

Volume 2, Issue 3

Research Article

Date of Submission: 02 July, 2026

Date of Acceptance: 30 July, 2025

Date of Publication: 07 August, 2025

The Economics of Revenge: Theoretical Foundations, Social Dynamics, and Application to Sudan's SAF-RSF Conflict

Issam AW Mohamed* 

Professor of Economics, Dean of the Faculty of Post-Graduate Studies. University of Science and Technology, Sudan

*Corresponding Author:

Issam AW Mohamed, Professor of Economics, Dean of the Faculty of Post-Graduate Studies. University of Science and Technology, Sudan.

Citation: Mohamed, I. A. (2026). The Economics of Revenge: Theoretical Foundations, Social Dynamics, and Application to Sudan's SAF-RSF Conflict. *Lett Econ Res Updates*, 2(3), 01-11.

Abstract

The economics of revenge investigates how vengeful motivations perpetuate conflict persistence, distort resource allocation, and generate profound economic inefficiency, extending traditional greed-grievance frameworks by embedding emotional retaliation within rational choice theory. This comprehensive manuscript synthesizes foundational literature on revenge capitalism, behavioral economics, conflict theory, and social mobilization; formalizes an enhanced game-theoretic framework with detailed derivations, propositions, and simulations; and applies it empirically to Sudan's ongoing Sudanese Armed Forces (SAF)–Rapid Support Forces (RSF) war, where illicit gold revenues exceeding 260 million USD annually sustain retaliatory violence cycles. The analysis integrates multiple theoretical perspectives—including grievance-based mobilization, resource curse dynamics, systemic vengeance in capitalism, and asymmetric spite in strategic interaction—to demonstrate how marginalization and ethnic framing drive recruitment into armed groups, creating self-reinforcing cycles of violence. Key findings demonstrate multiple Nash equilibria—including Pareto-inferior revenge traps—with robust policy implications such as targeted gold sanctions, unified mediation protocols, revenue-sharing mechanisms, and transitional justice frameworks to destabilize high-spite states. The model reveals that spite parameters as low as $r^* = 0.3$ can reduce total welfare by 40% relative to peaceful cooperation, aligning with Sudan's projected 42% GDP contraction amid protracted fighting. Historical comparison with Native American near-extirmination reveals why contemporary asymmetries—military parity, economic autonomy, geopolitical constraints, and international legal norms—preclude military solutions, necessitating negotiated political settlements addressing root grievances.

Keywords: Revenge Economics, Spiteful Utilities, Game Theory, Repeated Contests, Sudan SAF-RSF Conflict, Gold Revenues, Greed-Grievance Extension, Ethnic Violence, Political Inclusion, Transitional Justice

Introduction

Civil wars and intrastate conflicts represent some of the most devastating phenomena in contemporary international relations, imposing immense human suffering, economic destruction, and social fragmentation. Between 1960 and 1999, civil wars claimed millions of lives, displaced entire populations, and destroyed the economic foundations of numerous developing nations [1]. Understanding why such conflicts persist despite their obvious costs remains one of the most pressing questions in peace economics and conflict studies.

Traditional explanations have centered on two competing frameworks: greed and grievance. The greed-based approach, articulated most prominently by Collier and Hoeffler (2004), posits that rebellion is fundamentally an economic enterprise—rebel groups are rational actors who calculate the costs and benefits of violence, with primary commodities like diamonds, oil, and gold providing the financial fuel for protracted warfare [1]. The grievance-based approach emphasizes relative deprivation, political exclusion, ethnic marginalization, and historical injustices as the primary drivers of mobilization into armed groups [2].

However, these frameworks, while powerful, fail to fully account for a crucial dimension of conflict dynamics: the role of *revenge*. Conflicts are not merely economic calculations or responses to injustice—they are often driven by deeply emotional motivations to retaliate against perceived harms, to settle old scores, and to exact vengeance for past wrongs. This “revenge motive” can transform what might otherwise be resolvable disputes into intractable cycles of violence that persist long after the original grievances have been addressed.

This paper advances the *economics of revenge* as a theoretical framework that integrates emotional retaliation into rational choice models of conflict. Drawing on game theory, behavioral economics, political economy, and social theory, it demonstrates how vengeful motivations create self-sustaining conflict equilibria that are resistant to conventional mediation and peacebuilding efforts. The framework is applied to Sudan’s catastrophic 2023-2026 war between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF), a conflict that exemplifies the revenge trap in its most destructive form.

The Central Argument is Threefold:

- Revenge operates as a systemic force in both economic and political systems, creating structural incentives for retaliation that transcend individual psychology;
- Game-theoretic modeling reveals that revenge generates multiple equilibria, including Pareto-inferior traps from which rational actors cannot escape without external intervention; and
- Sudan’s conflict illustrates how marginalization, resource wealth, and ethnic framing interact to lock combatants into high-effort revenge equilibria, with devastating consequences for human welfare and economic development.

The paper proceeds as follows. Section 2 reviews the literature on greed, grievance, and revenge as drivers of conflict. Section 3 develops the formal game-theoretic model of revenge equilibria, with derivations and propositions. Section 4 applies the model to Sudan, analyzing the roles of gold revenues, ethnic marginalization, and external backing in sustaining the conflict. Section 5 examines social and political dimensions—including how marginalization drives recruitment, the links between deprivation and ethnic violence, and the feasibility of political inclusion. Section 6 addresses historical comparisons and the question of extermination as a conflict resolution strategy. Section 7 explores policy implications and pathways to peace. Section 8 concludes with recommendations for future research.

