Peace in the Face of Uncertainty: Conflict Negotiation with Stochastic Armaments

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Overview

Motivation

- Resolving wars in a way that ensures long-term peace is a matter of humanitarian and economic importance.
- Conflict often features sources of uncertainty - especially in the developing world.
- When can peace be guaranteed despite uncertainty?
- How uncertainty impacts the effectiveness of peace negotiations and the fairness of proposals during peace talks?

Key Findings

- Parsimonious one-shot model demonstrates how uncertain arms impact the effectiveness of negotiated outcomes in ensuring peace
- Uncertainty can deter agents from choosing a negotiated outcome which guarantees peace.
- Uncertainty removes incentive make fair offers during peace talks and leads to complete extraction of resources which is occasionally disrupted by rebellion

Literature

Existing Literature

1. **Theories of civil conflict and political violence**: Besley & Persson (2011); Acemoglu & Robinson (2000); Fearon (2008); Caselli & Coleman (2013); and Rohner et al. (2013)
2. **Conflict under uncertainty**: Myerson & Wärneryd (2006) & Lim & Matros (2009) (uncertain number of competitors); Wasser (2013) (uncertain cost)
3. **Stochastically micro-founding contest success functions:** Garfinkel & Skaperdas (2007); Jia (2008)

Model

Set-Up

- Two groups: the **government** and the **rebels** indexed by G, R;
- Resources for consumption are exogenous- we normalise value to 1;
- **Government controls resources and needs to decide how to share them with rebels under the threat of war**;
- Each group has an **exogenous level** of arms- **rebel group's arms is subject to a shock** ϵ_R.
- Many reasons for why uncertainty might occur: variable resolution of the collective action problem, rough terrain, or covert interventions from neighbouring states.

Timing

1. The government proposes a split $(\beta, 1-\beta)\beta \in [0,1]$;
2. The shock ϵ_R to rebel's arms is realised;
3. Each group decides to either accept the proposed split or reject it and enter into conflict:
    - If both groups accept, then they receive their respective shares of resources;
    - If either (or both) reject, then the country descends into war, and the winner takes all of the state resources.[1]

War is destructive: Some resources are destroyed during the conflict by an exogenous factor of $\alpha \in [0,1]$.

[1] This is equivalent to letting the winner choose a new β.

Mechanism for war

- **Arms** for each group are denoted y_R and y_G;
- The rebel group experiences an **additive shock** $\epsilon_R \sim \mathcal{U}(a, -a)$ so that realised capacity is $y_2 + \epsilon_R$;[2] - use a to parameterise uncertainty
- The **probability of winning** governed by the logit-specification of the Tullock contest success function:

$$p_G = \frac{\exp y_G}{\exp y_G + \exp(y_R + \epsilon_R)} \qquad p_R = \frac{\exp(y_R + \epsilon_R)}{\exp y_G + \exp(y_R + \epsilon_R)}$$

[2] In the paper: generalise to any shock with bounded support.

Results

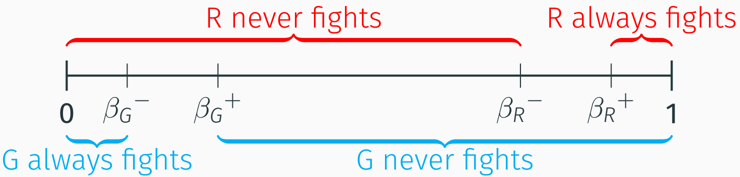
Peace-Guaranteeing Solutions

- Fighting decision depends whether the realisation of ϵ_R is above/below a certain **threshold**.
- Focus on finding the set of **peace-guaranteeing resource splits**: both groups **never fight**, regardless of the **shock realisation**;
- **Threat of war is often as destructive as war itself- guaranteed peace is valuable**.

Values of β for which fighting outcomes are certain

Proposition 1

Let $y_G - y_R$ and $\mathbf{a}$ be fixed. For each group there exists values of β such that the decision to accept/reject β is certain, regardless of the realisation of the shock ϵ_R.



Remark

If $\beta_R^- \geq \beta_G^+$: there is an interval of β which guarantees peace

What happens to peace-guaranteeing solutions as uncertainty increases?

