Fear, Risk, Conflict Escalation, and Conciliation
Departures from Expected

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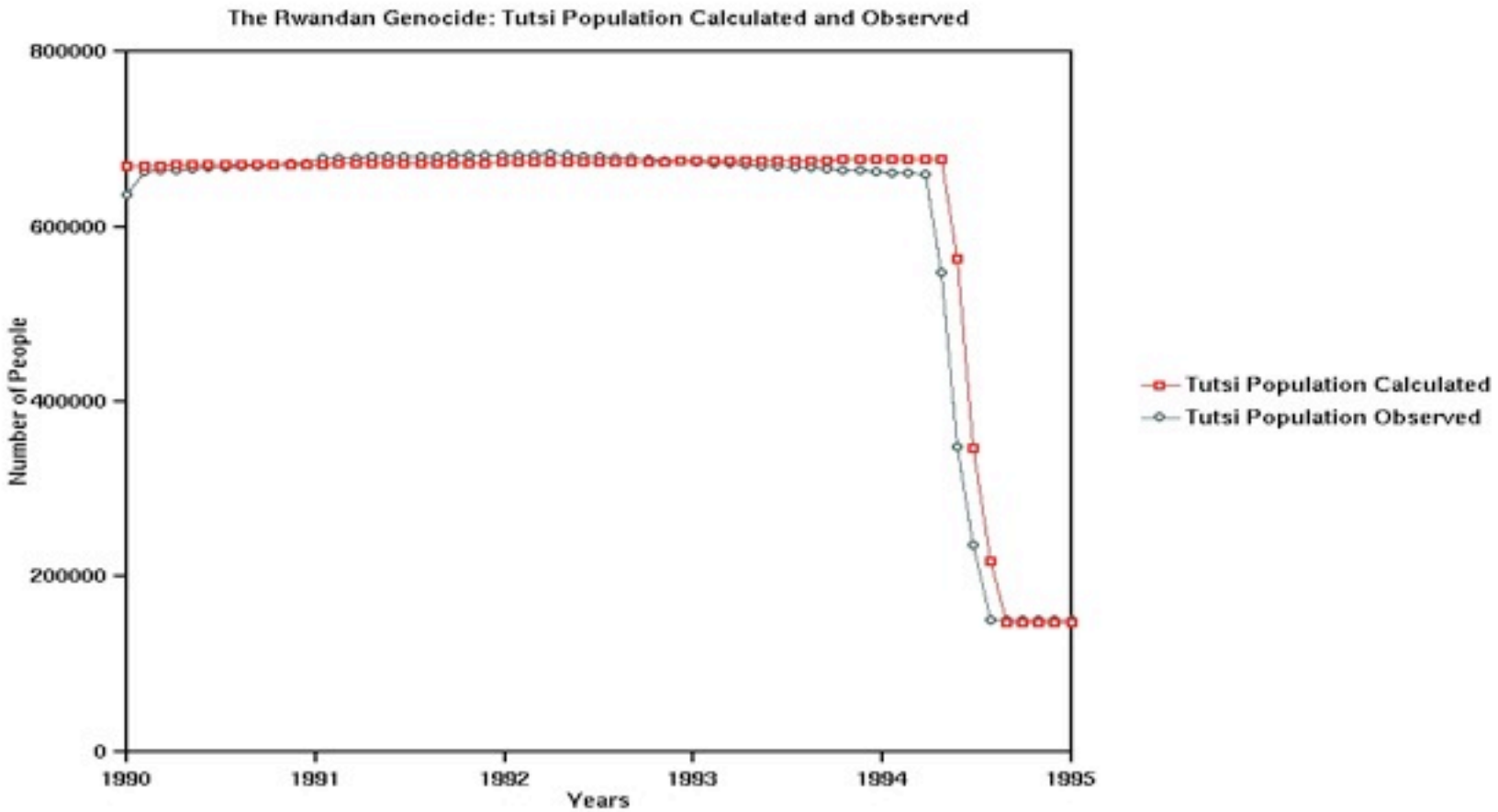
Conflicts as Catastrophic Events