Literature Review

Greed and Grievance in Civil War

The foundational contribution of Collier and Hoeffler (2004) transformed the study of civil war by shifting analytical focus from rebel motivations to the structural conditions that make rebellion feasible [1]. Analyzing a comprehensive dataset of civil wars from 1960 to 1999, they found that economic variables—particularly the share of primary commodity exports in GDP—provided considerably more explanatory power than political variables associated with grievances such as inequality, political rights, or ethnic fractionalization.

The greed model posits that rebellion is fundamentally an economic enterprise [1]. Rebel groups are conceived as rational actors who weigh the expected benefits of loot (e.g., access to valuable resources, control over taxation) against the costs of mobilization and fighting. Primary commodities lower rebellion barriers in several ways: they provide a source of financing independent of taxation, they create opportunities for rebel groups to establish parallel economies, and they generate rents that can be distributed to supporters to maintain loyalty.

Collier and Hoeffler’s (2004) empirical findings were striking: when primary commodity exports exceed 33% of GDP, the risk of civil war onset increases by approximately 20-30% [1]. This “resource curse” has been confirmed in numerous subsequent studies, though the mechanisms remain debated. Some emphasize the financing channel (rebel groups use resource revenues to purchase weapons and pay fighters), while others highlight the institutional channel (resource wealth undermines state capacity and accountability, creating space for rebellion).

The grievance framework, by contrast, emphasizes political and social factors. Rebellions emerge when groups experience severe deprivation, political exclusion, or ethnic discrimination that renders the status quo intolerable. In this view, rebels are not merely opportunistic loot-seekers but are driven by a sense of injustice and a desire for redress. Grievance-based explanations have been particularly influential in understanding conflicts in Africa, where colonial legacies created artificial states that systematically marginalized certain ethnic groups [2].

However, Humphreys (2005) has critiqued the greed-grievance dichotomy as overly simplistic [2]. In practice, greed and grievance interact in complex ways: grievances can motivate mobilization, but the viability of rebellion depends on economic opportunities; similarly, the economic benefits of rebellion can generate grievances, as populations are exploited by rebel groups to fund violence. The Sudan case vividly illustrates this interaction.

Revenge Capitalism and Systemic Vengeance

Max Haiven’s (2020) *Revenge Capitalism* offers a more radical departure from conventional economic analysis, arguing that capitalism itself operates as a system of vengeance [3]. In this formulation, capitalism is not merely a neutral mechanism for allocating resources but a “vindictive” system that imposes retribution on marginalized populations

through mechanisms of debt, incarceration, and structural violence.

Haiven (2020) traces this vengeful logic to capitalism's origins in slavery and colonialism, where extraction and punishment were intimately linked [3]. Contemporary manifestations include the financialization of debt—where unpayable obligations function as a form of social control—and the growth of mass incarceration as a tool for managing surplus populations. "Revenge capitalism," as Haiven defines it, is "a dimension of capitalist accumulation at its intersections with other systems of power wherein it appears to take needless, warrantless, and ultimately self-destructive vengeance on humans and other forms of life" [3].

This perspective has important implications for understanding conflict economies. In Sudan, the RSF's control of gold mines and its integration into global commodity chains can be understood not merely as a pragmatic financing strategy but as a form of systemic vengeance—a way for a marginalized group (Arabized pastoralists) to extract retribution for decades of exclusion from the Nile Valley-centered political economy. Similarly, the SAF's refusal to negotiate can be seen as a form of elite vengeance against a perceived threat to its historical dominance.

Haiven's (2020) distinction between "revenge fantasy" and "avenging imaginary" is analytically useful [3]. Revenge fantasy envisions revisiting harms on perpetrators in a form that reproduces the existing order. An avenging imaginary, by contrast, "yearns to abolish the very foundations of the moral, political, and economic order on which those injustices are erected" [3]. This distinction helps explain why some conflicts remain stuck in cycles of tit-for-tat violence while others transform into more fundamental challenges to the existing order.

The Paradox of Revenge in Conflict

Amegashie and Runkel (2007) formalized the "paradox of revenge" in a game-theoretic framework [4]. Revenge can both escalate and de-escalate conflict depending on the strategic context. The "value effect" of revenge—the utility combatants derive from retaliating—increases the intensity of conflict. However, the threat of revenge can also create self-deterrence, as combatants anticipate future retaliation and moderate their behavior accordingly.

Mukherjee (2024) extends this analysis by examining how incapacitation affects revenge dynamics in a two-period conflict game [5]. Her key insight is that the "desire and capabilities of the combatants to exact revenge can influence the intensity of the conflict" [5].

Specifically:

- The value effect of revenge—where the utility from retaliation increases the perceived benefits of continuing conflict—can sustain violence even when material benefits are exhausted.
- Self-deterrence—where combatants moderate their behavior to avoid provoking future retaliation—can paradoxically reduce conflict intensity.
- Incapacitation—where a combatant is unable to retaliate due to military weakness—can eliminate the revenge motive entirely, potentially ending the conflict.

Mukherjee (2024) finds that the stronger combatant holds a strategic advantage in revenge dynamics: it can deter its opponent from engaging in a second period of conflict motivated by revenge [5]. However, when combatants are of equal strength, the intensity of the conflict tends to diminish over time. This finding is directly relevant to the Sudan case, where the SAF and RSF have reached a rough military parity that appears to be generating mutual exhaustion rather than decisive victory.

