori, quite hard to predict how conflict levels and overall welfare of the players are affected.

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For example, consider the territorial dispute over Jammu and Kashmir in the Indian subcontinent between India and Pakistan for over 70 years.[1] Over the years, both India and Pakistan have chosen to make Jammu and Kashmir the cornerstone of their respective identities. In their maximalist versions, Kashmir is claimed to be India's *atoot ang* (integral part) and Pakistan's *shah rag* (jugular vein). And it has witnessed some of the most unending bloodsheds of modern times. But not only is it a tale of revengeful neighbours perpetuating conflict but also third-party interventions. China has been an ally of Pakistan in most of the diplomatic wars and in its conflict against India.[2] We discuss several other real-life conflicts in the Narrative Evidence (Section 4) that drag on for years being subject to revenge motivations of the opponents as well as interventions by third parties (like the Yemen conflict, Persian Gulf crisis, etc.). In short, any real-life conflict situation is likely to be under both forces acting simultaneously – intervention by third parties (pushing down or fanning conflict) and revenge (again ameliorating or exacerbating conflict). This paper intends to bring these very potent influences acting on a conflict into closer conversation with each other.

Let us briefly look at the concepts of revenge and third-party intervention before formally turning to our model.

Revenge

Revenge is a strong emotional trigger that mobilises people into action. As Michael McCollough, evolutionary psychologist of the University of Miami, states it as 'it's this very pervasive experience in human lives, people from every society understand the idea of getting angry and wanting to hurt someone who has harmed him/her'[3] *BBC*, 2017. Revenge not only drives up crime rates but also plays a pivotal role in politics. According to an article in the Washington Post, as of 15 October 2015, Donald Trump's victory came as a result of 'revenge of working-class whites . . . who felt abandoned by a rapidly globalising economy'.[4] Many studies have illustrated that exacting revenge brings satisfaction to the person who has suffered previous harm. De-Quervain et al. (2004) conducted a study which supported the hypothesis that people derived satisfaction from punishing norm violations, and the anticipated satisfaction from punishing defectors was reflected by the activation in the dorsal striatum.

Revenge is also believed to be the major cause of continuing conflict other than major cause of original conflict. It usually leads to escalation of the conflict with huge losses and tragic consequences for all the parties involved. Chagnon (1988) from his studies of the Yanomamö people in the Amazon Rainforest, empirically showed that the major cause of conflict escalation was retaliatory killings.

However, contrary to expectations, the fear of retaliation or revenge can also serve as a reason for the weakening of conflict. Amegashie and Runkel (2012) call it the 'paradox of revenge'. They have explained the paradox of revenge by characterising two effects – the 'value of revenge' effect which is the benefit of exacting revenge (which puts an upward pressure on overall conflict level) and the 'self-deterrence' effect which is fear of the opponent's desire to exact revenge or retaliate (which puts a downward pressure on overall conflict level). They have constructed examples where the equilibrium is such that the self-deterrence effect paradoxically exceeds the value effect and thereby decreases the aggregate conflict investments below that exerted when there is no revenge.

Liang, Chen and Siqueira (2020) re-examined the two effects and the paradox of revenge in a defender–attacker scenario. As per their framework, the defender (and only the defender) who was attacked in the first period takes revenge on the attacker in the ensuing period.

In short, revenge considerations can both drive up and down, overall conflict levels, depending on the strengths of the value that the players place on revenge and the fear of retaliation from the opponent to their own conflict investments.

Third-Party Intervention

Like revenge, another factor that can lead to escalation or de-escalation of conflict is third-party intervention in a conflict. To begin with, third-party intervention is an endogenous decision on the part of the third party, and hence, the question arises as to what makes a country intervene in some other dispute that does not directly concern it. According to Morgenthau (1967), countries choose to intervene when national interests are at stake. Regan (1998) calls it the 'paradigm of realism'. Blechman (1995) and Carment and Jones (1995) posit that ethical issues and domestic policies play a crucial role in the decision to intervene. The general type of third-party intervention is military subsidy, as considered by Siqueira (2003). Increase in subsidy increases the likelihood that the ally gains or maintains possession of the territory.

Regan (1998) conducted a study to evaluate the third-party intervention strategies and relative success rate, using data on all intra-state conflicts since 1944. The results showed that under certain conditions, third-party interventions in intra-state conflict can expedite the end of the violent facet of the conflict. Regan (2002) assumed that the third parties play the role of an mediator or 'conflict manager', and their main attempt is to limit hostilities. Similarly, Siqueira (2003) also assumed that the short-run objective of an intervener is to reduce or weaken the existing level of conflict. Chang, Potter and Sanders (2007) called these approaches as 'liberal or idealist'.

Chang, Potter and Sanders (2007) developed a sequential game in which they endogenised the third-party intervention by considering a scenario in which the third party's welfare depended on the outcome of a territorial dispute between two factions. In their setting, the third party acted as a 'selfish' agent, who is interested in maximising its own payoff.

Amegashie and Kutsoati (2007) similarly examined the endogeneity of third-party intervention in an intra-state conflict, by portraying the third party as a 'benevolent social planner', who maximises the weighted sum of the welfare of the combatants and non-combatants when deciding the optimal level of intervention.

Beviá and Corchón (2010) analysed a model of war where the players are rational and there is complete information. As per their model, a war can be avoided in many cases in the absence of binding agreements, if one player transfers money to the other. Their paper explores the possibility of such transfer agreements in a four-stage game with finitely lived and fully informed players. However, Garfinkel and Skaperdas (2000) showed in their model that war can emerge as an equilibrium outcome when the future holds long-term compounding rewards. In their model, each player chooses between guns and butter. First, they consider a static one-period game where peaceful settlement is the preferred end result, and then, they consider a two-period model to show their primary result of the analysis.

In short, third-party intervention again can lead to an increase or a decrease in conflict, depending on the nature of intervention and a host of other circumstantial factors.

Our Model

This paper attempts to put these two strands of literature into closer conversation with each other. We augment the Amegashie and Runkel (2012) setup by introducing an endogenous third-party intervention that can either be as an ally of one of the combatants or as an 'idealist' (drawing upon Chang, Potter and Sanders (2007)). Hence, we explore conditions and parametric restrictions under which Amegashie and Runkel's (2012) findings (of the paradox holding or not) may or may not still hold good. There are, in fact, cases where any form of third-party intervention can alter the paradox of revenge that may have been in effect without any intervention.

Amegashie and Runkel (2012) considered a two-period game of conflict between two players competing over a given resource. They also incorporate the idea of revenge, where each player wants to exact revenge for the previous destruction suffered. Hence, say in time t, players make conflict investments. Then in time $t+1$, they exact revenge on each other. We augment this

game, by introducing another period before the two conflicting players make their conflict investments – when a third player decides whether or not to intervene in the subsequent conflict-revenge game of the existing conflicting parties. Hence in time $t-1$, a third party decides whether or not to intervene. Thereafter, the Amegashie and Runkel two-period conflict game is played out.

As found in the conflict literature, third-party interventions can mainly be of two broad kinds – either a third party intervenes as an ally of one of the conflicting parties, or it intervenes as an 'idealist' intending to reduce overall conflict levels, thereby reducing loss of human lives and damage that conflict causes. We assume that whether a third party acts as an ally or an idealist is dictated by history, norms, etc. and is exogenous for purposes of the present analysis.[5] Hence in Section 2, we assume that the third party decides to intervene or not as an ally of one of the conflictual players, and thereafter, the players engage in conflict investments and revenge. We analyse the subgame perfect Nash equilibrium (SPNE) of the game and find out parametric restrictions under which the third party decides to intervene as an ally or it decides to not intervene at all. In Section 3, we assume that the third party decides to intervene or not as an 'idealist', and thereafter, the players engage in conflict investments and revenge. Once again, we analyse the parametric restrictions under which the third party decides to intervene as an idealist or it decides to not intervene at all, in any SPNE. We closely look at and compare the associated equilibrium conflict levels and welfare of the players in all the resulting games.

We find that the conflicting players are better off exacting revenge on each other, irrespective of whether the third party has intervened or not (either as an ally of one of them or as an 'idealist'). Given this, the third party intervenes as an ally only when the (strategic) value of the resource, if its ally wins, is sufficiently high. While the third party intervenes as an idealist only if its intervention can significantly reduce resultant conflict levels.

The rest of the paper is organised as follows: Section 2 lays out the model and the results when the third party intervenes as an ally of one of the sides. Section 3 lays down the model and results when the third party is an idealist. Section 4 discusses some real-world conflicts where both third-party intervention and revenge motivations of the players seem to play important roles. Section 5 concludes with a discussion on future research questions.

Third-Party Intervening as an Ally

Two players, $i = A, B$, are engaged in combat against each other over two periods of time, $t = 2, 3$. There is a third party, denoted by T. As explored in Chang, Potter and Sanders (2007), a third party can intervene either as an ally of one of the combatants or as an idealist who wants to reduce overall conflict levels. In this section, let us assume that it is acting as an ally and supports A.[6] In the next section, we explore the possibility of the third party being an idealist and wanting to reduce overall conflict levels. After the third party decides whether or not he wants to intervene as an ally of A, the players compete for a resource in period 2, and whoever wins it, gets to keep it. However, in period 3, the players may decide to exact revenge for the atrocities suffered at the hands of its opponent in period 2. Thereafter the game ends.