- While one focuses often on catastrophic natural events one should remember that so far conflicts tend to kill far more people
- So WWI killed over 35 Million people, WWII, over 60 Million
- Between April 6th and Mid July 1994 between 500 000 and 1 M people were killed in Rwanda So far the casualties of the Syrian conflict are already close to 20 000
- Costs are also important: costs of Iraq war have been estimated at 3 trillion $ by Stiglitz
- We don't have yet a convincing explanatory scheme for conflicts
- Conflict events are worth investigating and analytical approaches explaining their occurrences and dynamics

Standard Puzzle

- Conflicts and warfare with high costs and dubious rewards are particularly difficult to rationalize even though they continue to occur. Fear is a powerful motivator for such extreme behavioral responses in general and for conflict and violence in particular. These appear irrational and cannot usually be explained through standard models of decision making such as expected utility as shown by Chichilnisky (2010). We want to reestablish what constitutes the critical explanatory role of emotions in the understanding of conflict initiation and conflict persistence and to show how attitudes towards risk and uncertainty can lead to and stabilize cooperation

Example of the Rwanda Massacre: Use of a Lanchester-Deitchman Combat Model with Recruitment and Demographics



Classical approach

- We have what can be called classical explanations of conflicts which explain them via EU models emphasizing incomplete information, commitment strategies and signaling through a theory of types Example:
- James Fearon's model of conflict takes for granted: (i) that decision-makers are essentially risk neutral, occasionally weakly risk averse and (ii) that probabilities about such crucial outcomes such as winning wars or the costs associated with them (another random variable) are essentially given by nature and are not based on subjective estimates by the parties involved. Same the selection of types (usually hard or soft) that protagonists to a conflict are supposed to represent:
- These: assumed to be given once and for all by a random draw out of a predetermined probability distribution. Resulting theory of conflict and war is simple: war may occur because two parties do not have complete information about each other's means or each other's preferences.

Our Conception

- We want to present resolutions of the puzzle that are based on attitudes decision makers exhibit about risk taking and result from the poor understanding they have about each other
- Fearon's approach is called the bargaining model of conflict and this is in our view a correct presentation of the basic issue:
  - To explain a choice for a chancy action such as war, its superiority over a bargained outcome has to be established.
  - However, links between defecting from a bargain to choose conflict in Fearon and classical bargaining theory are not investigated. Our analysis: reestablish the deep connection between theories about choices of conflict initiation or the pursuit of negotiations and bargaining approaches. Allows us to put conflict and

We will essentially take 2 paths

- 1. Open up the standard EU model to varying attitudes toward risk. This can for instance occur if instead of a standard linear or concave or convex utility function each agent has an S-curve risk averse on gains risk preferring on losses
- 2. Abandon the classical EU framework altogether in favor of Rank Dependent Expected Utilities
- In both cases we can demonstrate that it suffices to sign the risk premium, irrespective of the axiomatics that generate the parties preferences, to be able to predict the outcome of the bargaining process, cooperation or conflict
- We will be able to integrate Rank-Dependent Expected Utility (RDEU) preferences in a straightforward manner

Conflict and Bargaining

- Nash showed that a unique solution to a two person bargaining problem obtains under conditions of (1) joint efficiency; (2) symmetry of gains to the two actors if the game situation they were involved in was symmetric; (3) linear invariance of the solution; and (4) independence of the solution from irrelevant alternatives.
- The unique solution to the joint bargaining problem is the result of maximizing the Nash product (here for 2 agents) : Max (u1-c1) (u2-c2) where u1 and u2 are the utility functions of agents 1 and 2 respectively and c1 and c2 their conflict points $\frac{1}{-}$ $\frac{1}{-}$
- Rubinstein: $Max(u1-c1)^{\gamma}(u2-c2)^{\delta}$