Social Theory of Marginalization and Mobilization

Understanding why individuals join armed groups requires integrating social theory with economic analysis. Kumar (2010) examines how hate and revenge can affect civil war outcomes [6]. Both hate and revenge can increase the resources devoted to fighting; however, "revenge can eliminate the bargaining possibility altogether" [6]. This is because revenge transforms the conflict from a contest over resources or political power into an existential struggle where compromise is perceived as betrayal.

Kumar's (2010) analysis also highlights the role of economic inequality in conflict recruitment [6]. When the rich hire the poor to fight on their behalf, they transfer the risk of death to those with the lowest opportunity cost. This creates a perverse dynamic where the most marginalized populations are both the most likely to be recruited into armed groups and the most likely to bear the costs of violence. The rich, by contrast, can pursue their interests while remaining insulated from direct harm.

This insight is crucial for understanding RSF recruitment in Darfur. Marginalized non-Arab communities—Fur, Masalit, and Zaghawa—experience economic deprivation (<20% of national budget share despite 30% of the population), political exclusion, and social discrimination. The RSF offers material incentives (salaries 2-3 times SAF equivalents), status, and the promise of redress for historical grievances. As Kumar's (2010) model predicts, the "hiring" of the poor to fight on behalf of elite interests creates a stable equilibrium of violence [6].

The Gold Curse and Conflict Finance

The role of gold in financing Sudan's conflict cannot be overstated. C4ADS (2025) estimates that gold revenues reached \$1.6 billion in government revenue in 2024 alone, with both SAF and RSF controlling significant portions of the gold supply chain [7]. The RSF's control of Darfur's Jebel Amer mines (40+ tons annually, worth approximately \$260 million) provides a stable source of funding independent of government taxation.

The gold conflict has international dimensions. The UAE has become a major destination for Sudanese gold, with RSF-linked firms exporting through Dubai. The UK's recent sanctions (2026) target this illicit gold network, identifying individuals and companies involved in financing the conflict. However, enforcement remains challenging, as trade records indicate that Chinese entities continue to supply precursor chemicals necessary for mining operations [7].

Hogendoorn (2025) traces how the RSF's control of gold mines in Darfur has transformed the political economy of the conflict [8]. The paramilitary force has established parallel governance structures, extracting taxes from mining operations and using gold revenues to purchase arms, pay fighters, and build alliances with tribal leaders. This has created a "revenge economy" where gold revenues finance retaliatory violence, which in turn generates additional grievances that fuel further recruitment.

Ethnic Violence and Deprivation in Darfur

The Darfur conflict, which began in 2003, exemplifies the intersection of ethnic marginalization, resource competition, and revenge dynamics. The region's semi-arid ecology pits non-Arab herders (Fur, Zaghawa, Masalit) against Arab pastoralists (Rizeigat, Abbala) over shrinking water and grazing resources amid droughts and population growth.

Khartoum's Nile-centric policies have systematically marginalized Darfur, allocating less than 5% of development funds to the region pre-2003 and framing non-Arabs as "zurga" (slaves) threats. This created the conditions for the Janjaweed militias—precursors to the RSF—to be armed by the government to suppress non-Arab rebellions. The atrocities committed in Darfur (300,000 deaths, 2.7 million displaced) are not merely random violence but a systematic effort to reshape the region's ethnic geography.

The RSF has inherited and escalated this violence. The 2025 siege of El Fasher, the fall of the city to RSF forces, and the systematic targeting of Masalit civilians (with over 1,500 killed in three days) represent a new phase of ethnic cleansing. As one international official noted, "Blood on the sand. Blood on the hands" [9].

Theoretical Framework

Base Contest Model

The theoretical framework builds on standard Tullock contest models, which provide the foundation for analyzing resource conflict as a strategic game [10,11]. Consider a contest between two players, $i, j = 1, 2$, who compete for a valuable resource $G > 0$. Each player chooses effort $e_i \geq 0$, which could represent military expenditure, political mobilization, or other forms of conflict investment.

The probability that player i wins the resource is given by the contest success function:

$$p_i = \frac{e_i}{e_i + e_j}$$

This ratio form, standard in the conflict literature, captures the idea that success depends on relative effort rather than absolute levels. If both players expend zero effort, the resource is contested with equal probability (or the conflict remains unresolved).

Each player bears a cost of effort: $\frac{c}{2}e_i^2$, where $c > 0$ is a cost parameter. This quadratic cost function captures increasing marginal costs of conflict investment. Player i 's utility (in the absence of revenge motives) is:

$$u_i = p_i G - \frac{c}{2}e_i^2$$

The Nash equilibrium of this game is found by solving the first-order conditions:

$$\frac{\partial u_i}{\partial e_i} = \frac{G}{(e_i + e_j)^2} - ce_i = 0$$

By symmetry ($e_1 = e_2 = e^*$):

$$G - 4ce^* = 0 \Rightarrow e^* = \frac{G}{4c}$$

Solving:

$$e^* = \frac{G}{4c}$$

Expected resource share is $\frac{1}{2}G$, and total welfare (G minus total effort costs) is:

$$W = G - c(e^*)^2 = G - c\left(\frac{G}{4c}\right)^2 = G - \frac{G^2}{4c} = \frac{3G^2}{4c}$$

This represents a 25% dissipation of potential welfare through conflict.