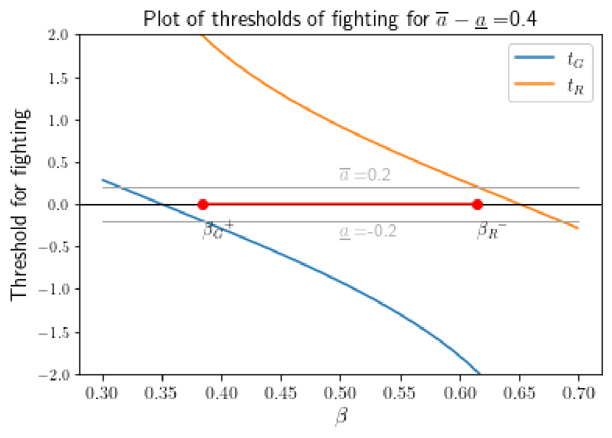


Figure 1: The interval of peace-guaranteeing solutions is large when uncertainty is low

What happens to peace-guaranteeing solutions as uncertainty increases?

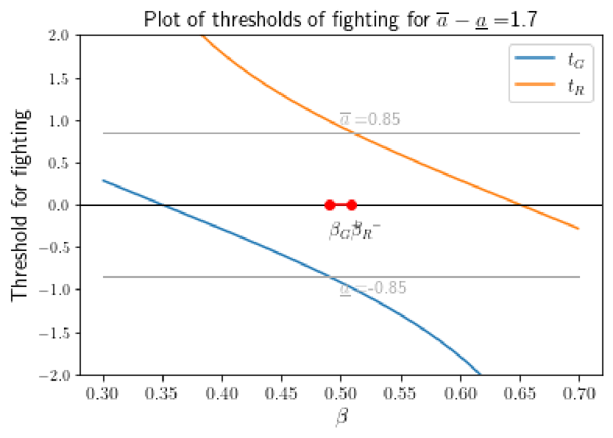


Figure 2: With moderate uncertainty, the set of peace-guaranteeing solutions begins to shrink

What happens to peace-guaranteeing solutions as uncertainty increases?

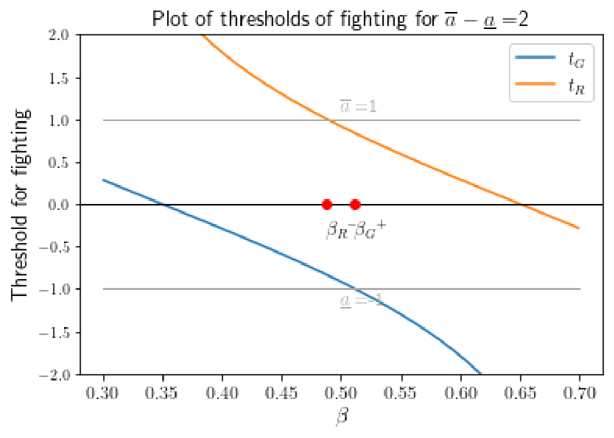


Figure 3: With high uncertainty, the interval of peace-guaranteeing solutions disappears

Large uncertainty makes guaranteed peace impossible

Theorem 1

Let y_G, y_R, and α be fixed. If $\alpha > \frac{1}{2}$ then there exists a critical value of a, a_{crit}, above which there exist no values of β that can guarantee peace. If $\alpha < \frac{1}{2}$ then a peace-guaranteeing choice for β always exists.

Essentially: the rebels and the government both want too many resources in order to promise to never fight

Comparative statics

Corollary 1

There is a closed-form solution for a_{crit}. Moreover, this a_{crit} is:

- *Decreasing in α: making war less destructive makes fighting harder to prevent; and*
- *Increasing at $|y_G - y_R|$: minimized when both parties have equal arms.*

Less destructive conflict and equally matched arms allow for less uncertainty when we want to guarantee peace.

Solving for the government's choice of β when $a \leq a_{crit}$

- Now want to solve for the government's optimal choice of β
- If guaranteeing peace is possible: will the government choose peace? Will they ever choose war with certainty?

Existence and Uniqueness of Equilibria

Theorem 2

If $a < \exp(y_G) - \exp(y_R)$ then the equilibrium value for β^* is unique for every value of a. Otherwise, the equilibrium is unique for all values of a except possibly at a single point, where the government is indifferent between an interior value of β that risks war and the value that ensures peace.

