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# Third-party interest, resource value, and the likelihood of conflict ☆

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ABSTRACT

Resource wealth induces predation incentives but also conflict-deterring third-party involvement. As a result, the relation between resource value and conflict probability is a priori unclear. This paper studies such relation with a theoretical framework involving a potential aggressor and a powerful third party. First, we show that, if the third party's incentives to intervene are sufficiently strong, conflict probability is hump-shaped in the resource value. Second, we theoretically establish that resource value increases the third party's incentive to side with the resource-rich defendant in case of intervention, providing another mechanism for stabilization when the resource value is high. Third, we explain how our theory relates to policy-relevant case studies involving conflict-ridden areas (including inter-state or civil conflicts) and powerful third parties.

Armed conflict often revolves around the ownership of a resource, such as an oil field, a stretch of land, or access to the sea. Incentives for engaging in war depend on participants' ability to gain from it. On the one hand, high resource value invites conflict by increasing incentives to predate. On the other hand, resource wealth induces stabilizing efforts by powerful third parties interested in safeguarding access to extraction or consumption. Since an increase in resource value induces higher predation but also higher deterrence by third parties, its effect on conflict occurrence is unclear a priori. This paper sheds light on the issue, formulating a theory of resource war in the presence of third parties.

Our work contributes to the understanding of the resource curse and economically-motivated third-party interventions. First, by setting up a simple model of resource war involving a resource holder, an aggressor, and a powerful third party, we characterize the relation between conflict probability and resource value. Such relation is *hump-shaped* when incentives for the third party to intervene are sufficiently strong—e.g., if the third party can use the intervention to improve its bargaining position, or if the resource holder's wealth does not fully translate into military capacity against aggression. Second, we show that resource value increases third parties' incentives to form an alliance with the defendant in resource conflicts, providing an additional stabilization mechanism when resource value is high. Third, specializing our model, we show that our main results hold in relevant real-world settings, such as a

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third party importing resources to be used in production from other countries, civil conflict motivated by resource extraction, and control of criminal activities by criminal organizations.

We develop a model of resource war as a sequential game. A country or government controls a scarce resource; an aggressor state or opposition group decides whether to attack and try to seize it. We first present a simplified version of our model, where the resource holder grants resource access to a powerful third party. An aggressor can decide to attack the resource holder and steal the resource, but the third party can intervene and back the defendant, securing its control over the resource. Uncertainty in the cost of war induces a probability of conflict, which depends on resource value. The aggressor attacks only if the probability of intervention is small enough. The probability that the third party intervenes to secure resource access increases with resource value. Further, the marginal benefit of an additional unit of value for the aggressor is substantial when the value is small, as intervention is unlikely; similarly, the marginal benefit for the aggressor is small when the value of the resource is large, because the intervention is very likely. So, an additional unit of value has the effect of increasing the probability of conflict when the value is small, and decreasing it when the value is large.

In the general version of our model, (i) we let resource wealth affect military strength, and (ii) we allow the third party to choose its ally—either the resource holder or the aggressor.[1,2] In the case of war, the third party can ex-ante commit to side with either of the two opponents; if the chosen ally loses the war, the third party forfeits access to the resource. This modeling structure captures settings in which alliances are not easily broken and renegotiated, e.g., because of reputation costs. Such situations naturally arise when the third party shares ideological or cultural affinity with one of the opponents, such as in the context of the Cold War.[3]

In this framework, two additional incentives emerge compared to the simplified model. First, higher military strength of the resource holder reduces the need for third-party intervention. Consequently, an increase in resource value creates a trade-off between increased rent and decreased intervention needs. Second, as resource value makes the resource holder comparably stronger, it increases the third party's willingness to side with it. Since the third party has an incentive to side with the stronger player and the resource holder gains strength with the growing resource value, the third party opts to side with the resource holder when the value is high enough. As a result, the probability of conflict is hump-shaped in resource value provided that the intervention incentives are strong enough when the value of the resource is high. If the payoff of the third party increases with resource value more than the relative military strength of the resource holder, the interest of the third party in securing the resource dominates the incentive of letting the resource-holder deal with the aggressor alone.

We call the condition explained above "strong interest of the third party" and we show that this is easier to satisfy in the realistic scenario where the third party uses the intervention to obtain improved conditions for resource exploitation.[4] Intuitively, the improvement in bargaining terms resulting from the intervention makes it even more advantageous to support the resource holder when the resource is valuable. In addition, this condition holds true in other real-world scenarios: e.g., if royalty payments are the main revenue source for the resource holder or if the resource holder's military expenses grow less than proportionally with GDP.[5]

Our theory is also general enough to nest other mechanisms explaining a non-monotonicity in conflict probability. This can still emerge when marginal returns from the resource decrease quickly for the third party (or the third party is absent). If the resource value significantly enhances the military strength of the resource holder, and the aggressor's marginal returns from resource value diminish fast enough with resource value, the war incentives for the aggressor decrease for high resource value. In this way, our model nests an alternative explanation for hump-shaped conflict probability discussed in the literature, e.g., proposed by Collier and Hoeffler (2004). Intuitively, if resources increase the ability to fund the military, attacking resource holders is more challenging for aggressors, ultimately reducing their incentives to predate.

In Appendix A we show that the model's results remain valid under two relaxations of the main assumptions. First, we consider a setting with private information on the stochastic costs of war, and show that our results hold in this case. Second, we allow the third party to choose an alliance after the conflict ends, instead of assuming that the third party can credibly commit ex-ante to an alliance in exchange for resource access. In this case, reported in Appendix A.1, the third party can get access to the resource from whichever actor wins control of the resource ex post, but war results in a loss of value extracted due to disruptions in production or extraction. In this context, the intervention is motivated by the desire to avoid production disruption, rather than by the fear of losing access, as in the main text. The central intuition of the model remains unchanged, and we obtain the same results, as long as the share of destroyed resources is sufficiently large. This alternative framework captures well situations in which alliances are mainly based on resource exploitation and war directly affects third party's rent—such as conflicts affecting oil prices, changes in ownership structure, or causing widespread destruction of capital.[6]

In spite of its simplicity, our theory applies to empirically relevant contexts. In Section 3, we show that our model's assumptions hold in the context of a third party that buys the resource and uses it in production, experiencing disruptions from changes in resource ownership. Such application is relevant for understanding the effects of US oil interests in the Middle East and the impact of the recent increase in Chinese presence in mineral-exporting African countries. We also apply our theory to civil conflicts, where

[1] For example, Collier and Hoeffler (2004) discuss the resource wealth channel as an explanation of Saudi Arabia's internal stability.

[2] Third parties can intervene in favor of challengers and not incumbents. See, for example, the discussion of the case of the Angola civil war in Bove et al. (2016), or the literature on *booty futures*, e.g., Ross (2012).

[3] Also, Chyzh and Labzina (2018) show how the incentive to keep an unprofitable alliance might arise from dynamic incentives.

[4] For example, Berger et al. (2013a) and Berger et al. (2013b) document that CIA interventions during the Cold War created a larger market for US products.

[5] Using data on military expenditure by country by SIPRI we find that the correlation between GDP and military expenses as a fraction of GDP is negative.

[6] As an example, Kilian (2009) shows how political events in the Middle East sensibly affect oil prices.

internal rival groups compete for control of a valuable resource, and conflicts between criminal organizations. In such cases, a powerful third party – the state, a strong non-state group or a foreign government – may have an incentive to deter conflict when resource extraction is at risk.

Our theoretical insights provide a compelling explanation for the seminal empirical findings in Collier and Hoeffler (1998; 2004) showing a non-monotonic relation between a country's resource abundance – proxied by primary-commodity exports over GDP – and the probability of civil war.[7] In a companion paper, Battiston et al. (2024), we provide suggestive evidence of the discussed non-monotonicity, focusing on countries in the USA's sphere of influence. Moreover, we show that US influence in the data proxies for a higher probability of intervention in case of conflict, which may deter conflicts in countries with large resource value.

We conceptualize the powerful third party as capable of intervening and determining the outcome of a conflict in a given region, similar to the *superpower*'s role in Fox (1944), exerting some form of military control over its *sphere of influence* (see Hast, 2016, and Etzioni, 2015). For example, Latin America during the US Monroe Doctrine and NATO-affiliated countries during the Cold War are examples of areas in the US sphere of influence. Conversely, Eastern Bloc countries in Europe during the Cold War exemplify countries within the Soviet sphere of influence. In these settings, the relevant third party in an area is unambiguously identified.

*Related literature*

This paper contributes to two branches of the conflict literature: the study of the resource curse in conflict and the analysis of interventions by third parties.

As we explain above, the very first works in the empirical literature using cross-country data recognized a potentially non-monotonic relation between conflict probability and resource value (Collier and Hoeffler 1998, 2004).[8] Subsequent work have empirically investigated the predation incentive, e.g., Caselli et al. (2015) show that oil fields close to country borders are more likely to cause conflicts, and analyzed empirically and theoretically for third parties to intervene to secure resource access (see Bove et al., 2016, for the case of oil).[9] However, previous research did not study the relation between predation and third-party deterrence in resource conflict.

Modeling third parties' incentive to intervene in conflict, we contribute to a literature analyzing third-party interventions, which received large interest starting from the extended deterrence literature in political science, studying how third parties can deter attacks against another actor—see Huth (1989) for a classic reference. Our simplified model of Section 1 is an instance of the "deterrence games" reviewed by Quackenbush (2011), where the effective players of the game are the aggressor and the third party. More precisely, our toy framework is a "perfect deterrence" model (Zagare and Kilgour, 2000)—a dynamic deterrence game solved for subgame-perfect equilibria. Chang et al. (2007), too, studies similar games focusing on the relation between the timing of intervention and the equilibrium outcome. Our comparative statics are completely different and focus on how conflict incentives relate to resource value.[10]

We study interventions that are motivated by profits, differently from Meirowitz et al. (2022) and Kydd and Straus (2013) that analyzed 'neutral' interventions with humanitarian or welfare motivations; Levine and Modica (2018), that studies interventions to avoid another player's hegemony in a region; and Grillo and Nicolò (2022), that studies optimal third party interventions, considering military aid, sanctions, or direct military involvement.[11] The literature on 'biased' interventions has looked at their causes and consequences. Rosenberg (2020) shows that external powers can use war between the resource holder and the defendant in resource-rich areas to extract rents. Di Lonardo et al. (2019) uses a theoretical model to establish a stabilizing role of foreign threats for autocracies. Especially with our full-fledged theoretical model, we contribute to these studies by showing that the incentives to side with a particular player, the resource-holder, reinforce the stabilizing role of third parties.