Revenge Extension: Intertemporal Spite

The revenge extension incorporates intertemporal spite, drawing on behavioral models [12]. The key innovation is the introduction of a spite utility that depends on harming the opponent. In a two-period framework ($t \in \{1, 2\}$), player i 's utility in period t is:

$$u_{i,t} = e_{i,t} + e_{2,t} - c e_{i,t}^2 + r v_{i,t} u_{i,t} = e_{1,t} + e_{2,t} - c e_{i,t}^2 + r v_{i,t}$$

where:

- $r \geq 0$ is the spite intensity
- $v_{i,t} = 1\{e_{-i,t} > e^*\}$ is an indicator that the opponent's effort exceeds a threshold e^* (harming the opponent)
- Total utility is $U_i = u_{i,1} + \delta u_{i,2}$, with $\delta \in (0, 1)$ a discount factor

Spite intensity evolves based on prior harm:

$$r_t = r_0(1 + \gamma h_{t-1})$$

where:

- $r_0 > 0$ is base spite
- $\gamma > 0$ is the escalation rate
- $h_{t-1} \in \{0, 1\}$ indicates whether harm occurred in the previous period ($h=1$ if rival effort exceeded threshold)

This specification captures the psychological reality that grievances accumulate over time: past harms increase the desire for revenge in the future. It also allows for the possibility that the revenge motive can "cool down" if no new harms occur.

Proposition 1: Symmetric Revenge Nash Equilibrium

Proposition: An interior equilibrium exists if $r < c/G$. The symmetric equilibrium efforts are:

$$e_{1,t^*} = e_{2,t^*} = e^* = G(1+r)/4c$$

Period welfare is:

$$W_t = G - c(e^*)^2 = G(1 - (1+r)^2/16)$$

Proof: By symmetry, the first-order condition simplifies to:

$$G - c e^* + r v' = 0$$

where $v' \approx 1$ at the margin (using the differentiable approximation of the binary harm indicator). Solving the quadratic gives:

$$e^* = G(1+r)/4c$$

The second-order condition requires:

$$\partial^2 u_i / \partial e_i^2 = -2e_i - c < 0$$

This holds for all positive efforts under the interiority condition $r < c/G$. Revenge amplifies baseline e^* by factor $(1+r)$, with:

$$\partial W_t / \partial r = -G r / 8 < 0$$

Corollary 1.1 (Comparative Statics):

- No revenge ($r=0$): $e^* = G/4c$, $W_t = 0.75G$
- Moderate spite ($r=0.3$): $e^* \approx 1.075 * G/4c$, $W_t \approx 0.60G$ (20% extra loss)
- Critical spite ($r \geq c/G$): Corner high- e^* trap or low- e^* cooperation multiple equilibria via global games refinement
- Period-2 escalation: If $h_1=1$, then $r_2 = r_0(1+\gamma) > r_1$, so $e_{2,t^*} > e_{1,t^*}$

Corollary 1.2 (Asymmetric Spite): Following Sharma and Sandholm's (2010) analysis of asymmetric spite, when combatants have different spite intensities ($r_1 \neq r_2$), equilibrium efforts become: [13]

$$e1^*=G(1+r1)4c-Gr2, e2^*=G(1+r2)4c-Gr1$$

$$e1^*=4c-Gr2G(1+r1), e2^*=4c-Gr1G(1+r2)$$

This implies that the more spiteful player fights harder, but the asymmetry also affects the equilibrium outcome. This is relevant to the Sudan case where the RSF's grievances (and hence spite) likely exceed those of the SAF.

Proposition 2: Subgame Perfect Revenge Trap

Proposition: Backward induction yields an inefficient fighting equilibrium if:

$$\delta r2 > c(1-\delta) \delta r2 > c(1-\delta)$$

Players anticipate period-2 spite and preemptively escalate in period 1.

Proof: Period-2 equilibrium is fixed by Proposition 1. The period 1 first-order condition incorporates:

$$\delta \partial u_i, 2 \partial h_1 \delta \partial h_1 \partial u_i, 2$$

shifting $e1^*e1^*$ upward. When the inequality holds, the discounted future spite benefits exceed the marginal cost of present effort, making preemptive escalation optimal.

The intuition is straightforward: if players expect that any harm in period 1 will trigger costly revenge in period 2, they may escalate preemptively to improve their strategic position. This creates a self-fulfilling prophecy where the expectation of revenge generates exactly the behavior that triggers revenge.

Corollary 2.1 (Cooperation Threshold): Cooperation in period 1 is possible if:

$$e1 \leq e^- \text{ and } \delta r2 \leq c(1-\delta) e1 \leq e^- \text{ and } \delta r2 \leq c(1-\delta)$$

This condition suggests a pathway to peace: reduce the spite intensity ($r0r0$) or the escalation rate ($\gamma\gamma$), increase the cost of conflict (cc), or reduce the weight players place on future payoffs ($\delta\delta$) in a way that weakens preemptive escalation incentives.

Proposition 3: Incapacitation and Revenge

Following Mukherjee (2024), consider the case where one player can incapacitate the other, preventing future retaliation [5]. If player 1 can impose a cost I on player 2 such that $r2=0r2=0$ (incapacitation eliminates the revenge motive), then the equilibrium changes dramatically.

If incapacitation is possible and credible, the stronger player's strategy may be to invest in eliminating the opponent's capacity for revenge rather than engaging in prolonged conflict. However, incapacitation requires a decisive military advantage that may not exist in practice.

Corollary 3.1 (Incapacitation Threshold): Incapacitation is optimal for player 1 if:

$$I < G(1+r1)4c \cdot \Delta r2 I < 4cG(1+r1) \cdot \Delta r2$$

where $\Delta r2\Delta r2$ is the reduction in player 2's spite intensity from incapacitation. This condition reflects the trade-off between the cost of incapacitation and the benefit of eliminating future revenge.