Sometimes there is a strange jump-discontinuity in values of β^*, although this generically this doesn't occur.

Uncertainty Causes the Government to Abandon Gauranteed Peace

Theorem 3

The government switches from guaranteeing peace to risking war as a increases. In particular, for small a : $\beta^* = {\beta_R}^-$; *and for large a:* $\beta^* \in \left({\beta_R}^-, {\beta_R}^+\right)$.

- Low uncertainty: guaranteeing peace is not too painful for the government: avoids destruction of resources and allocates surplus to themselves
- High uncertainty: guaranteeing peace is costly and not worth the additional surplus.

Non-Monotonicity in Uncertainty

Theorem 4

The government's choice of β^* demonstrates a non-monotonicity in a. In particular, when a is sufficiently small so that $\beta^* = {\beta_R}^-$ then β^* is decreasing in a. When a is large enough so that $\beta^* \in \left({\beta_R}^-, {\beta_R}^+\right)$ is increasing in a.

- When guaranteeing peace: need to give rebels an increasingly large share of resources in the event they receive a large positive shock
- When not guaranteeing peace: government may as well take as much as they can without risking certain war.

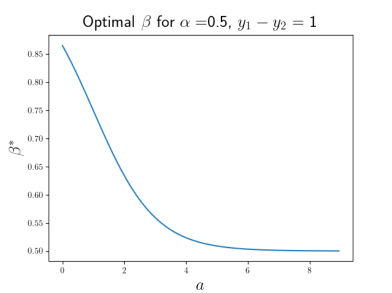
Inequality Precipitates Conflict

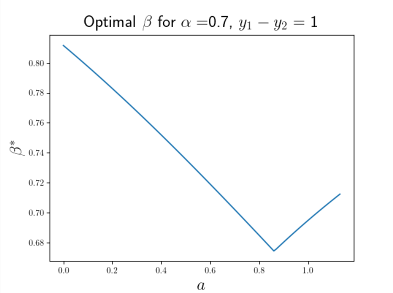
Corollary 2

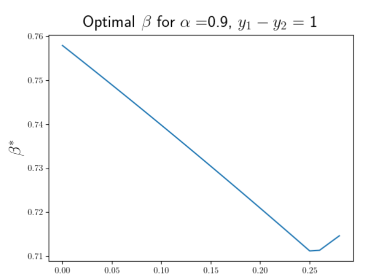
When a is sufficiently large that peace cannot be guaranteed the government will allocate an increasingly large share of resources to themselves. Fighting will only occur when the rebels receive sufficiently large positive shocks.

Result hinges on fact that when your opponent's arms are highly uncertain you have no incentive to placate them by offering a desirable split.

Government switches regime as a and α increase







Solving for β^* when $a > a_{crit}$

Theorem 5

When a sufficiently large that peace cannot be guaranteed, the optimal value for β occurs in $\left(\beta_R^-, \beta_R^+\right)$. Moreover β^*, and so the inequality of the proposed splits, increases as a increases.

Conclusion

Conclusion

- If uncertainty is too large peace can never be guaranteed;
- Increasing uncertainty causes a change in strategy: proposed splits switch from guaranteeing peace to risking war
- Moreover, we find a non-monotonicity in proposed splits:
    - Uncertainty low: increasing uncertainty decreases unfairness of splits
    - Uncertainty high: increasing uncertainty increases unfairness of splits

Thank you for listening!

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Appendix

Choice of conflict intensity is independent of β

Proposition 2

Suppose that each group is able to choose their conflict effort (y_1, y_2) is allowed to vary, incurring cost of conflict $c(y)$ in the process. Suppose that we constrain the choice of (y_1, y_2) so that conflict is not a certainty:

- $-\infty < l_{\beta_1} + (y_1 - y_2) \leq a$ *(so that group 1 does not always fight); and*
- $\infty > -l_{\beta_2} + (y_1 - y_2) \geq -a$ *(so that group 2 does not always fight),*

then each group's choice of conflict effort is independent of the split of resources, β and only depends on a.

The linearity of the thresholds on fighting decouples the decisions: FOCs y_1 and y_2 are functions of a only.