We organize the rest of the paper as follows. In the next section, we illustrate a simplified version of the model to clarify the main mechanisms. In Section 2, we illustrate the full-fledged model. In Section 3, we describe how US oil interests abroad and China involvement in the Democratic Republic of Congo can be seen as an illustration of our mechanism, and we apply our theory to hegemonic criminal organizations. All proofs are in Appendix B.

## 1. Simplified model and baseline result

We model the interaction between an aggressor, denoted as $A$, and a third-party, denoted as $T$. The aggressor can attack or not a resource holder and the third party must decide whether to intervene to defend the resource holder or not. The aggressor $A$ has two options: to attack or not to attack. Similarly, the third party $T$ has two options: to intervene or not to intervene. If $A$ does not

[7] Collier and Hoeffler (1998) argue that such non-monotonic relation could relate to the increased ability of the resource-holding state to provide security with an increased taxable base. As we explain below, we model this channel in our general framework and show it reinforces third parties' stabilizing role.

[8] See Blattman and Miguel (2010) for a comparison between the two pioneering studies of Collier and Hoeffler (2004) and Fearon and Laitin (2003) and a comprehensive review of the literature on civil wars in political science.

[9] Paine et al. (2022), Paine (2019), instead, theorize how economic activities such as oil extraction can lead to civil war incentives. They do not consider the effect of third party presence.

[10] Work by de Soysa et al. (2009), instead, studies the moral hazard problem induced by the third-party intervention on the incentives for the resource holder to declare war.

[11] The distinction between neutral and biased interventions is empirically relevant. For instance, Regan (2002) documents that external intervention in civil wars often increases conflict length; however, biased interventions, backing one opponent, result in lower duration compared to neutral interventions.

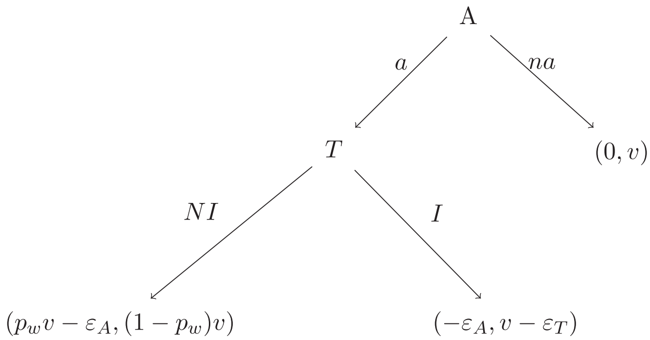


**Fig. 1.** Game tree of the simplified model. ***Note:*** At the terminal nodes are reported the payoffs respectively of $A$ and $T$.

attack, it gets a payoff equal to zero and $T$ gets $v$, the value of the resource. If $A$ attacks and $T$ does not intervene, $A$ wins with a probability denoted as $p_w$. In this case, $T$ loses all access to the resource and receives a payoff of zero and $A$ gets a payoff of $v$.[12] If $T$ intervenes instead, $A$ loses for certain.

In the general model presented in the next section, we relax the assumption that $T$ always sides with $R$, and we let $p_w$ vary with the resource value $v$.

We introduce a stochastic additive cost of war, $\varepsilon_i$ for $i \in \{A, T\}$, respectively with uniform distribution on $[0, M]$, paid by contestants if conflict occurs.[13] We assume that these are independent, $\varepsilon_A \perp \varepsilon_T$. These costs are realized at the beginning of the game and observed by all players.[14] Shocks $\varepsilon_i$ represent war costs, including physical, financial, and political costs. Conflict arises from many different causes, and adding a source of heterogeneity helps capture its non-deterministic nature. We call these shocks costs of war; however, they can capture, at least partially, factors affecting conflict that are uncorrelated with resources (see also the discussion below in paragraph 2.2).

The timing of the game is as follows: first, the war costs $\varepsilon_A$ and $\varepsilon_T$ are realized. Then, the aggressor decides whether to attack. Finally, the third party decides whether to intervene. We look for subgame-perfect equilibria of this model. Fig. 1 represents the game tree.

### 1.1. Equilibrium

If $A$ attacks and the third-party does not intervene, $A$ wins with probability $p_w$. Then, if $A$ attacks, the payoffs for the third party are:

(a) $(1 - p_w)v$ if $T$ does not intervene;
(b) $v - \varepsilon_T$ if $T$ intervenes.

So, if $p_w v > \varepsilon_T$ the third party finds it optimal to intervene if the resource holder is attacked. If $p_w v > \varepsilon_P$ and $p_w v < \varepsilon_T$ the aggressor attacks. Depending on the parameters, we have the following cases:

1. if $p_w v < \varepsilon_A$, $A$ never wants to attack and there is no war;
2. if $p_w v > \varepsilon_T$ then $T$ would intervene in case of conflict, hence $A$ does not attack;
3. if $p_w v > \varepsilon_A$ and $p_w v < \varepsilon_T$ then there is no intervention and $A$ attacks.

Since $\varepsilon_T$ and $\varepsilon_A$ follow a continuous distribution, the cases in which some of the above inequalities are satisfied with equality have probability zero and are irrelevant for the results.

For given realizations of the costs of war, $\varepsilon_A$ and $\varepsilon_T$, if $\varepsilon_A \leq \varepsilon_T$, conflict occurs if and only if $v$ is in the intermediate range of values $[\varepsilon_A/p_w, \varepsilon_T/p_w]$. In other words, without uncertainty in the costs of war, the conflict probability is non-monotonic in resource value. Instead, if $\varepsilon_A > \varepsilon_T$, the cost of war is higher for the aggressor. So, when the third party finds it too costly to intervene, the aggressor also finds it too costly to attack, implying that conflict does not occur for any value of $v$.

[12] Our result would also go through if the third party loses only part of the resource in case its partner loses. Indeed, in the Appendix, Theorem 2.1 is proven under this more general assumption.

[13] As we clarify in the next section, we keep the uniform assumption to ease the exposition, but all results hold under general assumptions spelled out in the Appendix.

[14] Private war costs give analogous results: details are available in Appendix A.2.

To express the implications of the model compactly, we compute the ex ante probability that the subgame-perfect equilibrium of the game involves an attack, before the $\varepsilon_i$ are drawn. This is:

$$\mathbb{P}(war; v) = \begin{cases} \frac{p_w v}{M}\left[1 - \frac{p_w v}{M}\right] & v < \frac{M}{p_w} \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

The expression is the probability of the case (3) above—the aggressor attacks if the cost of war for the third party is high enough to avoid intervention. The probability of war is hump-shaped in $v$, having a maximum in $\frac{M}{2p_w}$.

Intuitively, an increase in resource value results in a higher incentive to go to war for the aggressor only if the realization of the cost for the third party is sufficiently high to imply no intervention. Then, the predation effect dominates when the value is small, while the deterrence effect dominates when it is high. If the value is small, the third party will almost surely not intervene. An increase in the value will incentivize the aggressor to attack for many realizations of the errors; so, the predation effect dominates the deterrence. On the contrary, if the value is high, the third party will intervene almost surely; so, an increase in the resource's value will increase the incentives to attack for very few realizations of $\varepsilon_A$, implying that the deterrence effect dominates.

## 2. Full model: endogenous alliances and military strength

We now analyze the full-fledged model. We modify the structure of the game in two ways with respect to the previous section. First, we allow for the possibility that the third party can intervene in favor of both contenders $A$ and $R$, consistently with our framework, where the third party only serves its economic interests. Second, we let the relative military strength of $A$ and $R$ (measured by $p_w$) depend on the resource value $v$. Moreover, we allow for the value of the natural resource to generate different profits or rents for the third party and the aggressor, for example the economic or political benefits arising from resource access, profits from selling the resource or the benefit of using it in the production of another good.

In the following subsection, we describe the model in detail. In the next subsection, we discuss the interpretation of each assumption.

### 2.1. Model presentation

The game still has two players, the third party $T$ and the aggressor $A$. Player $T$ moves first and chooses to be allied with the resource holder, action "$R$-alliance", or with the aggressor, "$A$-alliance". In both cases, the aggressor then chooses whether to attack or not. Finally, the third party decides whether to intervene or stay out. If the third party intervenes, the player it backs wins; otherwise, if it does not intervene, $T$ retains resource access only if the ally wins, and loses all resource access if the ally loses. In the conflict between $A$ and $R$, $A$ wins with probability $p_w$ if there is no intervention (see Fig. 2).

We define $\Pi_A(v)$ and $\Pi_T(v)$ as the payoffs from having access to a resource of value $v$ for $A$ and $T$, respectively. We do this to remain agnostic on the specific origin of these payoffs or the value index $v$. We assume that both $\Pi_A(v)$ and $\Pi_T(v)$ are increasing and unbounded. We normalize $\Pi_i(0) = 0$. We make the following assumption on the relation between $\Pi_A$ and $\Pi_T$:

**Economic efficiency of the third party – EE** there is a constant $C > 0$ such that, for all $v$, $\Pi_A(v) \leq C\Pi_T(v)$

The condition wants to capture the fact that the aggressor country cannot be too economically developed with respect to the third party.

Differently from the simplified model, now we assume that $p_w$ is a decreasing function of $v$, to capture the fact that, as $v$ grows, $R$ has a larger amount of resources to devote to military investment. Past literature has highlighted the role of specific natural resources, such as oil, in increasing military expenditures and arms imports—see, for instance, Ali and Abdellatif (2015) and Vézina (2020). Formally, we assume:

**Tullock-like – TL** $p_w(v)$ is decreasing in $v$, differentiable, $p'_w(v)$ is bounded, and $p_w(0) > 0$.[15]

We assume that $\varepsilon_T$ and $\varepsilon_A$ are independent, and distributed according to densities $f_T$ and $f_A$, respectively, on the support $[m, M]$, where $m \geq 0$. These costs are realized after the alliance choice but before any attack decision. More precisely, we maintain the following assumption.

[15] A way to think about the bounded derivative assumption is that $R$ has some amount of wealth to devote to war that does not depend on $v$, and $v$ can increase this wealth. An example of functional form satisfying the above assumption is the Tullock contest success function (CSF), commonly used in the literature (see, for instance, Beviá and Corchón (2010) and Jackson and Morelli (2007)):

$$p_w(v) = \frac{w_P^\gamma}{w_P^\gamma + (w_R + v)^\gamma}$$

where $w_P$ and $w_R$ represent the baseline financial strengths of $A$ and $R$, to which $R$ can add the funds obtained through the resource.