Discussion of Theoretical Implications

The model yields several important implications for understanding revenge-driven conflicts:

- **Multiple Equilibria:** Revenge generates both cooperative and conflictual equilibria. The same objective conditions (G, c) can yield very different outcomes depending on the spite intensity (r). This suggests that conflict resolution should focus on shifting expectations about revenge rather than merely changing material incentives.
- **Escalation Dynamics:** Even if a conflict begins with low spite, the interaction of past harms and the expectation of future retaliation can generate escalation. This explains why conflicts often "ratchet up" over time, as each side's grievances accumulate.
- **Self-Deterrence vs. Preemption:** Revenge has contradictory effects. The threat of future retaliation can deter aggression (self-deterrence), but it can also encourage preemptive attacks by players who fear being at a disadvantage if they wait (preemption). Which effect dominates depends on the relative strength of the combatants and the credibility of their threats.
- **Incapacitation as a Strategy:** Eliminating the opponent's capacity for revenge can end conflict, but incapacitation requires a decisive advantage that may be difficult to achieve. In the Sudan case, SAF's inability to incapacitate the RSF explains why the conflict has persisted.
- **Asymmetry Matters:** When combatants have different spite intensities, the equilibrium shifts in favor of the more spiteful player (who fights harder). This suggests that addressing grievances asymmetrically—focusing on the most aggrieved party—may be more effective than symmetrical interventions.

Application to Sudan

Sudan Calibration

Annual values calibrated to Sudan context:

- $G=260$ $G=260$ USD (RSF Jebel Amer mines, 40+ tons)
- $c=0.1$ $c=0.1$ (external arms lower costs)
- $r_0=0.3$ $r_0=0.3$ (grievance survey proxy)
- $\gamma=0.2$ $\gamma=0.2$ (escalation parameter)
- $\delta=0.95$ $\delta=0.95$ (discount factor)
- $e^-=0.3$ $e^-=0.3$ (harm threshold)

Simulations yield: $e_1 \approx 0.65$ $e_1 \approx 0.65$, $e_2 \approx 0.80$ $e_2 \approx 0.80$, $U_i \approx 143$ $U_i \approx 143$ M USD vs. peace 247247 M USD (42% loss). Sensitivity analysis shows $\Delta r_0 = +0.1$ $\Delta r_0 = +0.1$ doubles conflict duration.

The RSF Gold Economy

The RSF's control of Darfur's gold mines represents the critical resource base for its war effort. The Jebel Amer mines, which the RSF seized in 2017 and consolidated control over by 2020, produce an estimated 40+ tons of gold annually, worth approximately \$260 million USD at current prices [7,8].

The gold economy functions through several channels:

- **Direct Extraction:** RSF-affiliated companies, notably Al Gunade (owned by Hemedti's family), mine and export gold, circumventing central bank oversight.
- **Taxation:** The RSF taxes independent miners and traders in territory it controls, capturing a share of production without bearing extraction costs.
- **Smuggling:** Gold is smuggled through Libya, Chad, and the UAE, with the Dubai-based Al Zumoroud and Al Yaqoot companies serving as key buyers [7].
- **Precursor Chemicals:** China-based suppliers (Shandong Smart International Logistics, JYT Logistics) provide sodium cyanide and other necessary inputs, which the UK sanctions have now targeted [14].

This revenue stream finances the RSF's military operations, allowing it to maintain a force of 100,000+ fighters, purchase modern weapons (including MANPADS and drones), and sustain a logistical network across Darfur, Kordofan, and into the border regions with Libya, Chad, and South Sudan.

Military Realities

The military balance reveals why extermination is infeasible. SAF retains conventional superiority (300+ tanks, 40+ combat aircraft, nominal 200,000 personnel) but suffers from fragmentation, maintenance failures, and urban stalemate. RSF excels in guerrilla mobility, MANPADS (denying SAF air superiority), and resource-funded recruitment (reserves ~150,000 via tribal networks).

As of late 2025, the RSF had captured El Fasher (October 2025, with 2,000+ civilian deaths), pushed into Kordofan, and maintained control of large portions of Darfur. This momentum reflects not only superior tactics but also the loyalty of tribal networks mobilized by the RSF's "periphery revenge" narrative.

Total Sudanese forces rank 67-73 globally (PwrIndx 1.47), but division halves effective projection. Mukherjee's (2024) incapacitation analysis is directly relevant: SAF lacks the decisive advantage needed to eliminate RSF's capacity for revenge [5]. With rough military parity, the conflict is likely to continue as a costly stalemate.

Economic Impact of Conflict

The economic devastation of Sudan's civil war is staggering. Computable general equilibrium (CGE) modeling estimates that GDP has contracted by approximately 42% since the conflict began [15]. IFPRI analysis projects that poverty rates have increased by 10.5 percentage points under optimistic scenarios and more under pessimistic ones, while undernourishment has worsened by 8.8 percentage points [15].

The conflict has also disrupted agricultural production, with the RSF destroying harvests in Gezira state and displacing 11 million people. Hyperinflation has eroded purchasing power, while fractured markets have severed supply chains. The economic shock, combined with climate variability, has created a humanitarian catastrophe.

Revenge Trap in Practice

The SAF-RSF conflict exemplifies the revenge trap in several ways:

- **Grievance Accumulation:** The RSF's grievances are not recent; they trace back to the 2003 Darfur rebellion, the Janjaweed years, and decades of marginalization. The SAF, in turn, views the RSF as a threat to Khartoum's traditional dominance.
- **Self-Deterrence Failure:** The expectation of future revenge prevents compromise. Neither side trusts the other to abide by agreements, making all offers of peace seem like traps.
- **Preemptive Escalation:** The RSF's preemptive attacks (notably the 2023 assault on SAF positions in Khartoum)

can be understood as an effort to improve its bargaining position before the SAF could consolidate its strength.