Figure 1 depicts the game. The sequence of moves is as follows: First, the third party decides whether it will intervene as an ally of A or not. In the next period, A, B simultaneously decide on conflict investments. In the third period, both players simultaneously decide on whether they will exact revenge on each other or not.[7] Hence, the different possibilities in this case and the corresponding payoffs (listed as payoff of A, payoff of B, payoff of T) are as follows[8]:

(i) The third party doesn't intervene and there is no revenge $(\tilde{\pi}_A, \tilde{\pi}_B, \tilde{\pi}_T)$; (see section 2.1 below)
(ii) The third party doesn't intervene and A, B exact revenge $(\hat{\pi}_A, \hat{\pi}_B, \hat{\pi}_T)$; (see section 2.2 below)
(iii) The third party intervenes but there is no revenge $(\pi_A^T, \pi_B^T, \pi_T^T)$; (see section 2.3 below)
(iv) The third party intervenes and there is revenge $(\pi_A^{TR}, \pi_B^{TR}, \pi_T^{TR})$; (see section 2.4 below)

Since it is a game of perfect information, we use backward induction to find the SPNE.

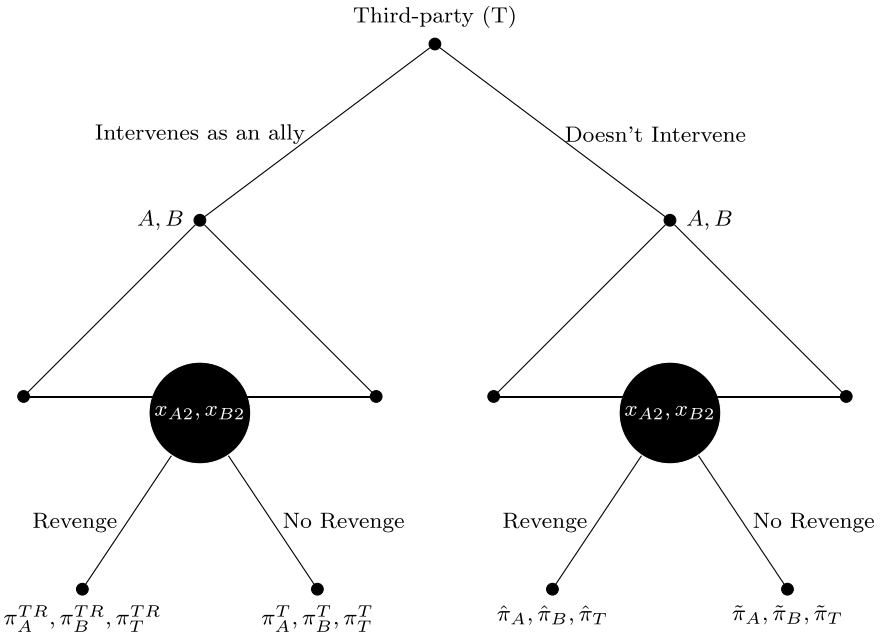

Figure 1. Third party intervening (or not) as an ally in the presence (or absence) of revenge motivations.

Subgame Equilibrium – Conflict and Revenge

In this section, we analyse the subgames where players A, B are engaged in conflict and revenge (or not). In the next section, we look at the SPNE of the entire game.

Let player i's valuation of the resource that they compete over, be $V_i, i = A, B$. Let x_{it} be the 'conflict investment' of player $i, i = A, B$ in period $t, t = 2, 3$. Let the probability with which player i wins the resource in period t be given by the standard ratio-form Tullock contest success function as follows:

$$P_{it} = \frac{x_{it}}{x_{it} + x_{jt}}, i, j = A, B, i \neq j.$$

Also for simplicity, assume that the cost of effort is linear and the marginal cost is normalised to 1. Hence, the utility functions of the players in period 2 are given as follows:

$$\pi_{i2} = P_{i2}V_i - x_{i2}, \quad \text{where}, i = A, B$$

Now let us turn to revenge. Laying down the setting of revenge of Amegashie and Runkel (2012), we have revenge functions, R's in period 3, which depend on conflict investments of one's opponent in period 2. For example, R_A would be as follows:

$$(i) \quad R_A(x_{B2}) > 0, \text{if} \quad x_{B2} > 0,$$

$$(ii) \quad R_A(x_{B2}) = 0, \text{if} \quad x_{B2} = 0,$$

$$(iii) \quad R'_A(x_{B2}) > 0.$$

Hence, 'revenge' investment of player A in period 3 is positive whenever conflict investment of player B in period 2 is positive. Moreover, it is increasing in the opponent's conflict investment.

No Third-Party Intervention and No Revenge

As a benchmark case, we first lay out the basic model without third-party intervention and without the possibility of revenge.[9] In the absence of revenge, there is no third-period revenge investments. Letting all variables in the benchmark case be denoted by tilde (without digressing from the Amegashie and Runkel (2012) paper), we have $\tilde{x}_{A3} = \tilde{x}_{B3} = 0$. Let $\tilde{X}_3$ be the aggregate revenge investments in period 3. Hence $\tilde{X}_3 = \tilde{x}_{A3} + \tilde{x}_{B3} = 0$. In period 2, the utility function of player $i, j = A, B, i \neq j$, is given by the following:

$$\pi_{i2} = P_{i2} V_i - x_{i2}. \tag{1}$$

Maximising w.r.t. x_{i2}, and assuming an interior optimum, we arrive at the equilibrium levels of conflict investments, $\tilde{x}_{A2}, \tilde{x}_{B2}$. Hence, we can find the aggregate conflict investment in period 2, $\tilde{X}_2 = \tilde{x}_{A2} + \tilde{x}_{B2}$. Summing over two periods (assuming away discounting), we can arrive at the aggregate level of investments in violence (conflict and revenge), $\tilde{X} = \tilde{X}_2 + \tilde{X}_3 = \tilde{X}_2 + 0 = \tilde{X}_2$. We arrive at the following values:

$$\tilde{x}_{i2} = \frac{V_i^2 V_j}{(V_A + V_B)^2}, \quad i, j = A, B, \quad i \neq j;$$

$$\tilde{X}_2 = \tilde{X} = \frac{V_A V_B}{(V_A + V_B)}.$$

No Third-Party Intervention but Revenge

With minor alterations, this part is essentially adopted from Amegashie and Runkel (2012), pp. 318-319 and hence is not discussed in details here.[10] A very brief outline is as follows: there is conflict in period 3 owing to revenge of the players (in addition to that in period 2 over the resource). It can be calculated that the equilibrium levels of period 3 conflict investments, $\hat{x}_{A3}$ and $\hat{x}_{B3}$ and the aggregate level of third-period conflict $\hat{X}_3 = \hat{x}_{A3} + \hat{x}_{B3}$ as follows:

$$\hat{x}_{i3} = \frac{R_i^2 R_j}{(R_A + R_B)^2}, \quad i, j = A, B, \quad i \neq j; \tag{2}$$

$$\hat{X}_3 = \frac{R_A R_B}{(R_A + R_B)}. \tag{3}$$

Conflict efforts in the second period fall in this case relative to the first benchmark case of no revenge, no third party as laid down in 2.1. Amegashie and Runkel (2012) call this the 'self-deterrence effect' of revenge. Self-deterrence effect is the effect where each combatant anticipates its effort in period 2 will cause its opponent to exact revenge in period 3 as a result each player reduces its effort in the conflict over the resource in the second period.

We now turn to the case where a third party acts as an ally of player *A* but the combatants are not revengeful.

Third-Party Intervention as an Ally of A *but No Revenge*

The third party intervenes as an ally of *A* only in the second-period conflict against *B* for the resource. Since there is no revenge by assumption, there is no third-period conflict. The third party, *T*, provides military subsidies, *M*, to party *A*. Using Chang, Potter and Sanders' (2007) cost-reduction function, $s = \frac{1}{(1+M)^{\theta}}$, where θ measures the degree of effectiveness with which a dollar of subsidy reduces player *A*'s unit cost of arming and $0 < \theta < 1$. The utility functions of *A* and *B* in this case are as follows:

$$\pi_{A2} = P_{A2}V_A - \frac{1}{(1+M)^{\theta}}x_{A2}; \tag{4}$$

$$\pi_{B2} = P_{B2}V_B - x_{B2}. \tag{5}$$

Maximising the utility functions w.r.t x_{i2} in the simultaneous game and assuming an interior solution we get the equilibrium levels of conflict investments x_{A2}^T, x_{B2}^T and the aggregate level of conflict in period 2, $X_T = x_{A2}^T + x_{B2}^T$, as follows:

$$x_{A2}^T = \frac{V_A^2 V_B (1+M)^{2\theta}}{\left(V_A(1+M)^{\theta} + V_B\right)^2}; \tag{6}$$

$$x_{B2}^T = \frac{V_B^2 V_A (1+M)^{\theta}}{\left(V_A(1+M)^{\theta} + V_B\right)^2}; \tag{7}$$

$$X_T = X_{T2} = \frac{V_A V_B (1+M)^{\theta}}{\left(V_A(1+M)^{\theta} + V_B\right)}. \tag{8}$$

Observation 1. As expected, $\tilde{X} < X_T$, i.e. an intervention by a third party, acting as an ally, increases the overall conflict investments (by making conflict less costly for one of the players).

Let us now turn to the contribution of this paper – to analyse the model with both a third party intervening (as an ally in this case) and revenge motivations of the players. The third party, can, for example, provide military subsidies (*M*) like arms and ammunitions and thus reduce the cost of conflict of its ally by enhancing its military efficiency and potentially increasing its conflict efforts. Chang, Potter and Sanders (2007) used the example of Soviet Union's intervention with military assistance during the Cold War on behalf of Afghanistan's ruling Marxist government to explain the third-party intervention as an ally of one of the combatants.