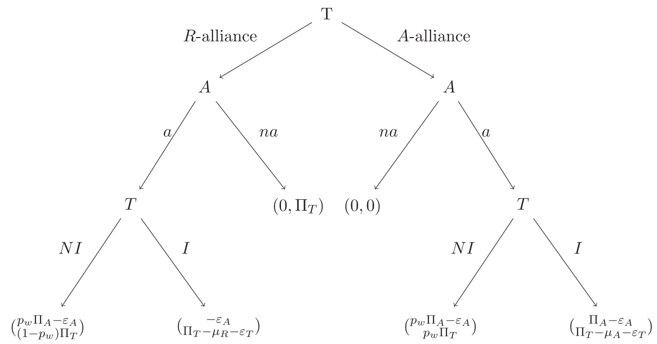


**Fig. 2.** Game tree of the full model. ***Note:*** At the terminal nodes are the payoffs of $A$ and $T$, respectively.

**Regularity conditions - RC** Payoffs $\Pi_T(v)$ and $\Pi_A(v)$ are differentiable, and the limit

$$\lim_{v\to\infty} \Pi_T'(v)/\Pi_P'(v)$$

exists. Moreover, assume that the densities of $\varepsilon_T$ and $\varepsilon_A$ are positive in the interior of the support, that is $f_i(x) > 0$ for any $x \in (m, M)$. In addition, the following holds:

1. if $\lim_{x\to M} f_T(x) = 0$ (as has to be if, e.g., $M = \infty$), there is a left neighborhood of $M$ such that $x^2 f_T(x)$ is strictly decreasing and $\lim_{x\to M} xF_A = 0$
2. if $m = 0$ and $\lim_{x\to m} F_A(x) = 0$, there is a right neighborhood of $m$ such that $F_A$ is strictly increasing and $\lim_{x\to m} xf_T = 0$.[16]

The key economic assumption on the payoffs and the probability $p_w(v)$ that drives the hump-shape result is the following.

**Strong Interest of the third party –** $SI_T$ For $v$ large enough, $p_w(v)\Pi_T(v)$ must be increasing, and

$$\lim_{v\to\infty} p_w(v)\Pi_T(v) \geq M,$$

where $M$ is the upper bound of the support of $\varepsilon_i$, and can be finite or infinite.

We also introduce alliance-dependent, non-stochastic costs of war parameters, $\mu_R(p_w)$ if the third party is backing $R$ and $\mu_A(p_w)$ if the third party is backing $A$. These can have a variety of possible interpretations (discussed in the next subsection), so we remain agnostic on the precise shape of $\mu_R(p_w)$ and $\mu_A(p_w)$. We only assume that, whatever the other effects, it is always less costly for $T$ to intervene in favor of a stronger contender: this is why we assume that they depend on $p_w$. Since the relative military strength is captured by $p_w$, this means that the cost of backing the resource holder $\mu_R(p_w)$ is equal to zero if $p_w = 0$, increases in $p_w$, and that the cost of backing the aggressor $\mu_A(p_w)$ decreases in $p_w(v)$. Formally:

**Costs of war – CW** $\mu_A(p_w)$ and $\mu_R(p_w)$ are differentiable, $\mu_A'(p_w) < 0$, $\mu_R' > 0$ and moreover $\mu_R(0) = 0$.

Together with Assumption $TL$, this implies that $\mu_A$ and $\mu_R$, respectively, increase and decrease in $v$.

### 2.2. Discussion of assumptions and generalizations

We now discuss the main assumptions we make in the full model.

The economic meaning of the Economic Efficiency assumption $EE$ is that the economy of the aggressor country is not more developed than the third party, and so it cannot much more efficiently convert the resource in wealth. This is consistent with our focus on third parties that are powerful countries or governments and hence have larger endowments of capital, know-how, and technology. All these assumptions, for instance, hold if the payoffs from the resource are constituted by a monetary rent $v$, with the third party earning the fraction $\eta v$, and the player controlling the resource obtaining the fraction $(1-\eta)v$.

We allow for the possibility of an alliance of $T$ with $R$ because resource-dependent countries may have incentives to provide military support to resource holders, but they may also have incentives to side with the aggressor due to its higher chances of victory or honoring a previous alliance.[17] Further, in the proof of Theorem 2.1 in the Appendix, we assume that, in case of a victory of the aggressor, the third party still retains the capacity to extract some wealth from the natural resource, but only a fraction $\alpha$ of the

[16] The condition is general enough to be satisfied by many commonly used probability distributions on the positive reals, such as the gamma, the chi-squared, the lognormal, and any standard distribution on the whole real line restricted to $[m, M)$.

[17] For instance, Bove et al. (2018) shows how oil producers are more likely to receive support.

status quo $\Pi_T(v)$, capturing, e.g., higher royalties by the new resource owner, and renegotiation costs. The results are not affected.

We can think of $\varepsilon_i$ for $i \in \{A, T\}$ as material and political costs of war that may be difficult to forecast in the long run, such as the cost of military equipment or the popular support for a specific conflict. The assumption that these costs are realized after the alliance choice aligns with the view that the alliance decision is stable over time and likely made well before the conflict, whereas the actual war costs may depend on evolving political and military circumstances.

Costs $\mu_R(p_w)$ and $\mu_A(p_w)$, instead, represent long-term institutional and cultural factors affecting the cost of alliances and war, such as cultural and ideological proximity to the potential ally, relative military strength of the players, reputation costs of changing alliance, the cost of renegotiating contracts or royalties, and the cost of changing resource ownership in terms of lost physical, human or organizational capital.[18] They can also incorporate the consensus for an alliance in the population.

Condition $SI_T$ states that the growth in the third party payoff offsets the decrease in the probability of victory of the aggressor. The condition can be re-expressed as saying that the elasticity of $\Pi_T$ is larger than the elasticity of $p_w$.[19] In other words, an additional unit of the resource value increases the payoff more than it decreases the probability that the aggressor wins. We now outline some examples that clarify when we should expect $SI_T$ to be satisfied.

**Example 2.1** (*Third Party Improving Its Bargaining Position After the Intervention*)**.** A natural extension of our model is to allow the bargaining position of the third-party to improve if it intervenes. The literature on third-party interventions draws a connection between intervention by third parties and a better ability to extract surplus from the party in conflict they defend, both theoretically (Di Lonardo et al., 2019; Rosenberg, 2020), and empirically (Berger et al., 2013a).[20] We can capture such effect in reduced form by assuming that, if the intervention takes place, the payoff of the third party becomes $(1+\beta_T)\Pi_T(v)$ and the aggressor's payoff – when the third party backs the aggressor – becomes $(1-\beta_A)\Pi_A(v)$ with $\beta_T, \beta_A \in (0,1)$.[21]

In this situation, condition $SI_T$ requires that $(\beta_T + p_w(v))\Pi_T(v)$ becomes larger than a constant at the limit. So, if $\beta_T > 0$, $SI_T$ is easier to satisfy. Intuitively, in this case, the improvement in bargaining terms after the intervention counterbalances the increase in power of the resource-holder. For a formal proof, see Proposition B.1 in the Appendix.

**Example 2.2** (*Third Party Finances Military Expenses of the Resource Holder*)**.** We can conjecture that, in many real world settings, there is a direct connection between third party resource profits and the resource-holder's military strength, especially when revenues from exporting the resource make a large fraction of the resource-holder's budget. Indeed, Snider (1984) and Bove et al. (2016) provide evidence that arms trade is used to offset the cost of importing the resource.

Suppose, for instance, that the revenues from the sale of the resource are $v$, and the third party can obtain a fraction $1-\eta$ as a royalty. Third party's payoffs are now given by $\Pi_T(v) = (1-\eta)v$. Further, assume that $p_w$ has a Tullock functional form, that is:

$$p_w(v) = \frac{w_A^\gamma}{w_A^\gamma + (\eta v)^\gamma}$$

where $w_A$ represents the baseline wealth of $A$, and $\gamma < 1$. Then:

$$p_w(v)\Pi_T(v) = \frac{w_A^\gamma}{w_A^\gamma + (\eta v)^\gamma}(1-\eta)v,$$

which is increasing, verifying $SI_T$. Intuitively, the military strength of the resource holder is now connected to the benefit the third party has from the resource; therefore, it cannot grow indefinitely.

**Example 2.3** (*Resource-Holder Military Expenses as a Decreasing Fraction of Wealth*)**.** In the general formulation expressed above, resource value can fully translate in military power. In reality, military power returns to resource-holder's resource wealth may be decreasing.[22] For instance, consider the setting of the previous example, where the wealth of the resource holder was a fraction of the resource value $\eta v$, but assume that the amount of wealth allocated to military expenses is not the total, but a function $(\eta v)^\phi$, with $0 < \phi < 1$. In this setting the marginal amount of new wealth allocated to military expenses is decreasing. In this setting:

$$p_w(v)\Pi_T(v) = \frac{w_A^\gamma}{w_A^\gamma + (\eta v)^{\gamma\phi}}(1-\eta)v,$$

[18] The interpretation of costs as political preferences is consistent with the framework of Eguia (2019), analyzing military interventions motivated by a noxious policy in the target country.

[19] Because:

$$(p_w\Pi_T)' = \frac{p_w\Pi_T}{v}\left(\frac{\Pi_T' v}{\Pi_T} + \frac{p_w' v}{p_w}\right) > 0$$

if and only if $\frac{\Pi_T' v}{\Pi_T} > -\frac{p_w' v}{p_w}$.

[20] For instance, the latter shows that after CIA interventions helped USA obtain better trade conditions from targeted countries.

[21] For instance, this situation emerges when the profit from exploitation of the resource is $v$, a fraction $\eta$ goes to the current party controlling the resource as a royalty, and after intervention the third party is able to obtain a better split of surplus $\eta' < \eta$. In this case, if the third party is allied with the aggressor, after the aggressor successfully seizes the resource without intervention, the payoffs are $\Pi_T(v) = \eta v$ and $\Pi_A(v) = (1-\eta)v$. If, instead, the third-party intervenes in favor of the aggressor, the payoffs are $\Pi_T(v) = \eta' v$ and $\Pi_A(v) = (1-\eta')v$, so that $\beta_T = \beta_A = \eta - \eta'$.

[22] Using data on military expenditure by country by SIPRI we find that the correlation between GDP and military expenses as a fraction of GDP is negative.