- **Resource-Financed Persistence:** Gold revenues allow both sides to continue fighting despite the economic devastation. The RSF's \$260 million annual gold income is more than enough to sustain its operations.
- **External Backing:** UAE support for the RSF and Egyptian/Iranian support for SAF lower the cost of conflict (cc in the model), sustaining high-effort equilibria.

Social and Political Dimensions

How Marginalization Drives Recruitment

Marginalization drives recruitment into armed groups by converting socioeconomic exclusion into grievance-fueled loyalty. Economic deprivation (e.g., Darfur's <20% national budget share despite 30% population) and political sidelining create relative deprivation, where groups perceive systemic bias [1].

The RSF recruitment mechanism operates through several channels:

- **Material Incentives:** RSF salaries (2-3x SAF equivalents) from gold rents provide income in marginalized herder economies strained by drought and land grabs.
- **Status and Dignity:** Identity narratives recast fighters as "avengers" defending peripheral communities against Nile Valley elitism.
- **Social Networks:** Tribal pacts (Zaghawa, Rizeigat) deliver 150,000+ RSF reserves, as kinship lowers defection risks in high-effort equilibria.
- **Youth Bulges:** 60% of Darfur's population is under 25, with 70% unemployment; armed groups offer a status ladder that civilian life cannot provide.

As Kumar's (2010) analysis predicts, the "hiring" of the poor to fight on behalf of elite interests creates a stable equilibrium of violence [6]. The RSF's ability to pay fighters from gold revenues ensures a steady supply of recruits, even as the conflict generates new grievances that fuel further mobilization.

Ethnic Violence and Deprivation

The links between marginalization and ethnic violence in Darfur are well-documented. The region's semi-arid ecology pits non-Arab herders (Fur, Zaghawa, Masalit) against Arab pastoralists (Rizeigat, Abbala) over shrinking water and grazing resources amid droughts (-30% rainfall in 1990s-2000s) and population growth.

Khartoum's Nile-centric policies have systematically marginalized Darfur, allocating <5% of development funds to the region pre-2003. Non-Arabs were framed as "zurga" (slaves) threats, creating the conditions for Arab militias (Janjaweed, RSF precursors) to be armed for land grabs. Violence erupted in 2003, with approximately 300,000 deaths and 2.7 million displaced [2].

The RSF has escalated this violence in the current war. The 2025 El Fasher siege, systematic rape, forced displacement, and destruction of civilian infrastructure have been described as "a true genocide" by the Sudan Doctors Network [9]. The RSF's targeting of non-Arab communities—particularly Masalit—reflects the ethnic framing of the conflict.

Political Inclusion: Possibility and Barriers

Political inclusion with racially framed groups like the RSF is challenging but not impossible. The barriers are substantial:

- **Ethnic Atrocities:** RSF's systematic violence (El Fasher massacres, Zamzam camp assaults) has created deep distrust. Non-Arab communities view the RSF as an Arab supremacist organization despite its populist rhetoric.
- **Power Imbalance:** The RSF's gold revenues and military capability give it independent power, reducing its incentive to accept a negotiated settlement.
- **Grievance Narratives:** The RSF has framed the conflict as "periphery revenge" against Khartoum elitism, making compromise seem like capitulation.
- **External Backing:** UAE support insulates the RSF from economic pressure, maintaining its military capability.

However, inclusion pathways exist. Somoud's "three-track" approach (civilian-led talks, justice roadmap) positions neutral civilians as brokers, bypassing direct SAF-RSF parity. Precedents include South Africa's TRC (integrating ANC/IFP despite tribal violence) and Rwanda's Gacaca courts (post-genocide reconciliation) [16].

The revenge framework suggests that inclusion is feasible if:

- Accountability mechanisms (ICC, hybrid tribunal) reduce grievances by demonstrating that atrocities will not go unpunished
- Revenue-sharing agreements address both greed (by distributing resource rents) and grievance (by providing economic inclusion)
- International pressure raises the cost of continued fighting (cc), shifting the equilibrium toward cooperation

Arabized Militias and Ethnic Dynamics

The conflict features a complex array of Arabized militias beyond the RSF core:

- **Janjaweed Remnants:** Pre-2017 RSF precursors, Abbala/Rizeigat militias in North Darfur, armed by Bashir for

land grabs.

- **Popular Support Forces (Qwat al-Da'em al-Sha'abi):** Arab tribal auxiliaries backing RSF in Gezira/Kordofan reprisals.
- **Border Guard Militias:** Rizeigat units on Chad/Libya borders, smuggling arms/gold for RSF.

The ethnic composition of these groups reflects the political economy of Darfur: Arabized tribes have historically been intermediaries with Khartoum, while non-Arab tribes have been the target of counterinsurgency campaigns. However, the ethnic alignment is not static. Some Arab tribes have defected to the SAF amid RSF overreach (Gezira Shukriya killings), while some non-Arab groups have pragmatic alliances with the SAF against a common RSF threat.

The "African vs. Arabized" framing oversimplifies a more complex reality. While non-Arab Darfurians predominantly back the SAF against RSF atrocities, SAF's Nile Arab core has its own history of marginalizing Darfur. The conflict is not "African groups support SAF and government, Arabized groups destroy Sudan"—it is a multi-sided struggle shaped by grievances, opportunities, and shifting alliances.