Third-Party Intervention as an Ally of A *and Revenge*

For this subsection, the third party intervenes in the conflict as an ally of player *A* in the second period. In the third period, when players exact revenge on each other, the third party does not intervene (by assumption). Proceeding like before, the second-period payoff functions of players *A* and *B* are as follows:

$$\pi_{A2} = \frac{x_{A2}}{x_{A2}+x_{B2}}V_A - \frac{1}{(1+M)^{\theta}}x_{A2} + \hat{\pi}_{A3}; \tag{9}$$

$$\pi_{B2} = \frac{x_{B2}}{x_{A2}+x_{B2}}V_B - x_{B2} + \hat{\pi}_{B3}. \tag{10}$$

Maximising the payoff functions w.r.t x_{i2}, the FOCs are given as follows:

$$\frac{d\pi_{A2}}{dx_{A2}} = \frac{x_{B2}}{(x_{A2}+x_{B2})^2}V_A - \frac{1}{(1+M)^\theta} + \frac{d\hat{\pi}_{A3}}{dx_{A2}} = 0; \tag{11}$$

$$\frac{d\pi_{B2}}{dx_{B2}} = \frac{x_{A2}}{(x_{A2}+x_{B2})^2}V_B - 1 + \frac{d\hat{\pi}_{B3}}{dx_{B2}} = 0. \tag{12}$$

Rewriting (11), we get

$$\frac{d\pi_{A2}}{dx_{A2}} = \frac{x_{B2}}{(x_{A2}+x_{B2})^2}V_A - 1 + \frac{d\hat{\pi}_{A3}}{dx_{A2}} + \left(1 - \frac{1}{(1+M)^\theta}\right) = 0. \tag{13}$$

Since there is a positive term in the LHS $\left(\frac{1}{(1+M)^\theta} < 1\right)$, the payoff function of A is maximised at a higher value of x_{A2}. Hence, in this case, the first-period conflict investments of A increase because of third-party intervention. Denoting the equilibrium levels of second period conflict in this case by x_{A2}^{TR}, x_{B2}^{TR}, and the aggregate level of conflict in the second period by $X_2^{TR} = x_{A2}^{TR} + x_{B2}^{TR}$, we get $X_2^{TR} > \hat{X}_2$.

Let us now turn to the effect of third-party intervention in the second period, on the third-period conflict investments for revenge. Let the third-period conflict be denoted by $X_3^{TR} = x_{A3}^{TR} + x_{B3}^{TR}$. Since $\frac{dX_3^{TR}}{dx_{A2}} = \frac{R_A^2 R'_B}{(R_A+R_B)^2} > 0$ and since x_{A2} rises; hence, due to third-party intervention in the second period, total conflict in the third period increases. Let total conflict be $X_R^T = X_2^{TR} + X_3^{TR}$. Therefore, total conflict with third-party intervention and with revenge is more than the total conflict without third-party intervention and with revenge. That is, $X_R^T > \hat{X}$.

To analyse more concrete cases, we look at the examples in Amegashie and Runkel (2012), but now augmented with the presence of the third party. The following proposition summarises the results in the case when the revenge functions, R's are symmetric across the players and so are the V's, the valuations of the resource for the players.[11]

Proposition 1. *Let* $R_i(x_{j2}) = a x_{j2}^{\phi}, i \neq j, V_A = V_B$ *and* $(1+M)^\theta < 2$.

$$(i)\ \ X_R^T > X_T > \tilde{X},\ \ \textit{and}\ \ X_R^T > \hat{X} > \tilde{X},\ \ \textit{when}\ \ \phi < \frac{1}{2};$$

$$(ii)\ \ X_T > X_R^T > \hat{X} > \tilde{X},\ \ \textit{when}\ \ 1 > \phi > \frac{1}{(1+M)^\theta};$$

$$(iii)\ \ X_T > X_R^T > \hat{X},\ \ \textit{and}\ \ X_T > \tilde{X} > \hat{X},\ \ \textit{when}\ \ \phi > 1.$$

Proof. Proof in online Appendix B. ■

Observation 2. When ϕ lies between 1 and $\frac{1}{(1+M)^\theta}$ we get a complete relation between the conflict levels. The maximum conflict is when there is a third party and it is helping one of the players but no revenge, and the minimum conflict is when there is conflict without both revenge and third party.

However, irrespective of whether or not there is revenge, conflict levels are now higher (more so if there isn't revenge) since $X_T > X_R^T > \hat{X} > \tilde{X}$.

Observation 3. In this case (case (iii)), as in a corresponding case of Amegashie and Runkel's (2012) Proposition 1, $\tilde{X} > \hat{X}$, i.e. the paradox of revenge is in effect. However, with the introduction of the third party, we see that conflict invariably rises from that lower level.

Observation 4. The presence of a third party acting as an ally of one of the combatants accelerates the paradox of revenge. In other words, for a value of $\phi < 1$ the paradox of revenge is in effect ($X_T > X_R^T$) compared to without third-party case. The presence of a third party as an ally of one of the combatants increases the conflict investment of the ally (and also the overall level of conflict) which increases the value effect of revenge of its opponent in the third period. Since the elasticity of revenge is more than the cost-reduction factor of the ally, its opponent has a strong incentive to strike back thus reducing the second-period effort of the ally.

Like in Amegashie and Runkel (2012), let us see how conflict is affected in the more asymmetric cases. The next proposition lays down the results when the valuation of revenge is different for the two players.

Proposition 2. *When* $R_i(x_{j2}) = a_i x_{j2}, a_A \neq a_B$ *and* $V_A = V_B$ *then* $X_T > X_R^T > \hat{X}$ *and* $X_T > \tilde{X} > \hat{X}$.

Proof. Proof in online Appendix C.■

Observation 5. When third party intervenes as an ally of one of the parties, the level of conflict without revenge is more than with it, thus we observe paradox of revenge ($X_T > X_R^T > \hat{X}$). And also, in the presence of such third-party intervention but in the absence of revenge, the level of conflict is higher than the original level ($X_T > \tilde{X}$).

Observation 6. $\tilde{X} > \hat{X}$ is just the paradox of revenge, as reported in Proposition 2 in Amegashie and Runkel (2012).

Proposition 3. *When* $R_i(x_{j2}) = x_{j2}, V_A \neq V_B$ *then* $X_T > X_R^T > \hat{X}$ *and* $X_T > \tilde{X} > \hat{X}$.

Proof. Proof in online Appendix D.■

Observation 7. With symmetric revenge functions but with asymmetric valuations, we have findings that are similar to that of Proposition 2.

Observation 8. This result is similar in spirit to Amegashie and Runkel's (2012) result in Proposition 3 where we see the paradox of revenge with the introduction of asymmetry in the valuations of the two players. i.e. $\tilde{X} > \hat{X}$.

Hence from all the propositions in this section, the general message seems to be that the introduction of a third party that acts as an ally of one of the players is likely to lead to escalation of conflict, even overturning downward pressure on conflict that the self-deterrence effect of revengeful opponents might have.

Third-Party Intervention as As Ally – SPNE

The literature on third-party interventions, is divided, as to what the objective of third parties is, when they decide to intervene. Here, we follow a formulation proposed in Chang, Potter and Sanders (2007), where the third party be a 'selfish-agent'. In their setup, the conflict between the parties is a territorial dispute and the third party maximises its expected payoff depending on who gets to keep hold of the land net of the military subsidies to its ally, given by

$$\pi_T = p_A K_A + p_B K_B - M, \tag{14}$$

where, $K_i, i = A, B$, is the strategic value of the resource to the third party if combatant i wins the conflict which is given exogenously, $p_i, i = A, B$, is the probability that combatant i wins in the conflict, and M is the military subsidy provided to its ally. If the third party doesn't intervene with the military subsidy then its expected payoff will remain, $\tilde{\pi}_T = p_A K_A + p_B K_B$.

We have already calculated the equilibrium conflict investments of the combatants when the third-party acts as an ally of the combatant A. So, without loss of generality let us assume $K_A > K_B \geq 0$, and hence the third party will be better off if A wins the conflict and gets to keep the resource, so that the third party would want to provide the military subsidy to A.[12]

No Revenge

Recall, that the equilibrium probabilities of winning of the combatants in the no-revenge scenario is as follows:

$$p_{A2}^T = \frac{V_A(1+M)^\theta}{V_A(1+M)^\theta + V_B}, \tag{15}$$

$$p_{B2}^T = \frac{V_B}{V_A(1+M)^\theta + V_B}. \tag{16}$$

Thus, the probability of winning of combatant A (third party's ally) rises compared to the no third-party intervention case and the probability of winning of B falls compared to the no third-party intervention case. Putting the equilibrium values of the probabilities in the third party's payoff function we get:

$$\pi_T = \left(\frac{V_A(1+M)^\theta K_A}{V_A(1+M)^\theta + V_B}\right) + \left(\frac{V_B K_B}{V_A(1+M)^\theta + V_B}\right) - M \tag{17}$$

Maximising the third party's objective function in (17) w.r.t the military subsidy it provides to its ally, we get

$$\frac{d\pi_T}{dM} = \frac{V_A V_B \theta (1+M)^{\theta-1}(K_A - K_B)}{\left(V_A(1+M)^\theta + V_B\right)^2} - 1. \tag{18}$$

The third party won't intervene as an ally of combatant A if its payoff is always falling with M, i.e, $\frac{d(\pi_T)}{dM} < 0$, i.e. the RHS of (18) is negative, i.e.

$$(K_A - K_B) < \frac{\left(V_A(1+M)^\theta + V_B\right)^2}{V_A V_B \theta (1+M)^{\theta-1}} \tag{19}$$

$$\Rightarrow K_A < K_B + \frac{\left(V_A(1+M)^\theta + V_B\right)^2}{V_A V_B \theta (1+M)^{\theta-1}}. \tag{20}$$

Let $K_v = K_B + \frac{\left(V_A(1+M)^\theta + V_B\right)^2}{V_A V_B \theta (1+M)^{\theta-1}}$, be the reservation value of the resource for the third party. Hence, we conclude that when the strategic value of the resource for the third party (when its ally wins) is less than the reservation value of K_v, then the third party would choose to not intervene. Thus, the strategic value of the resource for the third party when its ally wins must be sufficiently high for the third party to intervene.