Condition $SI_T$ is now:

$$\begin{aligned}(p_w(v)\Pi_T(v))' &= -\frac{w_A^{\gamma}\gamma\phi\eta(\eta v)^{\phi\gamma-1}}{\left(w_A^{\gamma}+(\eta v)^{\phi\gamma}\right)^2}(1-\eta)v+\frac{w_A^{\gamma}}{w_A^{\gamma}+(\eta v)^{\phi\gamma}}(1-\eta)\\ &=\frac{w_A^{\gamma}}{w_A^{\gamma}+(\eta v)^{\phi\gamma}}(1-\eta)\left(1-\gamma\phi\frac{(\eta v)^{\phi\gamma}}{w_A^{\gamma}+(\eta v)^{\phi\gamma}}\right)>0,\end{aligned}$$

and, for a smaller $\phi$ (i.e. the marginal investment in military expenses is decreasing more rapidly), $SI_T$ is satisfied for a larger set of values of $\gamma$.

### 2.3. Equilibrium and main result

As before, we look for subgame-perfect equilibria of this game. The analysis of the game proceeds by backward induction. First, consider the subgame after $T$ decided to ally with $R$ and $A$ attacked. Third party $T$ intervenes if and only if the benefit of intervening (the increase in the probability that the resource holder wins) is larger than the cost of war, that is if:

$$\Pi_T(v) \geq \mu_R(p_w(v)) + \varepsilon_T.$$

Anticipating this, $A$ attacks only if $T$ does not intervene in the conflict, and if its cost of war is low enough: $p_w(v)\Pi_A(v) \geq \varepsilon_A$. Second, consider the subgame after $T$ decided to ally with $A$ and $A$ attacked. $T$ intervenes if and only if the benefit of intervening is larger than the cost of war, that is:

$$(1-p_w(v))\Pi_T(v) \geq \mu_A(p_w(v)) + \varepsilon_T. \tag{2}$$

Then, if (2) holds, $A$ attacks if and only if $\Pi_A(v) \geq \varepsilon_A$, whereas if (2) does not hold, $A$ attacks if and only if $p_w(v)\Pi_A(v) \geq \varepsilon_A$. Details on the equilibrium characterization are provided in the proof in the Appendix.

Our main result is the following.[23]

**Theorem 2.1.** *Assume $EE$, $TL$, and $CW$. Then, the probability of conflict is increasing for small $v$.*
*If $SI_T$ also holds, then the probability of conflict is decreasing for large $v$.*

To understand the intuition behind the result, it is useful to first focus on a simplified case in which the costs of war $\varepsilon_i$ for $i \in \{A, T\}$ are deterministic. In this case, if $v$ is small enough, because $\Pi_A(0) = 0$, the aggressor has no incentive to attack regardless of $T$'s choice to side with $R$ or $A$. Then, for small $v$ there is no conflict. Instead, for $v$ high enough, the third party sides with $R$ and deters conflict. Indeed, if the strong interest condition $SI_T$ is satisfied, the third party always intervenes in favor of its ally. In other words, whether $T$ sides with $R$ or $A$, it gets access to the resource. While $A$ will not attack $R$ if the latter is backed by $T$, $A$ will attack $R$ when it has $T$'s support, imposing the cost of intervention on $T$. Then, in the first stage, $T$ will prefer to back $R$ and deter conflict. Once we allow for stochastic $\varepsilon_i$ for $i \in \{A, R\}$, these mechanisms imply that when $v$ is small, the probability of conflict is increasing in $v$, while when $v$ is large, it is decreasing.

Our result hinges on the Strong Interest condition $SI_T$ guaranteeing that, when $v$ grows, $T$'s incentive to preserve access to extraction outweighs a lower incentive to intervene in support of a stronger resource-holder. Indeed, while a higher resource value increases the stakes for $T$, it also increases the military capacity of the resource holder, implying that an intervention is *less* necessary. The latter effect follows directly from resource-dependent military capacity and is not present in the baseline model. The effect of resource wealth on the resource-holder's military capacity could also interact with the predator's incentive to attack, without a third party: the next Remark discusses this case.

**Remark 2.1.** Define condition $SI_A$ as follows:

**Strong Interest of the aggressor – $SI_A$** For $v$ large enough, $p_w\Pi_A$ is increasing, and

$$\lim_{v\to\infty} p_w(v)\Pi_A(v) \geq M.$$

If condition $SI_A$ does not hold, the probability of conflict increases in $v$ for low $v$ and decreases in $v$ for high $v$.

The formal proof is in Appendix B.2. If $p_w(v)\Pi_A(v)$ is not increasing for large $v$ ($SI_A$ does not hold), a higher resource value translates in higher military power for the resource-holder in a way that outweighs the incentives to attack created by higher spoils of war. In this case, the probability of conflict would be non-monotonic in resource value even in the absence of a third party (or in case the intervention incentive were not strong enough, and $SI_T$ were not satisfied). For example, if the resource holder is very efficient at extracting surplus from its supply of resources and financing an effective army, the resource wealth itself deters potential attackers. This type of mechanism is discussed in Collier and Hoeffler (2004) in relation to the case of Saudi Arabia.

To summarize, our model's empirical prediction is that a non-monotonic relation between conflict probability and resource value can emerge regardless of third-party presence, but third-party presence makes it more likely. In the companion paper (Battiston et al., 2024), we: (i) provide indirect evidence for the assumption $SI_T$ in presence of US influence, and (ii) we provide evidence that Assumption $SI_A$ is satisfied, when measuring military strength with military expenditure.

[23] Here and in the following we say that a property holds 'for small $v$' to mean that there exist a threshold $v_*$ such that the property holds for all $v < v_*$, and similarly 'for high $v$' to mean that there exist a threshold $v^*$ such that the property holds for all $v > v^*$.

## 3. Case studies

In this section, we present historical anecdotal evidence that supports our theoretical model. Specifically, we will examine cases where the involvement of a powerful third party appears to have actively reduced conflict in resource-rich regions, as well as cases where the absence of a powerful third party may have contributed to the outbreak of conflict. Such cases involve interstate war or civil wars and are reported in the first two subsections. These are cases of a third party that buys the resource and uses it in production, experiencing disruptions from changes in resource ownership, for which we show model assumptions to hold in Section 3. Finally, we will examine whether and to what extent our theory can explain conflict situations involving criminal organizations.

### 3.1. Oil interests and US foreign policy

The strategic interest of preserving access to resources used in production, particularly for hydrocarbons, was proposed as a driver of the foreign policy of several high-income economies, e.g., the US involvement in the Middle East, and the Italian and French presence in Libya and Algeria (Grigas, 2018; Prontera, 2018).[24] In particular, hydrocarbon dependence has been discussed as a key determinant of US foreign policy (Jones, 2012; Little, 2008).

The US was a net oil importer throughout the second half of the 20th century (EIA, 2021), and it has intervened directly or indirectly in a number of oil-rich countries over the years, such as Guatemala, Indonesia, and Angola, where civil conflict potentially threatened the interests of US oil companies such as Chevron (Bove et al., 2016). However, US involvement in the Middle East is probably the case where US foreign policy is more often linked to oil-import dependence.

Access to oil resources was a key driver of US involvement in the Middle-East during WWII, when the US started to gradually substitute the British as the main protector of the Saudi interests (Rubin, 1979). Since then, stability of the Middle East and its resource wealth has played a central role in defining US international relations in the region (Jones, 2012), culminating in the Carter Doctrine—the commitment by President Carter to the use of force against any "attempt by any outside force to gain control of the Persian Gulf region" that was expressed during the State of the Union in 1980. While such commitment arose from the intention to deter Soviet expansion in the Middle East around the USSR's invasion of Afghanistan, the US kept its commitment in 1990, during the first Gulf War, intervening to defend oil-rich Kuwait – a strategic partner – from the invasion by Iraq. Saddam Hussein's choice to invade aimed to preserve market power in the face of high oil extraction by Kuwait (Gause, 2002), during a severe economic crisis that made resource wealth especially attractive (Chaudhry, 1991), and it caused a spike in the market price of oil.

In addition to increasing the cost of US oil imports, the invasion represented a potential security threat to Saudi Arabia, by then a long-standing US partner (Gause, 2009; Metz, 1993). Such relationship facilitated the intervention—the deployment of US troops could exploit Saudi ports and airfields (Freedman and Karsh, 1991). In conclusion, US strategic interests may have contributed to Saudi Arabia experiencing relatively low levels of conflict, despite having access to large oil reserves.

The history of Sudan contributes another example that helps to explain the logic of our model, showing how extraction-motivated deterrence can fail under some circumstances. Sudan has historically been a strongly fragmented territory, prone to conflicts between the Muslim Arabic-speaking North and the Christian and animistic South. The discovery of oil in the 1970s contributed to precipitate the country into the Second Sudanese Civil War 1983–2002, one of the longest civil wars ever recorded (Cascão, 2013), undoing the progress made by the Addis Ababa peace agreement of 1972 (Martell, 2019). The South Sudan secession in 2011 did not prevent the outbreak of a new civil war in 2013, again fueled by the presence and control of oil resources.

Our model offers a rationale for understanding the occurrence of this conflict. Although Sudan became relatively rich in oil and Chevron was involved in oil extraction projects in the country (Rone, 2003), its wealth of resources was limited compared to that of other strategic U.S. partners in oil trade. Today, Sudan and South Sudan's proven oil reserves are estimated at around 5 billion barrels against, e.g., 102 in Kuwait (EIA, 2024a; EIA, 2024b). Naturally, many other factors have been at play in determining Sudan's civil wars, and the level of involvement of the US. For example, US-Sudan relations deteriorated over Sudan's lenient stance toward Islamic terrorism in the 1970s and 1980s (U.S. Bureau of African Affairs, 2008). However, our theory suggests that the intermediate level of the country's oil reserves may have been a key factor.

### 3.2. Cobalt, coltan and Chinese interests in the DRC

Stabilization mechanisms similar to those discussed for oil may be at work in the context of mineral extraction of cobalt in the Democratic Republic of Congo (DRC). Cobalt ore is a key input in the production of lithium-ion batteries, used in smartphones, laptops and tablets. The mass adoption of electronic devices in the last years (Pew, 2016) has caused global production to quadruple between 1995 and 2020 (Gulley, 2022), with the DRC single-handedly exporting 86% of the world trade volume in 2019. On the demand side, China imports 69% of the total (Simoes and Hidalgo, 2023) and uses it in the production of technological products. Mineral interests render the DRC a strategic partner for the Chinese government and economy, and the China-DRC relationship has resulted in the 2008 agreement that established Sicomines, a joint venture between Chinese firms and the government, granting

[24] A Politico article covering the recent French foreign policy in North Africa can be consulted at https://archive.md/IzOQ5 (Taylor, 2019).