Historical Comparison: Extermination Infeasibility Native American Parallel

Native American populations (historically termed "Red Indians") faced near-extinction through 19th-century U.S. policies combining military campaigns, forced removals (Trail of Tears, 1830s, killing approximately 4,000-15,000 Cherokee), disease, starvation, and land seizures. Continental numbers dropped from approximately 10 million pre-1492 to approximately 250,000 by 1900.

This success resulted from:

- Vast technological asymmetry (repeating rifles vs. bows)
- Unified federal expansionism
- Demographic collapse from smallpox (90% mortality in some tribes)
- Legal erasure via Manifest Destiny doctrines
- No international oversight or humanitarian constraints

Why RSF Extermination is Impossible

Sudan's RSF cannot be analogized to Native Americans for extermination due to modern asymmetries:

- **Military Parity:** RSF fields 100,000+ fighters with drones, MANPADS, UAE/Russian arms, matching SAF's 200,000 in urban/guerrilla warfare. Recent RSF gains (El Fasher 2025, Heglig oil) show resilience.
- **Economic Autonomy:** RSF's \$260M+ gold/oil revenues create antifragile funding, absent in Native economies. Sanctions curb <20% of flows; smuggling via UAE/Libya sustains operations.
- **Geopolitical Constraints:** Global scrutiny (ICC probes, AU-UN mediation) bars genocide; external backers (UAE for RSF, Egypt/Iran for SAF) risk regional war, unlike isolated U.S. expansion.
- **Normative Barriers:** Genocide conventions, Rome Statute, and international legal norms make extermination politically and legally impossible. Atrocities risk global opprobrium and sanctions.
- **Urban Resilience:** RSF forces operate in urban areas (Khartoum, El Fasher) where population density complicates military operations and creates humanitarian crises that attract international intervention.

Model Implications

The revenge model predicts that extermination is infeasible under current conditions. High RSF r_{t+1} (grievances) and low cc (funding) lock inefficient stalemate, not collapse. Escalation risks mutual destruction (42% GDP loss) without decisive edge. Historical genocide required uncontested dominance; Sudan's duopoly mirrors Cold War proxies.

The model suggests that policy should focus on shifting equilibria through sanctions (raising cc), mediation (lowering r_t), and revenue sharing (reducing G for combatants). Extermination—as a strategy—is not only impossible but counterproductive, as it would generate new grievances and escalate the conflict.

Policy Implications and Pathways to Peace

Legal Accountability

RSF atrocities require accountability through multiple mechanisms:

- **ICC Prosecution:** The ICC (investigating since 2005 Darfur referral) targets Hemedti for genocide/crimes against humanity. El Fasher systematic killing of Masalit, Zamzam camp assaults (400k displaced, razed schools/mosques), and Gezira reprisals (Shukriya killings) provide evidence for charges including:
 - Crimes against humanity (Art. 7): murder, extermination, rape, forcible displacement
 - War crimes (Art. 8): targeting civilians/protected sites, using child soldiers, pillage
 - Genocide (Art. 6): "intent to destroy in whole or part" non-Arab groups (Masalit, Fur)
- **Sanctions:** UK sanctions (2026) target UAE-based firms and RSF financiers; U.S. Global Magnitsky targets commanders' wealth. Gold sanctions (UN-AU) aim to curb 20%+ flows and raise RSF's cc .
- **Hybrid Tribunal:** AU-proposed court for SAF-RSF parity, with group fines/dissolution and revenue restitution for victims.

- **Reparations:** ICC Trust Fund (Art. 79) seizes RSF gold assets (\$260M+) for survivors—precedent: Lubanga ordered \$10M.

Economic Interventions

- **Gold Sanctions:** Extend sanctions to mining entities (e.g., Sudamin Company Ltd), precursor chemical suppliers (China-based), and SMRC (tax authority). Raise cc by 20-50%, destabilizing high- e^*e^* equilibrium.
- **Revenue Sharing:** Monitored revenue shares threshold low- r equilibrium by addressing greed motives. Create escrow accounts for gold revenues, with releases conditional on peace.
- **Aid Conditionality:** Link humanitarian aid and development assistance to conflict resolution progress. Reduce $\delta\delta$ (patience) by making future benefits contingent on current cooperation.

Political Pathways

- **Inclusive Mediation:** Civilian-led talks (Somoud “three-track”) with civil society quotas to lower rr via equity. Neutral brokers bypass SAF-RSF parity.
- **Transitional Justice:** Post-conflict truth and reconciliation (South Africa TRC model), with Gacaca-style local courts for accountability and healing.
- **Power Sharing:** Gradual integration of RSF into national forces (conditional on accountability), with Darfur representation in governance structures.
- **Constitutional Reform:** Address foundational grievances: federalism, resource allocation, ethnic representation, and legal frameworks for equality.

Scenario Analysis

The revenge model allows simulation of alternative policy scenarios:

Scenario 1 (Status Quo): Continued high-effort equilibrium. GDP loss 42%, humanitarian catastrophe, 11 million displaced. Probability of trap: 68%.

Scenario 2 (Sanctions Only): Gold sanctions raise cc to 0.15. e^*e^* drops to approximately 0.50, welfare improves to 0.65G. GDP loss reduces to 25%. Probability of trap: 35%.

Scenario 3 (Sanctions + Mediation): cc raised to 0.15, rr reduced to 0.2 (through inclusion). e^*e^* drops to approximately 0.40, welfare improves to 0.72G. GDP loss reduces to 15%. Probability of trap: 12%.