With Revenge

Now let us consider this endogenous third-party intervention in the presence of revenge. After the conflict ends and the winner gets hold of the resource, the third party can derive some strategic benefits out of the resource. But if the conflict continues out of revenge motivations then it is likely that it becomes difficult for the third party to derive strategic benefits from the resource. Hence, we hypothesise the following payoff function of the third party:

$$\pi_T = p_A(K_A - R_A) + p_B(K_B - R_B) - M, \tag{21}$$

where, $R_i, i = A, B$ is the revenge function of i. The idea is, even if i wins the conflict, the strategic value of the resource that accrues to the third party is lower by the amount of revenge investments. If the third party doesn't intervene with the military subsidy then its expected payoff will remain, $\hat{\pi}_T = p_A(K_A - R_A) + p_B(K_B - R_B)$. Maximising (21) w.r.t M, we get:

$$\frac{d\pi_T}{dM} = \frac{dp_A}{dM}(K_A - R_A) + \frac{dp_B}{dM}(K_B - R_B) - p_A\left(\frac{dR_A}{dM}\right) - p_B\left(\frac{dR_B}{dM}\right) - 1. \tag{22}$$

Simplifying (22), we get:

$$\frac{d\pi_T}{dM} = \frac{dp_A}{dM}(K_A - R_A - K_B + R_B) - p_A\left(\frac{dR_A}{dM}\right) - p_B\left(\frac{dR_B}{dM}\right) - 1. \tag{23}$$

The third party won't intervene if, $\frac{d\pi_T}{dM} < 0$. Simplifying (23) when $\frac{d\pi_T}{dM} < 0$, we get

$$(K_A - K_B) < \frac{1 + p_A(\frac{dR_A}{dM}) + p_B(\frac{dR_B}{dM})}{\frac{dp_A}{dM}} + (R_A - R_B) \tag{24}$$

$$\Rightarrow K_A < \frac{1 + p_A(\frac{dR_A}{dM}) + p_B(\frac{dR_B}{dM})}{\frac{dp_A}{dM}} + (R_A - R_B) + K_B \tag{25}$$

Now, $\frac{dR_A}{dM} = \frac{dR_A}{dx_{B2}}\frac{dx_{B2}}{dM} > 0$, when, $\frac{dx_{B2}}{dM} > 0$ since $\frac{dR_A}{dx_{B2}} > 0$ (as per the formulation of the revenge function), conflict investment of B rises when a third party intervenes as an ally of its opponent A when $V_B > V_A(1 + M)^{\theta}$. As the conflict investment of A rises with the military subsidy, in order to win the confrontation the conflict investment of B also rises. Since B values the resource more than that of A, its conflict investment increases with increase in $A's$ conflict investment from the military subsidy provided by the third party. Thus, revenge motivation of A rises with the military subsidy M. Similarly, $\frac{dR_B}{dM} = \frac{dR_B}{dx_{A2}}\frac{dx_{A2}}{dM} > 0$. Revenge motivation of B increases with the increase in military subsidy M.

Case 1

$V_B > V_A(1 + M)^{\theta}$ *i.e* $\frac{dx_{B2}}{dM} > 0$. Let $K'_v = \frac{1 + p_A(\frac{dR_A}{dM}) + p_B(\frac{dR_B}{dM})}{\frac{dp_A}{dM}} + (R_A - R_B) + K_B$ be the reservation value of the resource in the presence of revenge. Now, it is evident $\frac{1 + p_A(\frac{dR_A}{dM}) + p_B(\frac{dR_B}{dM})}{\frac{dp_A}{dM}} + K_B > \frac{1}{\frac{dp_A}{dM}} + K_B$ and if the change in revenge of the two combatants is negligible then the reservation value of the resource for the third party increases in the 'with-revenge' case compared to 'no-revenge' case. Thus, $K'_v > K_v$. That is, the reservation value further increases. Hence, the strategic value of the resource has to be even higher now for the third party to intervene as an ally of one of the combatants, when they are engaged in revenge of each other.

If $\left(p_A\left(\frac{dR_A}{dM}\right) + p_B\left(\frac{dR_B}{dM}\right)\right) < (R_B - R_A)\frac{dp_A}{dM}$ then $K'_v < K_v$, i.e the reservation value of the resource for the third party when its ally A wins fall compared to the 'no-revenge' case reservation value. This fall can be explained as follows: if the revenge motivation of the ally's opponent, B, is very high compared to the ally, A, then the strategic value of the resource if B wins is very low for the third party, and thus, the third party would want to help A more in order to get better strategic benefits from the resource.

Case 2

$V_B < V_A(1+M)^{\theta}$ *i.e* $\frac{dx_{B2}}{dM} < 0$. In this case the results are interesting. Now, $\frac{dR_A}{dM} = \frac{dR_A}{dx_{B2}}\frac{dx_{B2}}{dM} < 0$, when, $\frac{dx_{B2}}{dM} < 0$ since $\frac{dR_A}{dx_{B2}} > 0$. $\frac{dx_{B2}}{dM} < 0$ when $V_B < V_A(1+M)^{\theta}$. The conflict investment of the opponent, *B* falls with increase in military subsidy *M*, which further implies the negative impact of military subsidy on the revenge factor of *A*, i.e revenge motivation of *A* falls with increase in *M*.

Here, the reservation value of the resource for the third party depends on the impact of the military subsidy on the revenge motivation of the combatants.

If $(R_A > R_B)$ and if $\left(p_A\left(\frac{dR_A}{dM}\right) + p_B\left(\frac{dR_B}{dM}\right)\right) > 0$ then $K'_v > K_v$, the reservation value for the third party rises compared to the 'no-revenge' case. This can be explained in the following way: when the revenge motivation of *A* is comparatively more than that of *B* it puts a negative impact on the strategic value of the resource for the third party when its ally *A* wins. And when the positive impact of military subsidy provided by the third party on the revenge function of *B* is more than the negative impact of it on revenge function of *A* then the strategic benefits from the resource if *A* wins falls for the third party in a conflict with revenge. Which implies that only when the reservation value is very high nullifying the negative impacts from the intervention then only the third party will intervene in a conflict with revenge.

If $(R_A < R_B)$ and if $\left(p_A\left(\frac{dR_A}{dM}\right) + p_B\left(\frac{dR_B}{dM}\right)\right) < 0$ then $K'_v < K_v$, the reservation value for the third party falls compared to the 'no-revenge' case. This can be explained in the following way: when the revenge motivation of *B* is comparatively more than that of *A*, the third party would want to help its ally *A* more. And also when the negative impact of military subsidy on revenge function of *A* is more than the positive impact of it on the revenge function of *B*, then the strategic benefits from the resource if *A* wins, rises for the third party in a conflict with revenge. This shows that when the negative impact of the third-party intervention is more on the revenge factor, then the third party would want to help its ally more, thus reducing the reservation value of the resource for the third party.

In short, whether or not a third party decides to intervene as an ally or not is an endogenous choice on the part of the third party, and it importantly depends on whether or not the conflictual parties harbour revenge motivations against each other or not.

Comparing the Payoffs of the Players

In this section, we briefly discuss about the payoffs of A, B in the above discussed cases. In the benchmark case of no revenge and no third-party intervention, the payoffs are as follows:

$$\tilde{\pi}_i = \frac{V_i^3}{(V_A + V_B)^2}, \text{where}, i = A, B. \tag{26}$$

When there is no revenge but there is third-party intervention as an ally of *A*, the payoffs are as follows:

$$\pi_A^T = \frac{V_A^3(1+M)^{2\theta}}{\left(V_A(1+M)^{\theta} + V_B\right)^2}, \tag{27}$$

$$\pi_B^T = \frac{V_B^3}{\left(V_A(1+M)^{\theta} + V_B\right)^2}. \tag{28}$$

Comparing we get the following:

$$\tilde{\pi}_A < \pi_A^T.$$

$$\tilde{\pi}_B > \pi_B^T.$$

As expected, we find that sans revenge, the payoff of *A*, the player who gets help from a third party ally, increases when the third party acts as its ally relative to when it does not get help from the third party. However, the payoff of player *B* decreases when there is third-party intervention in the form of an ally of its opponent compared to the no third-party intervention case (sans revenge in both situations). Intuitively, this increase in payoff of combatant *A* can be explained by the fact that it attains an advantageous position in the conflict since it has the support of an ally in the conflict.