Chinese access to Congolese minerals in exchange for public infrastructure.[25]

Despite the large increase in value, cobalt-rich areas in the region of Katanga, in the South of the DRC, have not suffered extensive conflicts in the time span in which cobalt value increased, differently from mineral-rich areas in the East of the country. While an explicit test of resource-induced third-party deterrence is not possible in this case, anecdotal evidence suggests that Chinese involvement had a role in stabilizing the area. China has been directly involved in the financing and training of the armed forces of DRC, the FARDC (Clément, 2009), and supported their reform (Baaz and Stern, 2017), contributing to the construction of new FARDC Headquarters, and the acquisition of individual equipment, weapons, and ammunition (Buda and Szunomár, 2022).[26,27] Additionally, Chinese firms made the extensive use of Private Security Companies (PSC) to avoid looting and disruptions of their operations—even though use of PSCs has caused concern as a covert form of military presence.[28,29]

To better grasp the stabilization mechanism at play in cobalt-rich areas, it is useful to compare it to the case of coltan, another mineral that has instead generated extensive resource conflict in the DRC. Coltan is another key mineral for the production of electronic devices, present in DRC and extensively imported by China. Differently from cobalt, coltan is listed among the "conflict minerals" defined by the Dodd-Frank act. The price of its main product, tantalum, exploded in 2000, with an average price up 647% compared to the 1999 price.[30] The DRC became a main exporter of coltan and the sudden price increase led to the so-called "coltan fever", during which many local communities and farmers in DRC turned to artisanal mining of the now precious metal. The sudden increase in the price arguably induced an outburst in violence (Usanov et al., 2013) during the Second Congo War (1998–2003) (König et al., 2017), with different factions fighting to obtain control over mining areas.[31] Since 2014, coltan has contributed to an increase in violence and fatalities in the East of the country.[32] Although the DRC is also the major producer in this case, based on USGS data, the production of tantalum is less concentrated in the country, allowing coltan producers like China to diversify its suppliers and arguably rendering the DRC extraction sites less strategic for its economy. In 2019, China obtained 97% of its cobalt ore imports from the DRC, but only 16.5% of its tantalum, vanadium, and niobium ores (Simoes and Hidalgo, 2023). The different levels of violence in coltan-rich and cobalt-rich areas depend on several factors and cannot be explained by Chinese interests alone. Nonetheless, our theory suggests that Chinese interest in cobalt may be a key factor.

### *3.3. Third-party stabilization in illegal markets: organized crime*

Our model can also apply to the emergence of dominant nonstate actors performing illicit activities. Criminal organizations engaged in drug trafficking must establish themselves in contest with other criminal groups competing to obtain an advantage at the same activity, by controlling access to a certain market for illicit products or supplier, amid pressure from police enforcement. Unlike actors involved in legitimate trade, criminal organizations can be hurt by conflict beyond the disruption to the production and transportation of their product; indeed, conflict can invite unwanted attention by police enforcement resulting in seizures and arrests. In addition, the risk of predatory acts is exacerbated by the virtual absence of property rights protection from state authorities. In this context, there are historical cases of criminal organizations that stabilized an area after having obtained a sufficiently strong control. For instance, this is the case of the Primero Comando da Capital (PCC), a criminal organization that emerged in the Brazilian prison system and went on to become a major stakeholder in criminal activities across the country, such as drug trafficking. The PCC is known to enforce rigid rules of criminal behavior in the areas it controls (InSight Crime, 2020; Lessing and Willis, 2019), which have been associated with a particularly low level of violence by work in sociology (Feltran, 2019).

Another example of criminal organizations intervening to tame conflict comes from the history of the Mafia's spread in Sicily. As shown by Acemoglu et al. (2020), in Sicily at the beginning of the 20th century, landowners, estate managers, and local politicians sought Mafia's support to fight against rising peasant demands. In this case, the Mafia acted as a powerful third party, defending the local elites against the demands of salaried work.

## Conclusions

Our work shows that taking into account the stabilization incentives by third parties can significantly challenge the prevalent view on the theoretical relation between resource abundance and conflict. In particular, we show that third-party involvement creates a non-monotonic relationship between resource value and the probability of war. Our model also allows us to analyze the effects of resource value on alliance formation between profit-maximizing powerful third parties and resource-rich countries. We find that the ability of third parties to select their allies reinforces their stabilizing role, strengthening our main result. The presence of resources increases the military strength of resource holders and the third party's incentive to side with them in a conflict, further discouraging the intervention of the aggressor.

[25] New investments have also been announced recently as reported by Reuters https://archive.is/nt4Kn (Strohecker and Do Rosario, 2023).

[26] See also the following report from Oxfam (Oxfam, 2010) https://archive.is/a952J.

[27] See also https://archive.is/lvmRW (Wondo Omanyundu, 2018).

[28] See https://archive.is/1AulJ (Maheho, 2022).

[29] See https://archive.is/4i1YV (Nantulya, 2021) and http://archive.is/O2MKj (Brautigam, 2016).

[30] The figure was obtained from USGS data.

[31] See, for instance the report at https://archive.is/wip/RYtK0 (Totolo, 2009) .

[32] See the report U.S. Government Accountability Office (2022) by the US Government Accountability Office and Pierret (2022) by RFI.

Our results may provide an explanation for seemingly inconsistent results in the literature on the effect of resources on conflict, with some works finding an empirical association between conflict and the presence of natural resources (see, e.g., Collier and Hoeffler, 2004; Caselli et al., 2015) and others finding no relation (see, e.g., Fearon, 2005; Brunnschweiler and Bulte, 2009).

Our results on the relation among resource value, third-party influence, and conflict are particularly relevant given the fast pace of technological and environmental changes. In recent years, portable devices, such as smartphones, have become widespread globally; demand for lithium-ion batteries' raw materials, such as cobalt ore, has surged as a consequence. Such changes in global demand for minerals have likely shifted the incentives for engaging in conflict to control extraction areas. In addition, they probably induced third-party involvement in new resource-rich regions by advanced economies producing portable devices or intermediate products. At the same time, in high-income countries, the challenges raised by climate change have induced divestment from carbon-emitting technologies and investment in renewable energy. Although the long-term consequences of this process are hard to grasp at the moment, demand for fossil fuels and their price will likely decrease in the future. Given the concentration of hydrocarbon extraction in the Middle East, this may impact the stability of the area through predation incentives and stabilization incentives for third parties currently interested in oil price stability.

Our framework can be extended in many directions to study the causes and consequences of third-party interventions. First, in our framework, third parties decide on alliances and interventions based on resource presence, taking as given their 'sphere of influence'. Future research could investigate how third parties decide on their involvement in the first place. Second, in our theoretical framework, we study the relationship between resource presence and conflict, holding fixed the resource holder's ability to extract and sell the resource. Endogenizing investment in resource exploitation by third parties provides an interesting avenue for further research. Finally, as we note in the introduction, powerful third parties can act as enforcers of property rights at the international level. The overall normative implications of resource-induced third-party influence depend on the trade-offs between the benefits of property rights enforcement and the costs of dependence and third-party resource rents. Nonetheless, our results suggest that third parties are key mediators of the resource curse in conflict.

## CRediT authorship contribution statement

**Giacomo Battiston:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Matteo Bizzarri:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Riccardo Franceschin:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization.

## Declaration of competing interest

We declare that we have no relevant or material financial interests related to the research described in this paper.

## Appendix A. Additional theoretical results

### A.1. Intervention motivated by avoiding production disruptions

In this section, we explore a variant of the model in which the third party does not form a stable alliance with one of the contenders, but can costlessly form a trade relationship with whichever among the aggressor and the resource owner is the winner of the war. Hence, intervention cannot be motivated by the loss of access to the resource. Instead, we are going to assume that war without intervention entails a higher risk of destruction of natural resource (or capital and infrastructure needed for extraction), unless the third party intervenes, quickly resolving conflict. The goal of this section is to show that the main result carries through also in such an alternative setting.

Formally, we assume that, if there is no intervention, the payoff of the third party is $\alpha(p_w)\Pi_T$, where $1-\alpha \in [0,1)$ represents the fraction of resource lost in conflict. The simplest case is in which this fraction is constant but, consistently with allowing variation in military strength, we allow $\alpha$ to depend on $p_w$, to reflect the fact that the balance of forces may affect the amount of destruction due to war.[33] If $\alpha$ is constant or decreasing in $p_w$, that is a stronger aggressor means (weakly) higher destruction, the probability of conflict is decreasing for large $v$ because the increase in resource increases also the destruction, thus increasing the incentives to intervene. In general, though, we might expect $\alpha$ to have different shapes, for example could be u-shaped: there exist a $p^*$ such that $\alpha$ is decreasing for $p < p^*$ and is increasing for $p > p^*$. This corresponds to a case in which the highest destruction appears for a relatively balanced conflict. If this is the case (or, more in general, if $\alpha$ is increasing for small $p_w$) the result still holds if $\alpha(0) < 1$, that is there is some destruction even if the aggressor is very weak. The intuition is that, in this case, even if destruction decreases as $v$ grows, because the aggressor is weaker, it does not decrease enough to offset intervention incentives. If $\alpha(0) = 1$ instead, our result carries through, provided condition $SI_T$ holds: namely, if the destruction becomes null when $v$ is large enough, whether the third party has enough incentive to intervene or not depends on the strong interest condition, as in the main text. We are going to assume that $\alpha$ is differentiable and its derivative is bounded.

The timing of the game is as follows:

[33] We can of course expect some fraction of resource to be lost in conflict even with intervention. If we define this baseline rate of loss $\zeta$ and the fraction of resource lost without intervention as $\zeta\alpha$, all the results follow through. We set $\zeta = 1$ in the main text for simplicity.

1. the aggressor decides if to attack or not;
2. the third party decides if to intervene in favor of the aggressor ($I_P$), intervene in favor of the resource holder ($I_R$), or not intervene.

Moreover, we are going to add some structure to the costs of war:

**Costs of war 1 – CW1** $\mu_A$ and $\mu_R$ are differentiable, bounded, $\mu'_A \leq 0$, $\mu'_R \geq 0$. Moreover:

1. if $A$ wins for sure intervention in favor of $A$ is less costly: $\mu_A(1) < \mu_R(1)$;
2. if $R$ wins for sure intervention in favor of $R$ is less costly: $\mu_A(0) > \mu_R(0)$.