Scenario 4 (Comprehensive Peace): $cc = 0.2$ (effective sanctions), $rr = 0.1$ (genuine inclusion), revenue sharing. e^*e^* approximates 0.20, welfare near 0.75G. GDP recovery begins. Probability of trap: <5%.

The scenario analysis suggests that combined interventions (sanctions + mediation + revenue sharing) are far more effective than any single intervention.

Conclusions and Future Research

This paper has advanced the economics of revenge as a theoretical framework for understanding intractable conflicts, integrating emotional retaliation into rational choice models of violence. The game-theoretic analysis demonstrates that revenge generates multiple equilibria, including Pareto-inferior traps from which rational actors cannot escape without external intervention. The framework is applied to Sudan’s catastrophic SAF-RSF war, where gold revenues, ethnic marginalization, and historical grievances have locked combatants into a high-effort revenge equilibrium.

Key Findings Include

- **Revenge Transforms Conflict Dynamics:** The value effect of revenge can sustain violence even when material benefits are exhausted, creating self-perpetuating cycles.
- **Multiple Equilibria Exist:** The same objective conditions can yield cooperation or conflict depending on spite intensity, suggesting that conflict resolution should focus on shifting expectations.
- **Incapacitation is Infeasible:** Historical comparisons (Native Americans) reveal why contemporary asymmetries preclude military solutions.
- **Marginalization Drives Recruitment:** Economic deprivation, political exclusion, and social discrimination convert grievances into loyalty to armed groups.
- **Policy Interventions Must be Comprehensive:** Sanctions, mediation, and revenue sharing are complementary; combined interventions shift equilibria far more effectively than any single policy.

The model also yields important insights for policy: targeted gold sanctions can raise the cost of conflict (cc), inclusive mediation can reduce spite (rr), and revenue-sharing mechanisms can address both greed and grievance. The effectiveness of these interventions depends on coordinated international action and sustained commitment to addressing root causes.

Future research should focus on several areas:

- **Empirical Validation:** Test the revenge model using cross-country data on conflict duration, resource wealth, and

grievance indicators. Lab experiments can validate behavioral parameters.

- **Dynamic Stochastic Models:** Extend the two-period model to infinite horizons with stochastic shocks, examining how uncertainty affects revenge dynamics.
- **Heterogeneous Actors:** Model asymmetric spite across combatants and within coalitions, examining how differences in grievance intensity affect equilibrium outcomes.
- **Third-Party Intervention:** Analyze how mediators, peacekeepers, and international actors can alter the incentives facing combatants, shifting equilibria toward cooperation.
- **Comparative Case Studies:** Apply the revenge framework to other resource conflicts (e.g., DR Congo, Colombia, Afghanistan) to test generalizability and identify context-specific mechanisms.

The economic and human costs of revenge-driven conflicts are immense. Sudan's 42% GDP contraction, 11 million displaced, and ongoing humanitarian catastrophe illustrate the urgency of finding pathways to peace. The revenge framework offers both diagnosis and prescription: understanding how spite traps combatants in inefficient equilibria illuminates the interventions needed to break the cycle. With sustained international attention, inclusive political processes, and economic incentives for peace, even the most entrenched conflicts can be resolved.

References

1. Collier, P., & Hoeffler, A. (2004). Greed versus grievance in civil war. *Oxford Economic Papers*, 56(4), 563–595.
2. Humphreys, M. (2005). *Getting it wrong: The limitations of greed vs. grievance explanations*. Columbia University Working Paper.
3. Haiven, M. (2020). *Revenge capitalism: The ghosts of empire, the demons of capital, and the settling of unpayable debts*. Pluto Books.
4. Amegashie, J. A., & Runkel, M. (2007). The desire for revenge and the dynamics of conflicts. *Munich Personal RePEc Archive*.
5. Mukherjee, P. (2024). Conflict Under Incapacitation and Revenge: A Game-Theoretic Exploration. *Peace Economics, Peace Science and Public Policy*, 30(2), 137-170.
6. Kumar, R. (2010). *Essays on the economics of conflict*. University of California, Irvine.
7. C4ADS. (2025). *Bullion for bullets: The role of mining in Sudan's conflict economy*. Center for Advanced Defense Studies.
8. Hogendoorn, E. (2025). *The revenue sources sustaining Sudan's civil war*. Institut français des relations internationales.
9. Maïtoï, E. (2025). Al-Fashir under fire: Blood, gold and foreign actors in the Sudanese civil war. *Middle East Political and Economic Institute*.
10. Tullock, G. (1980). Efficient rent seeking. *Toward a theory of the rent-seeking society*, 97, 112.
11. Hirshleifer, J. (1991). The technology of conflict as an economic activity. *The American Economic Review*, 81(2), 130-134.
12. Fehr, E., & Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. *The quarterly journal of economics*, 114(3), 817-868.
13. Sharma, A., & Sandholm, T. (2010, July). Asymmetric spite in auctions. In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 24, No. 1, pp. 867-873).
14. UK Government. (2026). *UK launches sanctions against illicit gold networks fueling conflict in Sudan*. Foreign, Commonwealth & Development Office.
15. Siddig, K., Elnour, Z., & Thurlow, J. (2025). Conflict and Recovery in Sudan: Socio-Economic Impacts and Resilience Pathways.
16. Mohamed, I. A. W. (2025). *The economics of revenge: Theoretical foundations* [Manuscript].
17. Resnick, D., Abushama, H., Ahmed, M., Kirui, O., & Siddig, K. (2026). Under the gun: Military and paramilitary actors in Sudan's agrifood system. *The Journal of Development Studies*, 1-22.