Now, let us compare the payoffs of the cases where there is no third party but revengeful intentions may or may not be there. To keep it simple we won't compare the payoffs taking into consideration all the three revenge functions mentioned in Propositions 1, 2 and 3, but use a complete symmetric case to show the change in payoffs of the conflictual players in the presence of revenge. The payoffs of *A* and *B* in the presence of revenge (but no third-party intervention) are as follows:

$$\hat{\pi}_i = \frac{x_{i2}}{(x_{A2} + x_{B2})} V_i - x_{i2} + \hat{\pi}_{i3}, \text{where}, i = A, B.$$

Comparing these with the payoffs in the benchmark case of no revenge and no third-party intervention as given in (26), we get:

$$\tilde{\pi}_A - \hat{\pi}_A = V_A\left(\frac{\tilde{x}_{A2}}{(\tilde{x}_{A2} + \tilde{x}_{B2})} - \frac{\hat{x}_{A2}}{(\hat{x}_{A2} + \hat{x}_{B2})}\right) + (\hat{x}_{A2} - \tilde{x}_{A2}) - \frac{R_A^3}{(R_A + R_B)^3}. \tag{29}$$

Similarly, for player *B*. Since, we are considering the symmetric case where the valuation of the resource for both the combatants is equal, i.e. $V_A = V_B$, we can find that the equilibrium conflict investments of both the players are also equal. Thus, $\tilde{x}_{A2} = \tilde{x}_{B2}$ and $\hat{x}_{A2} = \hat{x}_{B2}$. The first part of RHS of (29) becomes zero; hence, equation (29) can be written as:

$$\tilde{\pi}_{A2} - \hat{\pi}_{A2} = 0 - (\tilde{x}_{A2} - \hat{x}_{A2}) - \frac{R_A^3}{(R_A + R_B)^3}. \tag{30}$$

Now, $\tilde{x}_{A2} > \hat{x}_{A2}$ because of the self-deterrence effect the second-period conflict investment of the conflictual players in the presence of revenge. Thus, equation (30) is negative. Hence, we get:

$$\hat{\pi}_A > \tilde{\pi}_A.$$

Similarly, for combatant *B*. Thus, the presence of revenge increases the payoff of the conflictual players in a completely symmetric setting which also explains why the conflicting parties want to exact revenge in the first place – the presence of revenge increases the payoff of the players engaged in conflict. The presence of a third party as an ally of one of the players (here, *A*) in the presence of revenge, further increases the payoff of the combatant-ally (here, *A*), i.e. $\pi_A^{TR} > \pi_A^T$. The payoff of the other combatant (here, *B*) is ambiguous (rises because of revenge, falls because of third-party intervention), but since revenge by one of the players implies revenge for both in the subgame, we will have revenge being taken by both.

However, if we compare the payoffs of the third party in the presence of revenge and no revenge, then the payoff of the third party falls in the presence of revenge because revenge motivations of the players enter as a negative component in the payoff function of the third party. The more the revenge motivation of the players, lesser the strategic benefits the third party can derive from the resource. In short, $\pi_T^T > \pi_T^{TR}$.

In summary, we have the payoffs of the conflictual players increase in the presence of revenge (or at least it increases for one of them, the ally). Thus, the dominant strategy for the conflictual players in the 'revenge' subgame would be to play 'revenge'. Given this, however, the decision of the third party to intervene in the conflict as an ally would depend on the strategic value of the resource ($K_i, i = A, B$). Listed below are the SPNE;

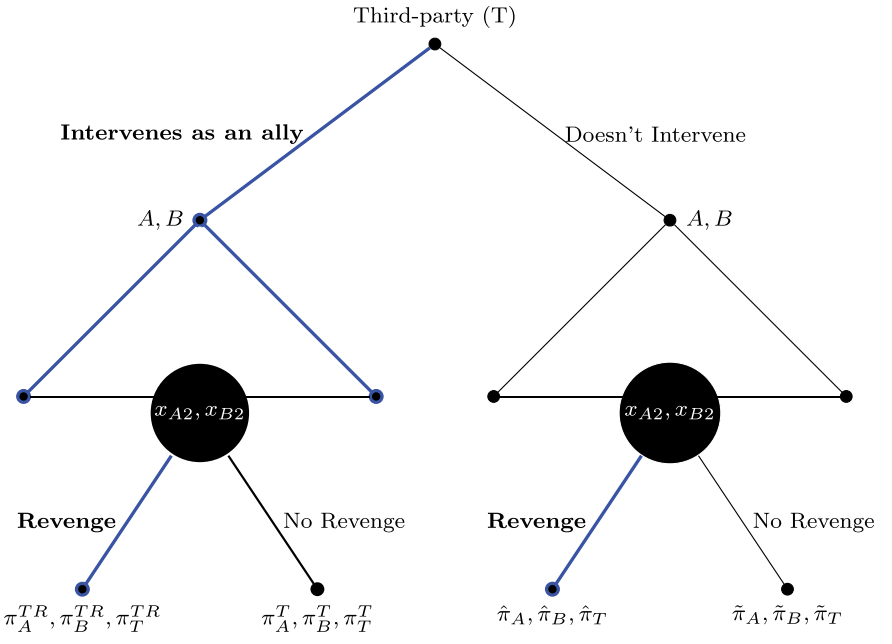

Figure 2. SPNE when third party intervenes as an ally and there is revenge.

1) When the strategic value of the resource if A wins is sufficiently high, i.e. $K_A > \frac{1+p_A(\frac{dR_A}{dM})+p_B(\frac{dR_B}{dM})}{\frac{dp_A}{dM}} + (R_A - R_B) + K_B$, then third party will intervene in any SPNE. Players A, B will choose $(x_{A2}^{TR}, x_{B2}^{TR})$ in the subgame following third party intervening as an ally of A, while they choose $(\hat{x}_{A2}, \hat{x}_{B2})$ in the subgame following no intervention by the third party. Moreover, both players A and B exact revenge on each other, irrespective of third-party intervention. The bold blue lines in Figure 2 depict the SPNE.

2) When the strategic value of the resource if A wins is not sufficiently high, such that, $K_A < \frac{1+p_A(\frac{dR_A}{dM})+p_B(\frac{dR_B}{dM})}{\frac{dp_A}{dM}} + (R_A - R_B) + K_B$, then third party will not intervene in any SPNE. However, choices of players A, B in the conflict and revenge subgames, remain the same, i.e. they will choose $(x_{A2}^{TR}, x_{B2}^{TR})$ in the subgame following third party intervening as an ally of A, they choose $(\hat{x}_{A2}, \hat{x}_{B2})$ in the subgame following no intervention by the third party. And they exact revenge on each other thereafter. The bold blue lines in Figure 1 in online Appendix F depict the SPNE.

Empirically too we can deduce the endogeneity of third-party intervention (as an ally), depending on whether or not there is revenge motivation on the part of the conflictual parties. See, for example, Iraq's role in Israel-Palestine conflict in Section 4.4 below.

Third Party Intervening as an 'Idealist'

In this section, our model is augmented by a third party where the third party is now an 'idealist' and therefore tries to reduce the overall level of conflict. This is in keeping with a large part of the literature on third-party intervention where the natural assumption is that third parties intervene on humanitarian grounds to minimise loss of lives and property in conflicting countries (see Regan (1998) and Siqueira (2003), for example), and hence the overall intention is to reduce conflict levels. The third party takes a neutral position and uses transfers $M, M \geq 0$ to increase the cost of conflict of both the players. Let $P(M)$ be the cost-increase function, such that $P'(M) > 0, P''(M) < 0$ and $P(M) = 1$

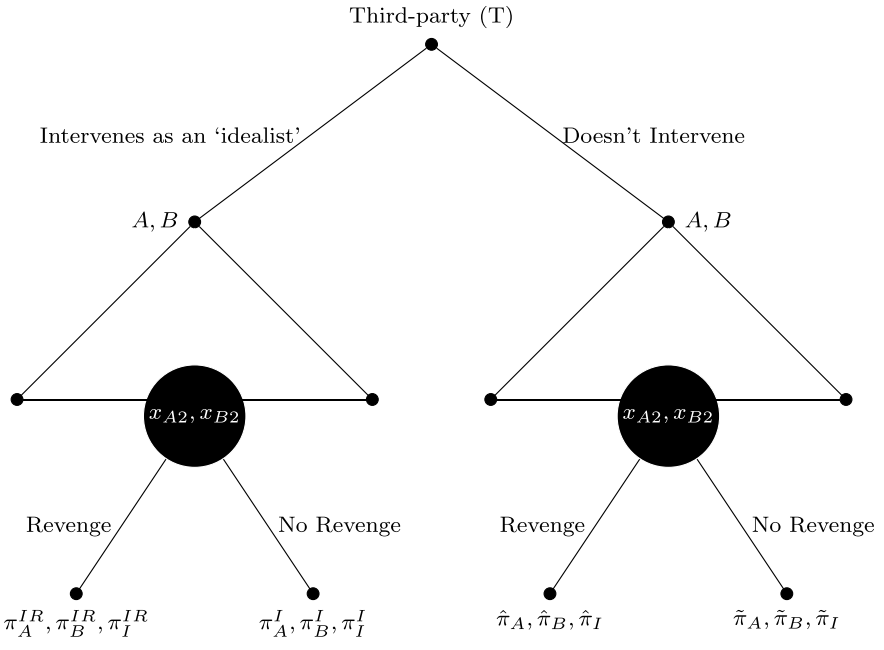

Figure 3. Third party intervening (or not) as an 'idealist' in the presence (or absence) of revenge motivations.

when $M = 0$, i.e. $P(M) \geq 1$. This formulation was used by Chang and Sanders (2009). Also refer to an idealistic intervention by the UN Security Council in the Eritrean-Ethiopian conflict, as given in Section 4.5 below.