The assumption above has the consequence that $\mu_A - \mu_R$ is monotonic, so there are no multiple regions with changes of alliance; the increase of $A$ has the unambiguous effect of making it more convenient to support $A$. Note that the case in which both are constant (or even zero, as in the simplified model) is a special case of the above assumption.

If $A$ does not attack, the intervention choice is immaterial. Instead, if $A$ attacks, different equilibria emerge based on the value of $v$. Under the above assumptions, if $v$ is high enough, so that $p_w$ is close enough to 0, $T$ intervenes in favor of the resource holder $R$. This is because if $p_w$ is small enough, by the above assumption, $\mu_A > \mu_R$. The behavior when $v$ is close to 0 instead depends on the relative military investments of $R$ and $A$ absent the natural resource, that is $p_w(0)$. If $p_w(0)$ is sufficiently close to 1, we have that $\mu_R(p_w(0)) > \mu_A(p_w(0))$; so, for small $v$, the intervention might be in favor of $A$, otherwise it is always in favor of $R$.

All the other assumptions on payoffs and error terms are as in the previous section.

The key mechanism is that the preferred ally of the third party in case of intervention is still given by the relative size of $\mu_A$ and $\mu_R$, that means that it is still the case that intervention is in favor of $A$ for $v$ small, and in favor of $R$ for $v$ large. If $v$ is small, there is no intervention regardless of the shape of $\alpha$. If $v$ is large, the shape of $\alpha$ matters: if asymmetry is destructive then as the resource holder grows powerful this might trigger more intervention, and less conflict via deterrence. If asymmetry is not destructive, as the resource holder grows powerful the incentive to intervene decreases and it has to be balanced with the increase in value, in a way very similar to what discussed in the previous section. The proof is in Appendix B.

**Proposition A.1.** *Assume $CW1$. The probability of conflict is increasing for small $v$.*

*If $\alpha' < 0$ for small $p_w$, or $\alpha(0) < 1$, then the probability of conflict is decreasing for large $v$. If $\alpha(0) = 1$ and $\alpha' > 0$ for large $p_w$, then the probability of conflict is decreasing for large $v$ if and only if $SI_T$ is satisfied.*

### *A.2. Private information on war costs*

In this section, we explore the robustness of our baseline result if the costs $\varepsilon_i$ are players' private information. This captures the idea that the different parties may not be able to perfectly observe each other's military capacity, internal consensus, and other factors that might contribute to the war cost. This different assumption also provides a context in which there is intervention on the equilibrium path.

We stick to the simplified model of Section 1 for the strategic structure, namely we consider the alliance between the powerful third party and the resource holder fixed. However, we consider general functional forms for the payoffs $\Pi_T$ and $\Pi_A$ satisfying the Assumptions $AI$, $RC$ and $EE$ detailed in B. For simplicity, now assume $\varepsilon_A > 0$, and $M < \infty$.

The game formally becomes a dynamic Bayesian game. We look for the Perfect Bayesian Equilibrium; this is a simple task in this context because the cost of $A$ does not affect the payoffs of $T$ directly. Hence, the decision of $T$ will depend only on the attack choice. Therefore, we can neglect beliefs of $T$ about the cost—players do not need to do Bayesian updating.

Now, we can closely mimic the analysis done for the baseline, and the results go through. The intuition is a close analog to the baseline, the difference being that now $A$ takes into account the expected probability of an intervention rather than the intervention itself. As in the baseline, if the value is small, the third party almost surely will not intervene. Hence, an increase in the value will incentivize the aggressor to attack for many realizations of $\varepsilon_A$, so that the predation effect dominates the deterrence. If the value is high, the third party will almost surely intervene, so an increase in the value of the resource will increase the incentives to attack for very few realizations of $\varepsilon_A$, so the deterrence effect dominates.

Formally, we can state the following proposition, with proof in Appendix B.

**Proposition A.2.** *In the model with asymmetric information, the probability of conflict is increasing for small $v$ and decreasing for high $v$.*

### *A.3. Theoretical representation of the examples in Section 3*

Think about the usual players in the model as representative agents of the respective economies. For simplicity, we assume that the third party $T$ has no endowment of the resource, and its firms need to buy it on the market to produce consumption goods. In particular, the third party behaves as a representative neoclassical firm and it maximizes the following profit function:

$$\pi_T = \Omega_T g_T^{\alpha} - p g_T, \tag{3}$$

where $\Omega$ denotes the resource-specific productivity, $g$ is the amount of resource bought, and $A$ is the market price of the resource.

The value of the resource is determined on the competitive international market. Also, we assume that $T$ is the only buyer of the resource to avoid useless algebraic complications. The owner of the resource $A$ or $R$ sells the resource to $T$. In addition, there is an international supply $R_M$ from the market. The profits coming from the ownership of the resource for players $A$ and $R$ are:

$$\pi_i = pR_i, \tag{4}$$

where $R_i$ is the amount of resource sold by $i$.

Extraction operations and trade are negatively affected by a war. Then, conflict results in a higher price for the resource: if a war occurs, production drops by a fraction $\eta$. Hence, the third party stands to lose from the war in two ways: the quantity available is smaller, and the price will be higher due to the supply-side shock. Through this channel, the third party has a clear interest in maintaining peace since higher prices hurt its economy.

We define a market equilibrium of this model as a price-quantity vector $(p^*, g_T^*, g_R^*, g_M^*)$. Any player is choosing the resource amount $g^*$ optimally given price $p^*$ and such that the market-clearing condition $g_T = g_M + g_R$ is satisfied.

In this context, if we interpret the amount of resource owned by the resource holder as the value parameter, $R_R = v$, the model described here is an instance of the model described in 2.3. In particular, solving for the market equilibrium, the payoff from resource access for the aggressor and the resource holder are:

$$\begin{aligned} \Pi_A(R_R) &= \frac{\alpha\Omega}{(R_M + \eta R_R)^{1-\alpha}} \eta R_R \\ \Pi_T(R_R) &= (1-\alpha)\Omega\left((R_M + R_R)^{\alpha} - (R_M + \eta R_R)^{\alpha}\right) \end{aligned} \tag{5}$$

So, we can now map this model to the model of the previous sections and state the following Corollary, whose derivation is detailed in the appendix.

**Corollary 1.** *If the payoffs $\Pi_A$ and $\Pi_T$ are as in (5), by Section 2, the probability of conflict is hump-shaped under the simplified model.*

*If, moreover, the probability of victory of the aggressor is given by a Tullock CSF with parameter $\gamma < \alpha$, then also $SI_T$ is satisfied, and by Theorem 2.1 the probability of conflict is hump-shaped also under the full model.*

## Appendix B. Proofs

For an orderly exposition of the proofs, we sum up here the assumptions that are used in the proofs.

**Aligned Interests - AI** $\Pi_T$ and $\Pi_A$ are both increasing in $v$, and they can become high enough to offset any cost of war, namely

$$\lim_{v\to\infty} \Pi_A = \lim_{v\to\infty} \Pi_T = +\infty$$

Furthermore, we use the normalization $\Pi_T(0) = \Pi_A(0)$.[34]

**Economic Efficiency of the Third party - EE** the rents extracted by the aggressor are not too large with respect to the rents extracted by the third party: there is a constant $C > 0$ such that, for all $v$, $\Pi_A(v) \leq C\Pi_T(v)$.

### *B.1. Proofs of Section 2.3*

We are going to need the following Lemma.

**Lemma B.1.** *Under assumptions $AI$, and $EE$,* $\lim_{v\to\infty} \frac{\Pi'_P}{\Pi'_T} \leq C$

**Proof.** By assumption AI we have $\lim_{v\to\infty} \frac{\Pi_A}{\Pi_T} = \frac{\infty}{\infty}$. By Assumption RC the limit $\lim_{v\to\infty} \frac{\Pi'_P}{\Pi'_T}$ exists, and so by De l'Hôpital's theorem, $\lim_{v\to\infty} \frac{\Pi_A}{\Pi_T} = \lim_{v\to\infty} \frac{\Pi'_P}{\Pi'_T}$, and by Assumption EE the former is less that $C$, which gives our thesis. $\square$

[34] This is without loss of generality: the payoffs are meant to capture the payoffs obtained *from the exploitation of the resource*, hence without the resource they are zero.

*Proof of Theorem 2.1*

*Generalized strong interest condition.* We prove the theorem under the more general assumptions that the third party, after non-intervention and a victory of the aggressor, can still earn a fraction of the profits from the resource, $\alpha \Pi_T$, with $\alpha \in (0,1]$. Moreover, after intervention, the third party earns an additional $\beta_T \Pi_T$, with $\beta_T \geq 0$, representing (eventual) improved bargaining terms. The strong interest condition in such a case becomes the condition that $((1-\alpha)p_w + \beta_T)\Pi_T$ is increasing and its limit is larger than $M$. Such condition is very similar to the condition in the main text, but for the factor $1-\alpha$ in front of $p_w$. For $\alpha = 1$ and $\beta_T > 0$, the condition is easier to satisfy than the condition in the main text; for $\alpha < 1$, none of the condition imply the other, in general. However, the discussion in the main text of the cases in which it is likely to hold still applies.

Hence, in this proof we refer to the Strong Interest condition as:

**(Generalized) Strong Interest of the third party** for $v$ large enough $((1-\alpha)p_w + \beta_T)\Pi_T$ is increasing, and $\lim_{v\to\infty}((1-\alpha)p_w + \beta_T)\Pi_T \geq M$.

*Expected payoffs and probability of conflict.* The expected payoff from non-intervention in this case becomes $p_w \alpha \Pi_T + (1-p_w)\Pi_T = (1-(1-\alpha)p_w)\Pi_T$. The equilibrium in the subgame following the alliance with $R$ is:

1. if $p_w \Pi_A(v) < \varepsilon_A$, $A$ never wants to attack and there is no war;
2. if $((1-\alpha)p_w(v) + \beta_T)\Pi_T(v) - \mu_R > \varepsilon_T$ then $T$ would intervene in case of conflict, hence $A$ does not attack unless $\varepsilon_A < 0$;
3. if $p_w \Pi_A(v) > \varepsilon_A$ and $((1-\alpha)p_w(v) + \beta_T)\Pi_T(v) - \mu_R(v) < \varepsilon_T$ then there is no intervention and $A$ attacks.