The nature of intervention is now different; otherwise, it is representable in the same game tree, as depicted in Figure 1. Figure 3 represents the sequential game with different strategies of the third party. Notice that the different possibilities in this case remain the same as in the game depicted in Figure 1 though the analysis will be different given the specific nature of intervention. For clear exposition though, we enumerate the different paths once again here. Like before, the payoffs at the end notes are listed as (payoff of *A*, payoff of *B*, payoff of *T*), respectively.

(i) The third party doesn't intervene and there is no revenge $(\tilde{\pi}_A, \tilde{\pi}_B, \tilde{\pi}_I)$; (see section 3.1 below)

(ii) The third party doesn't intervene and *A*, *B* exact revenge $(\hat{\pi}_A, \hat{\pi}_B, \hat{\pi}_I)$; (see section 3.2 below)

(iii) The third party intervenes but there is no revenge $(\pi_A^I, \pi_B^I, \pi_I^I)$; (see section 3.3 below)

(iv) The third party intervenes and there is revenge $(\pi_A^{IR}, \pi_B^{IR}, \pi_I^{IR})$; (see section 3.4 below)

Like before, we use backward induction to find the SPNE of the game. We begin by looking at the Nash Equilibria of the subgames following third-party intervention (as an idealist) in this case.

Subgame Equilibrium – Conflict and Revenge

The different possible subgames and the analysis therein are as follows:

No Third-Party Intervention and No Revenge

This is the same benchmark case of no third-party intervention and no revenge, as given in Section 2.1.

No Third-Party Intervention but Revenge

This is the same case of no third-party intervention but the presence of revenge, as given in Section 2.2.

With Third-Party Intervention as an Idealist and without Revenge

Since there is no revenge there is no third-period conflict. The payoff functions of players A and B are:

$$\pi_{i2} = P_{i2}V_i - P(M)x_{i2}, i = A, B. \tag{31}$$

Maximising w.r.t x_{i2} simultaneously and assuming interior solutions we get the FOCs as:

$$\frac{d\pi_{i2}}{dx_{i2}} = \frac{x_{j2}}{(x_{A2} + x_{B2})^2}V_i - P(M) = 0, i \neq j. \tag{32}$$

The equilibrium levels of period 2 conflict investments, x^I_{A2}, x^I_{B2}, and the aggregate level of conflict $X_I = x^I_{A2} + x^I_{B2}$ are as follows:

$$x^I_{i2} = \frac{V_i^2 V_j}{P(M)(V_A + V_B)^2}; \quad i, j = A, B, i \neq j; \tag{33}$$

$$X_I = \frac{V_A V_B}{(P(M))(V_A + V_B)}. \tag{34}$$

Observation 9. Comparing $\tilde{X}, X_T$ and X_I, it is clear that $X_T > \tilde{X} > X_I$. The idealistic intervention by the third party reduces the aggregate level of conflict, since the third party increases the cost of conflict for both the players.

With Third-Party Intervention as an 'Idealist' and with Revenge

Proceeding, in the same way as before, the second-period payoff functions of the players will be as follows:

$$\pi_{A2} = \frac{x_{A2}}{x_{A2} + x_{B2}}V_A - P(M)x_{A2} + \hat{\pi}_{A3}; \tag{35}$$

$$\pi_{B2} = \frac{x_{B2}}{x_{A2} + x_{B2}}V_B - P(M)x_{B2} + \hat{\pi}_{B3}. \tag{36}$$

Maximising the payoff functions w.r.t x_{i2}, the FOCs are as follows:

$$\frac{d\pi_{A2}}{dx_{A2}} = \frac{x_{B2}}{(x_{A2} + x_{B2})^2}V_A - P(M) + \frac{d\hat{\pi}_{A3}}{dx_{A2}} = 0; \tag{37}$$

$$\frac{d\pi_{B2}}{dx_{B2}} = \frac{x_{A2}}{(x_{A2} + x_{B2})^2}V_B - P(M) + \frac{d\hat{\pi}_{B3}}{dx_{B2}} = 0. \tag{38}$$

From the first-order conditions, it is evident that the point of maximisation of the payoff functions is less than that of the FOCs with revenge and without third-party intervention case (the Amegashie and Runkel model (2012)). The second-period conflict therefore falls additionally (other than the self-deterrence effect leading to the paradox of revenge) because of the idealistic intervention.

Let the equilibrium levels of conflict investments be x_{A2}^{IR} and x_{B2}^{IR}, the aggregate conflict in the second period be X_2^{IR}, that in the third period be X_3^{IR}, and the total aggregate level of conflict be X_R^I. Since conflict investments of both *A* and *B* fall in the second period, conflict investments in the revenge stage (in the third period) also fall. Therefore, total conflict falls because of the third-party idealistic intervention in this case, i.e. $\hat{X} > X_R^I$.

Proposition 4. *Let* $R_i(x_{j2}) = \alpha x_{j2}^{\phi}, i \neq j, V_A = V_B$. *Then we have the following*:

$$(i)\ \ \hat{X} > X_R^I > X_I, \ \ \textit{and}\ \ \hat{X} > \tilde{X} > X_I \ \ \textit{when}\ \ \phi < 1;$$

$$(ii)\ \ \tilde{X} > \hat{X} > X_R^I > X_I \ \ \textit{when}\ \ 1 < \phi < P(M);$$

$$(iii)\ \ \tilde{X} > X_I > X_R^I \ \ \textit{and}\ \ \tilde{X} > \hat{X} > X_R^I \ \ \textit{when}\ \ \phi > P(M).$$

Proof. Proof in online Appendix E.■

Observation 10. The most interesting cases seem to when $\tilde{X} > \hat{X} > X_R^I$. This corresponds to the 'paradox of revenge' in effect, but it falls much more with idealistic mediation. And this seems to be the case when $\phi > 1$. Recall that ϕ is the elasticity of the benefit of revenge of one player with respect to the conflict investment of the opponent in the previous period. Hence, idealistic efforts by a third party are more fruitful in deterring revengeful opponents in reducing conflict, the more elastic their revenge functions are.

Observation 11. It is also interesting to note that when $\phi < 1, \hat{X} > \tilde{X} > X_I$, that is even when the paradox of revenge does not work, only such idealistic mediation may reduce conflict.

Observation 12. The presence of a third party acting as an idealist in a conflict decelerates the paradox of revenge. In other words, for a value of $\phi > P(M) > 1$, the paradox of revenge is in effect whereas in the without third-party case the paradox of revenge is in effect when $\phi > 1$. Note that the conflict investments of both the combatants fall due to increase in cost of conflict in the second period thus leading to fall in the value effect of revenge of both the combatants and also fall in the overall level of conflict. Hence, the paradox will be in effect only when the elasticity of the benefit of revenge (ϕ) is very high i.e. more than the cost-increase function ($P(M)$) in which case, the incentive to strike back is high for both the combatants thus reducing the conflict efforts of both the combatants initially.

Proposition 5. *Let* $R_i(x_{j2}) = a_i x_{j2}, a_A \neq a_B$ *and* $V_A = V_B$. *Then* $\tilde{X} > X_I > X_R^I$ *and* $\tilde{X} > \hat{X} > X_R^I$

Proof. Similar to proof of Proposition (2) in online Appendix C.■

Observation 13. In a similar vein to that of observation 10, $\tilde{X} > \hat{X} > X_R^I$ which is now true even when valuations are similar though revenge functions are asymmetric. That is, idealistic mediation reduces conflict more than that in the reduction that happens as a result of paradox of revenge.

Observation 14. In fact, since $\tilde{X} > X_I$, we know that even in the absence of revenge motivations, idealistic mediation reduces conflict. However, since $X_I > X_R^I$, we know that conflict falls more with revenge than without, under idealistic intervention.

Proposition 6. *When* $R_i(x_{j2}) = x_{j2}, V_A \neq V_B$ *then* $\tilde{X} > X_I > X_R^I$ *and* $\tilde{X} > \hat{X} > X_R^I$.

Proof. Similar to proof of Proposition (3) in online Appendix D.■

In this case, the revenge functions are symmetric, but the initial valuation for the resource is different. However, the findings with respect to the conflict levels are exactly similar to that in Proposition 5.

Third-Party Intervention as an 'Idealist'- SPNE

In this case, when the third party intervenes as an 'idealist', its goal is to reduce the level of conflict (Siqueira (2003). Hence, its payoff function is given by:

$$\pi_I = -X - M, \tag{39}$$

where, X is the total level of conflict, and M is the transfers it uses to increase the cost of conflict for the conflictual players. If the third party doesn't intervene then its payoff remains equal to the negative of the total conflict level. Hence, without revenge, its payoff is: $\tilde{\pi}_I = -\tilde{X}$, while with revenge, its payoff is: $\hat{\pi}_I = -\hat{X}$.

Starting with the no-revenge scenario, in (34), we saw that the total level of conflict falls because of the intervention, thus having a positive impact on the third party's payoff. However, the third party will not intervene if its payoff keeps falling with its transfers, i.e. $\frac{d\pi_I}{dM} < 0$.

$$\frac{d\pi_I}{dM} = -\frac{dX_I}{dM} - 1 < 0. \tag{40}$$

Putting X_I from (34) in (40), we get,

$$\frac{d\pi_I}{dM} = \frac{V_A V_B P'(M)}{(P(M))^2 (V_A + V_B)} - 1 < 0. \tag{41}$$

Simplifying (41) we get,

$$\frac{V_A V_B}{(V_A + V_B)} = \tilde{X} < \frac{(P(M))^2}{P'(M)} \tag{42}$$

From (42), we can see that the LHS of the equation is the conflict level with no revenge, no third party, $\tilde{X}$. Thus, from (42), it is clear that the third-party will only intervene with conflict-reducing idealistic motive when the level of conflict without its intervention is sufficiently high and its intervention with transfers can have a significant impact to reduce the level of conflict.

The presence of revenge enters as a negative component in the third party's payoff function because of the additional conflict taking place in the third period out of revenge. However, when the motive of the third party is to reduce the level of the conflict and if the presence of revenge reduces the level of conflict when there is more pronounced self-deterrence effect than value effect, then the presence of revenge can have a positive impact on the third party's payoff. Thus, if there is paradox of revenge operating, then $\pi_I^{IR} > \pi_I^I$ (with or without intervention). But if there is no paradox of revenge then $\pi_I^{IR} < \pi_I^I$ (with or without intervention).

When the third party intervenes with a conflict-reducing motive and without any revenge the payoffs of the combatants are as follows:

$$\pi_A^I = \left(\frac{V_A}{(V_A + V_B)}\right) V_A - P(M) \left(\frac{V_A^2 V_B}{P(M)(V_A + V_B)^2}\right)$$

$$\Rightarrow \pi_A^I = \frac{V_A^3}{(V_A + V_B)^2} = \tilde{\pi}_A \tag{43}$$

Similarly, the payoff of combatant B can be checked. From equation (43), it is evident that the payoff of the combatants in presence of a third-party intervention as an idealist and no revenge is equal to the payoff of the combatants without any third-party intervention and no revenge, as shown in equation (26). These equal payoffs of the combatants can be explained from the fact that when a third party intervenes as an idealist it increases the cost of conflict for both the combatants thus reducing their conflict investments, and since the conflict investments of both the combatants fall their probability of winning remains the same and the increase in the cost factor is nullified by the fall in the conflict-investment factor. None of the combatants gain a favourable position in the conflict with respect to the other. Thus, this idealistic intervention only reduces the conflict investments of the the combatants leaving their payoffs unchanged. Thus; $\pi_A^I = \tilde{\pi}_A$ and $\pi_B^I = \tilde{\pi}_B$. A similar explanation holds for the with third-party intervention (as an idealist) and with-revenge scenario. Hence, when the third party intervenes as an idealist, the payoffs of the combatants will be higher in the presence of revenge. The SPNE of the whole game are as follows:

(1) The third party will intervene as an 'idealist' when its intervention can have a significant negative impact on the level of conflict (that is reduce the level of conflict), i.e. $-\frac{dX}{dP(M)} \geq \frac{1}{P'(M)}$ where $X = X_2 + X_3$ total level of conflict and $\frac{dX}{dP(M)} < 0$. Thus, the SPNE will be: the third party intervenes as an idealist; Players A, B will choose $(x_{A2}^{IR}, x_{B2}^{IR})$ in the subgame following third party intervening as an idealist, while they choose $(\hat{x}_{A2}, \hat{x}_{B2})$ in the subgame following no intervention by the third party. Moreover, both players A and B exact revenge on each other, irrespective of third-party intervention. The bold blue lines in Figure 4 depict the SPNE.

(1) Third party won't intervene as an 'idealist' when its intervention with the transfers won't have a significant impact on the level of conflict (reduce the level of conflict), i.e. $-\frac{dX}{dP(M)} < \frac{1}{P'(M)}$ where $X = X_2 + X_3$ total level of conflict and $\frac{dX}{dP(M)} < 0$. Thus, the SPNE will be: the third party does not intervene as an idealist; Players A, B will choose $(x_{A2}^{IR}, x_{B2}^{IR})$ in the subgame following third party intervening as an idealist, while they choose $(\hat{x}_{A2}, \hat{x}_{B2})$ in the subgame following no

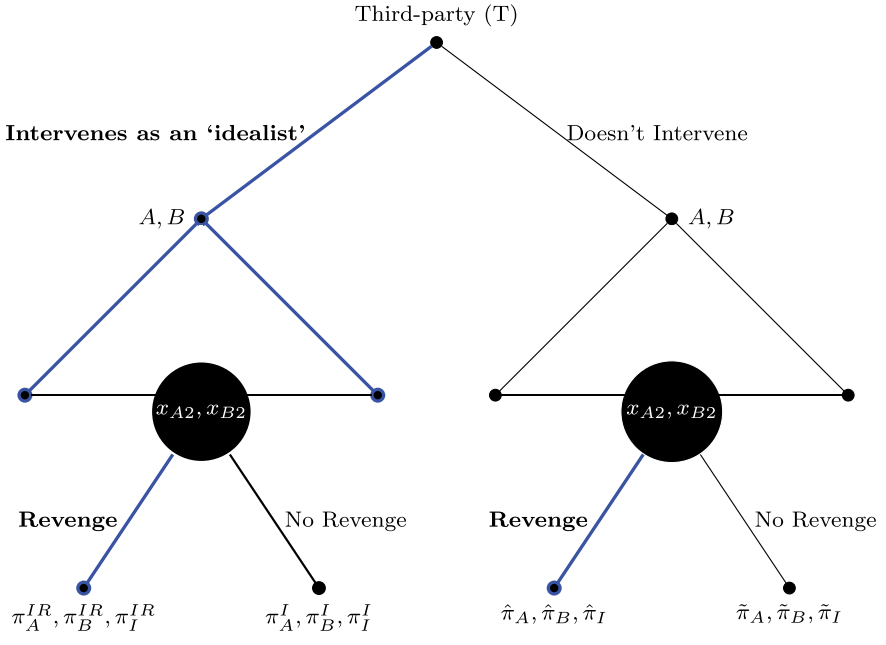

Figure 4. SPNE when third party intervenes as an idealist and there is revenge.

intervention by the third party. Moreover, both players *A* and *B* exact revenge on each other, irrespective of third-party intervention. The bold blue lines in Figure 2 in online Appendix F depict the SPNE.

Narrative Evidence

In this section, we specifically look at real-life examples of conflicts where the two potent influences of revenge and third-party intervention, are ubiquitous. Specifically, we try to highlight the specific SPNE that best fits the real-life conflict scenario that we cite here.[13]

Conflict in Yemen

Yemen has been reeling under conflicts for decades and faces one of the worst humanitarian crises (see Munshi (2020) for many other details of this discussion[14]). The main conflict in Yemen is between the UN-recognised government of Mansour Hadi, supported by Saudi Arabia and the United Arab Emirates (UAE), and the Iranian-backed Houthis. Hence, third parties play very important roles in the politics in general, and the conflicts in particular, in Yemen.

The Houthis belong to the Zaydi sect of Shias. The Zaydis had ruled over Northern Yemen for almost a millennium before being overthrown in a coup in 1962. For next three decades, the Zaydis were marginalised both politically and economically by the government. Finally, Mohammad Badr al-Din Houthi started the Ansar Allah movement which carried out extensive military campaigns during 2002–2009 in the hope of securing greater political participation. Hence we also see long, protracted, revengeful warfare that has been ongoing for decades.

The Houthis seized the presidential palace in January 2015, leading President Mansour Hadi and his government to resign. Beginning in March 2015, a coalition of Gulf states led by Saudi Arabia launched a campaign of economic isolation and air strikes against the Houthi insurgents, with U.S. logistical and intelligence support.

The conflict in Yemen best fits the SPNE where the third party intervenes as an ally, and there is violent revengeful interactions among the conflicting players (see Figure 2). Saudi Arabia has stayed as an ally of the former Hadi government and carried out many air strikes against the Houthis.

In fact, recall that the parametric restriction for such an equilibrium to exist, was essentially a high strategic value of the resource to the third party, should the ally win. In fact, the strategic importance of a Sunni-dominated Hadi government would be unquestionably immense to Saudi Arabia which sees itself as a leading Sunni Muslim power.

Conflict in Ireland

Here we consider the conflict between Catholics and Protestants in North Ireland.[15] When Ireland was under the control of England, large numbers of English and Scottish people were encouraged to settle in the north of Ireland. While most of the native Irish were Catholic, most of the settlers were Protestant. Even after the Irish independence in 1921, the struggle continued to get Ulster back from the British. The biggest obstacle was that the Protestants, who were happy as citizens of the United Kingdom did not want to be liberated.

The period after 1968 has been called the 'Troubles'. British soldiers came in 1969 to bring order to society, but unfortunately took sides and the discrimination against Catholics went on. Terrorism and murder were carried out both by extreme Catholics and extreme Protestants. In this conflict, we can say, that the British army was more of an ally of the Protestants and their bias against the Catholics lead to escalation of the conflict. But the majority on both sides were tired of all the violence and the personal losses caused by it. As a result, many saw the Good Friday Peace Agreement in 1998 as a milestone for peace, since it was signed by the most important political leaders on both sides.[16]

This conflict also best fits the SPNE where the third party (Britain) acts as an ally (of the Protestants) thereby intensifying existing conflict situation (see Figure 2). Again, corroborating the parametric restriction required for this case, the significant strategic importance of the Protestants in North Ireland (compared to Catholics) to the Britain, was quite unquestionable.