In this case, the probability of conflict is:

$$\begin{aligned} P^R(war) =& P(\{0 < \varepsilon_A \leq p_w \Pi_A,\ \varepsilon_T < (p_w + \beta_T)\Pi_T - \mu_R\}) = \\ & F_A(p_w \Pi_A)(1 - F_T^R) \end{aligned}$$

where $F_T^R := F_T(((1-\alpha)p_w + \beta_T)\Pi_T - \mu_R)$.

The equilibrium in the subgame following the alliance with $A$ is in the main text, and the probability of conflict is:

$$\begin{aligned} P^A(war) &= P(\{0 \leq \varepsilon_A < p_w \Pi_A,\ \varepsilon_T > (1 + \beta_T - p_w)\Pi_T - \mu_A\} \\ &\quad \cup \{0 \leq \varepsilon_A < \Pi_A,\ \varepsilon_T \leq (1 + \beta_T - p_w)\Pi_T - \mu_A\}) \\ &= F_A(p_w \Pi_A)(1 - F_T^A) + F_T^A(F_A((1-\beta_A)\Pi_A) - F_A(p_w(1-\beta_A)\Pi_A)) \end{aligned}$$

where $F_T^A := F_T((1 + \beta_T - p_w)\Pi_T - \mu_A)$.

The expected payoff of $T$ from choosing to be allied with $R$ is:

$$P^R(war)(1 - (1-\alpha)p_w)\Pi_T + (1 - P^R(war))\Pi_T = (1 - (1-\alpha)p_w F_A^A(1 - F_T^R))\Pi_T$$

the expected payoff from choosing to be allied with $A$ is:

$$(1 - f_T^A)F_P^P p_w \Pi_T + (F_A(\Pi_A) - F_P^P)\left( f_T^A((1+\beta_T)\Pi_T - \mu_A) - \int^{(1+\beta_T - p_w)\Pi_T - \mu_A} \varepsilon_T \mathrm{d}F(\varepsilon_T) \right)$$

where $F_P^P := F_A(p_w(1-\beta_A)\Pi_A)$, $f_T^A$ and $F_T^R$ have been defined in the text.

Hence, the third party chooses to be allied with $R$ if and only if:

$$\begin{aligned} &(1 - p_w F_A(1 - F_T^R))\Pi_T > (1 - f_T^A)F_A p_w \Pi_T + \\ &(F_A(\Pi_A) - F_A)\left( F_T^A((1+\beta_T)\Pi_T - \mu_A) - \int^{(1+\beta_T - p_w)\Pi_T - \mu_A} \varepsilon_T \mathrm{d}F(\varepsilon_T) \right) \end{aligned}$$

*Case 1: $v$ large.* Define $E^A = \int^{(1+\beta_T - p_w)\Pi_T - \mu_A} \varepsilon_T \mathrm{d}F(\varepsilon_T)$. If $v \to \infty$ the condition above is satisfied if and only if:

$$((1 - p_w F_A(1 - F_T^R)) - (1 - F_T^A)F_A p_w - (F_A(\Pi_A) - F_A)F_T^A)\Pi_T + \Delta F_A(\mu_A + E^A) > 0$$

As $v \to \infty$, $p_w \to 0$. Moreover, since $\Pi_T$ grows unbounded, as $v \to \infty$ we have that $E^A \to \mathbb{E}\varepsilon_A > 0$. We have two cases. If $\Delta F_A \to 0$, then the expression above is asymptotically equivalent to $\Pi_T + \Delta F_A(\mu_A + E^A)$, and is positive. If instead $\Delta F_A \to \ell > 0$, then the expression above is asymptotically equivalent to $(1-\ell)\Pi_T + \ell(\mu_A + E^A)$, still positive. Hence, for $v$ large, the third party supports the resource holder.

Hence, the probability of conflict for $v$ large is:

$$P^R(war) = F_A(1 - F_T^R)$$

and the derivative is:

$$f_A(p_w' \Pi_A + p_w \Pi_A')(1 - F_T^R) - f_T((1-\alpha)p_w' \Pi_T + ((1-\alpha)p_w + \beta_T)\Pi_T' - \mu_R' p_w')F_A$$

where as in the previous sections we omitted the argument of the densities $f_A$ and $f_T$. Using Lemma B.1, this is smaller than:

$$(f_A(1-F_T^R)-f_T(1-\alpha)F_A)(p_w'\Pi_T+p_w\Pi_T')+f_T(-\beta_T\Pi_T'+\mu_R'p_w')F_A$$

Now $\mu_R'p_w'<0$. Moreover, if $(p_w+\beta_T)\Pi_T$ goes to $M$, then $F_T^R\to 1$. So if $f_T(M)>0$, the remaining term is minus the derivative of $(p_w+\beta_T)\Pi_T$: if $SI_T$ holds, this is negative. If instead $f_T(M)\to 0$, then the function $G(x):=1-F_T^R(1/x)$ has a Taylor approximation:

$$G(x)-G(0)\sim G'(x)x=$$

that is:

$$1-F_T^R(1/x)\sim f_T(1/x)(1/x^2)x$$

so

$$1-F_T^R\sim f_T((p_w+\beta_T)\Pi_T-\mu_R)$$

So, the derivative above is smaller than:

$$f_T((f_A((p_w+\beta_T)\Pi_T-\mu_R)-(1-\alpha)F_A))(p_w'\Pi_T+p_w\Pi_T')+f_T(-\beta_T\Pi_T'+\mu_R'p_w')F_A$$

$$=f_T((f_A(p_w+\beta_T)-(1-\alpha)F_Ap_w'-\beta_TF_A)\Pi_T-(1-\alpha)p_w\Pi_T'-\mu_R+\mu_R'p_w'F_A)$$

the coefficient of $\Pi_T$ converges to $-\beta_T$, and so the derivative is negative.

*Case 2: $v$ small.* If $v\to 0$, we study separately the two cases of the alliance with $R$ and the alliance with $A$.

If the third party allies with $R$, if $f_A(0)>0$, the only part surviving in the derivative is $f_Ap_w\Pi_A'$, and is positive. If instead $f_A(0)\to 0$, use the fact that asymptotically $F_A\sim f_Ap_w\Pi_A$ and obtain that the derivative is asymptotically equivalent to:

$$f_A\left[(p_w'\Pi_A+p_w\Pi_A)(1-F_T^R)-f_T((1-\alpha)p_w'\Pi_T+\right.$$
$$\left.((1-\alpha)p_w+\beta_T)\Pi_T'-\mu_R'p_w')p_w(1-\beta_A)\Pi_A\right]$$

and again the only term surviving is $p_w\Pi_A'(1-F_T^R)>0$. So, the probability is increasing.

If, instead, the alliance is with $A$:

$$P(war)=F_A+(F_A(\Pi_A)-F_A)(1-f_T^A)$$

the derivative is:

$$F_A(1-\beta_A)(p_w'\Pi_A+p_w\Pi_A')f_T^A-f_T(p_w'\Pi_T+(p_w+\beta_T)\Pi_T'-\mu_R'p_w')(F_A(\Pi_A)-F_A)+$$

$$+F_A(1-\beta_A)(\Pi_A)\Pi_A'(1-f_T^A)$$

and if $v\to 0$ $F_A(\Pi_A)\to 0$. So, if $F_A(0)>0$ the negative term goes to zero and the expression is asymptotically equivalent to $f_A(p_w\Pi_A')f_T^A+f_A(\Pi_A)\Pi_A'(1-f_T^A)$, so it is positive. If instead $f_A\to 0$, we can use the fact that $F_A(\Pi_A)\sim f_A\Pi_A$ and $F_A\sim f_Ap_w\Pi_A$, and that $f_A(\Pi_A)\sim f_A(p_w\Pi_A)$ to rewrite it as:

$$f_A(1-\beta_A)\left[-(p_w'\Pi_T+p_w\Pi_T'-\mu_R'p_w')(1-p_w)\Pi_A+\Pi_P'(1-f_T^A)+(p_w'\Pi_A+p\Pi_A')f_T^A\right]$$

and now the only surviving terms are $\Pi_P'(1-\beta_A)(1-f_T^A)+p_w(1-\beta_A)\Pi_A'f_T^A>0$, so the probability of conflict is increasing. □

**Proposition B.1.** *If $\beta_T>0$, $\lim_{v\to\infty}\Pi_T'>0$ and $p_w$ is asymptotically equivalent to $v^{-a}$, for some $a>0$, then the $SI_T$ condition is satisfied.*

**Proof.** Call $\lim_{v\to\infty}\Pi_T'=\ell$, this implies that $\Pi_T$ is asymptotically equivalent to $\ell v$. Hence, $SI_T$ is equivalent to:

$$((p_w+\beta_T)\Pi_T)'>0\iff p_w'\Pi_T+(p_w+\beta_T)\Pi_T'>0$$

and for $v\to\infty$ the expression is asymptotically equivalent to $\ell(p_w'v+\beta_T)=\ell(v^{-a}+\beta_T)\to\ell\beta_T>0$. This means that for $v$ large enough $(p_w+\beta_T)\Pi_T$ is increasing. Moreover, it also implies that $(p_w+\beta_T)\Pi_T$ is asymptotically equivalent to $\ell\beta_Tv$, and so in particular diverges. The two last observations mean that the condition $SI_T$ is satisfied. □

### *B.2. Proof of Remark 2.1*

For small $v$, the result that the probability of conflict is increasing is independent of the strong interest condition.

For large $v$, instead, it is still possible that the probability of conflict is decreasing if $p_w\Pi_T$ is decreasing in $v$. To show this, we can replicate the first part of the proof of the Theorem, to find that for $v$ large enough the third party still chooses the alliance with the resource holder. Then, the probability of conflict is increasing for large $v$ if:

$$F_A(p_w'\Pi_A+p_w\Pi_A)(1-F_T^R)-f_T((1-\alpha)p_w'\Pi_T+((1-\alpha)p_w+\beta_T)\Pi_T'-\mu_R'p_w')F_A$$

If the strong interest condition fails, and in particular the derivative of $p_w \Pi_T$ is decreasing, then we have that the second term in the expression above is positive. The only way for the expression to be decreasing is if $F_A(p'_w \Pi_A + p_w \Pi_A) < 0$, that is possible only if $p'_w \Pi_A + p_w \Pi_A < 0$, that is $p_w \Pi_A$ is decreasing, and so the strong interest condition for the aggressor $SI_A$ is not satisfied. □

*B.3. Proofs of Section 3*

We calculate the equilibrium price, assuming all problems have an interior solution.

If there is no war, the FOC is:

$$\Omega_T \alpha (g_T)^{\alpha-1} = p \tag{6}$$

that is

$$p = \frac{\alpha\Omega}{g_T^{1-\alpha}} = \frac{\alpha\Omega}{(R_M + R_R)^{1-\alpha}} \tag{7}$$

where we already used the market clearing condition $g_T = R_R + R_M$. The equilibrium profits of the third party are as follows:

$$\pi_T = \Omega(R_M + R_R)^\alpha - \frac{\alpha\Omega}{(R_M + R_R)^{1-\alpha}}(R_M + R_R) = (1-\alpha)\Omega(R_M + R_R)^\alpha$$

If there is war instead, the FOC yields:

$$p(war) = \frac{\alpha\Omega}{g_T^{1-\alpha}} = \frac{\alpha\Omega}{(R_M + \eta R_R)^{1-\alpha}} \tag{8}$$

because now market clearing yields $R_M + \eta R_R = g_T$. The profit of the third party in this case is:

$$\pi_T(war) = (1-\alpha)\Omega(R_M + \eta R_R)^\alpha$$

Call $\Pi_A$ the profit of the aggressor when it seizes the resource. Since in this case war occurs for sure:

$$\Pi_A = \frac{\alpha\Omega}{(R_M + \eta R_R)^{1-\alpha}}\eta R_R$$

Instead, the payoff of having access to the resource for $T$ is:

$$\Pi_T = (1-\alpha)\Omega(R_M + R_R)^\alpha - (1-\alpha)\Omega(R_M + \eta R_R)^\alpha \quad \square$$

*Proof of Corollary 1*

RC is satisfied by the assumptions.

The derivatives are:

$$\Pi'_A = p\alpha\Omega\eta \frac{R_M + \alpha\eta R_R}{(R_M + \eta R_R)^{2-\alpha}}$$

$$\Pi'_T = (1-\alpha)\Omega\alpha\left((R_M + R_R)^{\alpha-1} - \eta(R_M + \eta R_R)^{\alpha-1}\right)$$

The first is obviously positive. To check the second, notice that is positive if and only if:

$$(R_M + R_R)^{\alpha-1} > \eta(R_M + \eta R_R)^{\alpha-1}$$

that is:

$$(R_M + \eta R_R)^{1-\alpha} > \eta(R_M + R_R)^{1-\alpha}$$

$$R_M + \eta R_R > \eta^{\frac{1}{1-\alpha}}(R_M + R_R)$$

$$R_M(1 - \eta^{\frac{1}{1-\alpha}}) + R_R\eta(1 - \eta^{\frac{1}{1-\alpha}-1}) > 0$$

and $\frac{1}{1-\alpha} - 1 > 0$ so $\eta^{\frac{1}{1-\alpha}-1} < 1$ and this inequality is true. This proves AI.

A sufficient condition for EE is that $\frac{\Pi'_A}{\Pi'_T}$ is decreasing. To prove this, the ratio of marginal payoffs is:

$$\frac{\Pi'_A}{\Pi'_T} = \frac{R_M + (\eta - 1 + \alpha)R_R}{(R_M + \eta R_R)^{2-\alpha}\left((R_M + R_R)^{\alpha-1} - \eta(R_M + \eta R_R)^{\alpha-1}\right)}$$

Taking the derivative, we find that it is decreasing if and only if:

$$(\alpha-1)R_M\left(R_M+\eta R_R\right)^{\alpha-3}\times$$
$$\left(\left(R_M+R_R\right)^{\alpha-2}\left((2\eta-1)R_M+\eta R_R(\alpha(\eta-1)+1)\right)-\eta^2\left(R_M+\eta R_R\right)^{\alpha-1}\right)<0$$

Manipulating this expression, we find that this is true if and only if

$$R_M>(1-\alpha)\frac{\eta}{1-\eta}R_R$$

Concerning the hypothesis of Theorem 2.1, we have to check the limit:

$$\lim_{R_R\to\infty}\frac{w_P^\gamma}{w_P^\gamma+(R_R+w_P)^\gamma}(1-\alpha)\Omega\left((R_M+R_R)^\alpha-(R_M+\eta R_R)^\alpha\right)$$

$$=\lim_{R_R\to\infty}\frac{w_P^\gamma}{w_P^\gamma+(R_R+w_P)^\gamma}(R_M+R_R)^\alpha(1-\alpha)\Omega\left(1-\left(\frac{R_M+\eta R_R}{R_M+R_R}\right)^\alpha\right)$$

and this goes to infinity if $\alpha>\gamma$. □

### B.4. Proofs of extensions in the appendix

*Proof of Proposition A.1*

$T$ prefers to intervene in favor of $R$ if:

$$\mu_R<\mu_A$$

$$\Pi_T-\mu_R-\varepsilon_T>\alpha\Pi_T$$

It prefers to intervene in favor of $R$ if:

$$\mu_R>\mu_A$$

$$\Pi_T-\mu_A-\varepsilon_T>\alpha\Pi_T$$

It prefers to stay out otherwise. In the first stage $A$ chooses to attack depending on the intervention choice and the values of $\varepsilon_A$, similarly as in the proof of Theorem 2.1.

So the intervention choice depends uniquely on the μs, and by *CW* it follows that intervention is in favor of $R$ if sufficiently high.

Hence, if $v$ is sufficiently small, and intervention is in favor of $A$ the probability of conflict is:

$$F_A(p_w\Pi_A(v))+F_T((1-\alpha)\Pi_T-\mu_A)(F_A(\Pi_A(v))-F_A(p_w\Pi_A(v)))$$

The derivative is:

$$f_A(p_w'\Pi_A+p_w\Pi_A')+f_T(-\eta'p'\Pi_T+(1-\eta)\Pi_T'-\mu_A'p_w')\Delta F_A+F_T(f_A\Pi_A'-f_A(p_w'\Pi_A+p_w\Pi_A'))$$

now proceeding as in the proof of 2.1 we see that if $v\to 0$ the only surviving term is $p_w\Pi_A'>0$, so the derivative is positive.

If for $v$ small intervention is in favor of $R$, the calculations are analogous to Section 2 and we again obtain that the probability is increasing.

If $v$ is sufficiently large the intervention is in favor of $R$. The probability of conflict is:

$$F_A(p_w\Pi_A)(1-F_T((1-\alpha)\Pi_T-\mu_R))$$

The derivative is:

$$f_A(p_w'\Pi_A+p_w\Pi_A')(1-F_T)-f_T(-\alpha'p_w'\Pi_T+(1-\alpha)\Pi_T'-\mu_R'p_w')F_A$$

Proceeding as in the previous proof, we have to study the sign of:

$$(1-\alpha)\Pi_T'-\alpha'p_w'\Pi_T-\mu_R'p_w'$$

a sufficient condition for this to be positive is:

$$\frac{\Pi_T'}{\Pi_T}>\frac{\alpha'p_w'}{1-\alpha}$$

If $\alpha'\leq 0$ for $v$ large this is true. If $\alpha'>0$ then for $v$ large we have $\frac{\alpha'p'}{1-\alpha}\sim\frac{p_w'}{p_w}\alpha'\frac{p_w}{1-\alpha}$. Now $\frac{p_w}{1-\alpha}$ converges to 0 if $1-\alpha(0)>0$. Otherwise, it converges to an indeterminate form $\frac{0}{0}$, so that by De l'Hôpital Theorem it is asymptotically equivalent to: $\frac{p_w'}{-\alpha'p_w'}=-\frac{1}{\alpha'}$. Hence the whole expression is asymptotically equivalent to:

$$\frac{\alpha' p'_w}{1-\alpha} \sim -\frac{p'_w}{p_w}\alpha' \frac{1}{\alpha'} = -\frac{p'_w}{p_w}$$

so that the condition is equivalent to:

$$\frac{\Pi'_T}{\Pi_T} > -\frac{p'_w}{p_w} \quad \square$$

*Proof of* Proposition A.2

The expected gain from a war for $A$ is $p_w \Pi_A (1 - F_T(p_w \Pi_T)) - \varepsilon_A$. Then there are also here three types of equilibria:

- If $p_w \Pi_A (1 - F_T((p_w)\Pi_T)) < \varepsilon_A$, $A$ never wants to attack and there is no war;
- If $p_w \Pi_A (1 - F_T((p_w)\Pi_T)) > \varepsilon_A$ then $A$ attacks and there is war. If in addition $(p_w)\Pi_T(v) > \varepsilon_T$ then there is intervention, otherwise there is no intervention.

The analysis of the alliances proceeds in a very similar way: for $v$ small enough $T$ is allied to $A$, for $v$ large enough is allied to $R$. If $v$ is small the analysis is identical to the theorem in the text.

If $v$ is large the probability of conflict is:

$$F_A((p_w \Pi_A - \mu_A)(1 - F_T(p_w \Pi_T - \mu_R)))$$

derivative of probability of conflict when $T$ allied with R (high $v$) is:

$$P' = f_A^R \left( -f_T^R((\beta_T + p_w)\Pi'_T + p'_w \Pi_T - \mu'_R p'_w)\Pi_A p_w + (1 - F_T^R)(\Pi'_A p_w + \Pi_A p'_w) \right)$$

Now $\mu'_R \to 0$, so this is the same as:

$$f_A^R \left( -f_T^R((\beta_T + p_w)\Pi'_T + p'_w \Pi_T)\Pi_A p_w + (1 - F_T^R)(\Pi'_A p_w + \Pi_A p'_w) \right) < 0$$

Now if $M < \infty$ everything remains finite apart from $1 - F_T^R$ and possibly $f_T^R$. IF $f_T^R(M) > 0$ we are done. If not, using the approximation $1 - F_T^R \sim f_T^R(M - (\beta + p_w)\Pi_T + \mu_R)$ (for $M > (\beta + p_w)\Pi_T - \mu_R$, zero otherwise), we find that the above is positive if and only if

$$-f_T^R((\beta_T + p_w)\Pi'_T + p'_w \Pi_T)\Pi_A p_w + f_T^R(M - (\beta + p_w)\Pi_T + \mu_R)(\Pi'_A p_w + \Pi_A p'_w) < 0$$

$$-((\beta_T + p_w)\Pi'_T + p'_w \Pi_T)\Pi_A p_w + (M - (\beta + p_w)\Pi_T + \mu_R)(\Pi'_A p_w + \Pi_A p'_w) < 0$$

and the second term goes to zero. Moreover, the first term is negative if either $\beta_T > 0$, or $SI_T$ holds. $\square$

## Data availability

No data was used for the research described in the article.

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