The 2019–2020 Persian Gulf Crisis

This crisis started in May 2018 when United States withdrew from the Joint Comprehensive Plan of Action (JCOPA) nuclear deal, which reinstated the sanctions against Iran. As a result of the sanctions, Iran's economy faced a sharp downturn. Military tensions between Iran and the United States escalated in 2019 amid a series of confrontations involving the US, Iran, and Saudi Arabia. In this conflict Saudi Arabia supported US. Iran and Saudi Arabia have been loggerheads since the Iranian Revolution in 1979. The rivalry today is primarily a political and economic struggle exacerbated by religious differences. Iran is largely a Shia Muslim and Saudi Arabia sees itself as the leading Sunni Muslim power. On 31 December 2019, Iran-backed militiamen attacked the outer perimeter of the U.S. Embassy in Baghdad, prompting American diplomats to evacuate to safe rooms. US retaliated, on 3 January 2020 President Donald Trump approved the targeted killing of Iranian Major General Qasem Soleimani in Baghdad. Iran's supreme leader Ali Khamenei pledged to exact revenge on US.[17]

The 2019-2020 Persian Gulf Crisis is also in line with the SPNE where the third party (Saudi Arabia) intervenes as an ally (of US) leading to worsening of the existing conflictual scenario which is also revengeful (Figure 2).

Israel–Palestine Conflict

Israelis and Palestinians have clashed over claims to the Holy Land for decades, a conflict that has long been one of the world's most intractable. Iraq has played a crucial role as a third party in this conflict. In 1948 when the State of Israel declared its existence, Iraq (with other Arab countries) immediately declared war on Israel, in order to restore Arab control on the whole of Palestine. Iraq has been implacably hostile to Israel and has always supported Palestine (has acted as an ally of Palestine).

But as time passed and the Israel–Palestine conflict escalated with revengeful attacks on each other, there has been a perceivable change in Iraq's role in the conflict. In fact, in 2019, Iraqi Foreign Minister, Mohammed Ali al Hakim, said that it would be Iraqi policy to support a two-state solution between the Israelis and the Palestinians.[18] The whole shift of role of the Arab and Muslim countries of the world towards Israel from hostility to normalisation shows how the strategic importance (of the ally, Palestine) and revengeful intentions of conflictual players can influence a third party's decision to intervene (as an ally in this case).

The evolved role of Iraq in the Israel–Palestine conflict seems to best fit the SPNE where the third party does not intervene and there is revengeful interaction among the conflicting players (see Figure 1 in online Appendix F). As laid down in the parametric restriction for such an SPNE to exist, the relative strategic importance of Palestine seems to be low enough for Iraq to intervene as an ally of Palestine.

Eritrean–Ethiopian War

The Eritrean–Ethiopian War also known as Badme war was a conflict that took place between Ethiopia and Eritrea from May 1998 to June 2000, with final peace agreed to in 2018.

According to a ruling by an international commission in The Hague, Eritrea broke international law and triggered the war by invading Ethiopia. After the war ended, the Eritrea–Ethiopia Boundary Commission, a body founded by the UN, established that Badme, the disputed territory at the heart of the conflict, belongs to Eritrea. On 5 June 2018, the Ethiopian People's Revolutionary Democratic Front, headed by Prime Minister Abiy Ahmed, agreed to fully implement the peace treaty signed with Eritrea in 2000, with peace declared by both parties in July 2018.[19]

The United Nations Security Council intervened as an idealist in this conflict. In May 2000, it established a committee to monitor and implement an arms embargo against Ethiopia and Eritrea in response to continuing hostilities between the two countries over the borders.[20] This conflict best fits our SPNE where the third party intervenes as an idealist in a conflict of revengeful interactions and is thus able to reduce conflict levels significantly (see Figure 4).

Conclusion

The literature on conflict has looked at revenge and at third-party interventions, but mostly separately. Yet most conflicts in the real world are characterised by significant presence of both. This paper attempts to explore implications that both of them acting together might have on a conflict situation. In fact, it also attempts to endogenise the decision of the third party whether or not to intervene in the first place (though the capacity in which it may intervene, as an ally of one of the combatants or an idealist aiming to reduce overall conflict, is exogenously considered).

This paper analyses how the presence of a third party in a conflict can influence the level of conflict with or without revenge. An intervention as an ally of one of the conflicting parties, increases the overall conflict levels, with and without revenge motivations, while an intervention as an 'idealist' decreases the overall levels of conflict, with and without revenge motivations. We find that the combatants are better off exacting revenge on each other, irrespective of whether the third party has intervened or not (either as an ally of one of them or as an 'idealist'). Given this, the third party intervenes as an ally only when the (strategic) value of the resource, if its ally wins, is sufficiently high. While the third party intervenes as an idealist only if its intervention can significantly reduce resultant conflict levels.

This paper is just intended to be a preliminary investigation into the issue of third-party intervention and revenge. There are plenty of avenues to explore in this area. For example, Munshi (2021) explores the possible impact of the pandemic on conflicts all over the world. She finds that under most parametric restrictions conflicts are likely to fall due to the ongoing pandemic. How will her results be affected when there are revenge motivations and/or third-party interventions? For example, the way conflicts are affected during a pandemic in Munshi (2021) [16], is through spillovers or externalities between countries, both positive and negative (for example vaccines are exported and imported which may constitute a positive externality whereas people travelling between countries, who are thereby acting as potential carriers of the virus, may constitute a negative externality). In the presence of revenge motivations and/or third-party interventions, the presence and effectiveness of these externalities will be affected. Hence close examination of how these channels are impacted will be necessary to see how conflicts will be affected in general.

Notes

1. Very briefly, the origin of the problem dates back to the independence of the Indian subcontinent from Britain and its partition into India and Pakistan in 1947. Till then Jammu and Kashmir was one of the largest princely states of the subcontinent under the 'indirect rule' of the British. With the lapse of the British 'paramountcy', the princely states were asked to accede to one of the two 'Dominions', India or Pakistan. The first Indo-Pak war over Jammu and Kashmir took place in January 1949, thereafter in 1965 and 1972, and numerous infiltrations and skirmishes in between and till recently. Thus was the beginning of an incessant story of reprisals and violence. See (Munshi 2013) for details.
2. https://en.wikipedia.org/wiki/Indo-Pakistani_wars_and_conflicts#Background.
3. https://www.bbc.com/future/article/20170403-the-hidden-upsides-of-revenge (accessed on 12.12.2020).
4. https://www.washingtonpost.com/news/wonk/wp/2015/10/15/i-asked-psychologists-to-analyze-trump-supporters-this-is-what-i-learned (accessed on 12.12.2020).

5. For example, to take the case of Saudi intervention in the Yemeni conflict – given Sunni-dominated Hadi government and given Saudi Arabia being a Sunni power of the area, it is possibly beyond doubt that, if at all, Saudi Arabia would definitely intervene as an ally of the Hadi-government rather than as an 'idealist' trying to reduce conflict between Shia-majority Houthis and Sunni-majority Hadi government. See Section (4.1) for details.
6. For example, think of China supporting Pakistan in its conflict against India or the Saudi Arabia supporting Yemen in its conflict against the Houthis (who is supported by Iran again), and so on.
7. Revenge is played out by both the players even if only one of them chooses to take revenge – its opponent is automatically drawn into taking revenge.
8. Notice the slight digression from convention where the usual order of payoffs follows the order in which players move. Here however, though the third party moves first, its payoff is listed last.
9. This is essentially from the section 'Equilibrium without Revenge' in the Amegashie and Runkel (2012) (Amegashie and Runkel 2012) paper (pg. 317) with $\eta = 1; j = A, k = B$, with the difference that the time subscript 1 has become 2 here and 2 has become 3 here, given we have added an additional stage to the game where the third party, player T, moves.
10. Please refer to online Appendix A.
11. A similar proposition under different parametric conditions ($(1+M)^{\theta} > 2$) is relegated to the online Appendix (Appendix B) to avoid cluttering of the main body of the paper.
12. (Chang, Potter, and Sanders 2007) also used a similar argument to explain the third party's intervention in a conflict as an ally of one of the combatants.
13. However, there are two SPNEs (out of four) where the third party doesn't intervene and the conflictual parties engage in revenge. It's hard to find evidence for something that doesn't happen, simply because it doesn't happen. So most of our empirical evidence points out instances of something happening (third party intervening, in this case). Though for the case of Israel-Palestine conflict (see Section 4.4), the role of Iraq discernibly changes from being an ally to not being an ally, thereby bringing out the case of 'no intervention' from 'intervention' by a third party.
14. Also see "'Dancing on the Heads of Snakes": A Glimpse into Yemen' by Soumyanetra Munshi (24 December 2020) for a general account of the history of the Yemeni conflict.
15. Note that this example was also cited by Amegashie and Runkel in (Amegashie and Runkel 2012), as a good example of demonstration of the 'paradox of revenge'. However, they admit that 'Of course, there may be other reasons for the resolution of the conflict (e.g. third-party intervention, faction asymmetries), but the self-deterrence effect identified in our analysis may also contribute to the explanation of this observation . . . ' (Pg. 315) Hence our analysis can be thought of complementing Amegashie and Runkel's (2012) observation, by incorporating third parties.
16. https://www.britannica.com/event/The-Troubles-Northern-Ireland-history.
17. 1)https://en.wikipedia.org/wiki/2019%E2%80%932020_Persian_Gulf_crisis
    2)https://en.wikipedia.org/wiki/Iran%E2%80%93Saudi_Arabia_proxy_conflict.
18. https://www.trtworld.com/opinion/why-iraq-is-starting-to-normalise-ties-with-israel-23676 (accessed 18/12/2021).
19. https://en.wikipedia.org/wiki/Eritrean-Ethiopian-War (accessed 19/12/2021).
20. https://www.un.org/securitycouncil/content/repertoire/sanctions-and-other-committees (accessed 10/6/2021).

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