- Where γ and δ are discount rates

Harsanyi's Bargaining Theory

- Harsanyi showed that Nash's theory is mathematically equivalent to a theory of bargaining due to Frederik Zeuthen (1930) Harsanyi showed how the Zeuthen theory expresses the bargaining process as a sequence of moves that eventually converge to the Nash bargaining solution. This Harsanyi-Zeuthen mechanism is based upon the concept of a critical risk ratio:

Harsanyi Zeuthen (HZ) Rules

$$r_i = \frac{U_i(x_{ij}) - U_i(x_{ji})}{U_i(x_{ij}) - U_i(c)}$$

- x_{ij} represents what agent i expects from agent j in the bargaining process, x_{ji} is what he gets as an offer from j and c represents the value of no agreement or conflict. For agent i, it is immediate that $r_{ij} = 0$ if the offer from agent j corresponds exactly to what he wants. On the other hand, $r_{ij} = 1$ if the offer from the other side does not differ from the value of the conflict situation. Thus r_{ij} varies between 0 and 1
- **Rule 1**: within a bargaining process, the player with the lower critical risk ratio makes a concession to the player with the higher critical risk ratio such that the inequality is reversed.
- **Rule 2**: when the critical risk ratios of both players

HZ Critical Risk Ratio and Conflict

- The condition which yields conflict in the Fearon (1995) setup trivially corresponds to a Harsanyi-Zeuthen critical risk ratio condition.
- Consider a simple two state of nature model of a party considering entering a conflict. With probability p, party 1 loses the conflict, yielding utility U (L), whereas she wins with probability 1-p, yielding utility U(W). Party 1 will thus engage in conflict when (S negotiated Sure Thing Outcome)

$$pU(L) + (1-p)\,U\,(W) > U(S)$$

HZ and Risk Premium

- This expression can be rewritten as the Harsanyi-Zeuthen critical risk ratio condition: $$\frac{U(W) - U(S)}{U(W) - U(L)} = r > p.$$
- Define the actuarily fair risk premium in the usual manner (Pratt 1964) as π such that:

$$pU(L) + (1-p)U(W) - U(pL + (1-p)W - \pi) = 0.$$

- Then conflict obtains whenever:

$$pU(L) + (1-p)U(W) = U(pL + (1-p)W - \pi) > U(S)$$

Risk Premium and conflict

- The Harsanyi-Zeuthen critical risk ratio condition can be written as: $\frac{W-S-\pi}{W-L} > p$
- For a strictly concave U(.), a trivial application of Jensen's inequality (Pratt 1964) yields $\pi > 0$, which implies that:

$$r = \frac{W-S-\pi}{W-L} > p$$

- The opposite obtains for a convex U(.)

Unobservable Preferences for Conflict

- Assume incomplete information about utilities, then π_i is essentially unobservable by agent j and vice versa, one can nevertheless postulate that an agent can anticipate the risk ratio: $r_i = \frac{W_i - S_{ji} - \pi_i}{W_i - L_i}$

- On the basis of the more "objective" ratio:

$$\widehat{r_i} = \frac{W_i - S_{ji}}{W_i - L_i}.$$

Meaning for the Bargaining Process

- Under risk aversion (concave U(.)), wit$\hat{r}_i > r_i$ there exists, according to the HZ rules, an incentive to offer a greater concession to the other side than if the subjective r_i were directly observable
- Thus under risk aversion (π_i, $\pi_j > 0$), mutual concessions will obtain and thus the cooperative outcome will be reached within the Harsanyi-Zeuthen process. Both agents are risk anticipating $\hat{r}_i < r_i$
- Conversely, under risk preference (π_i, $\pi_j <$ 0), , the bargainers underestimate the

2 Conclusions from this

- If both parties are risk-averse, conflict and war initiation is exceptional since powerful incentives exist to concede to the other side. However, if both parties are risk-loving, the equilibrium involves conflict. The analysis leads to the existence of a conflict or war trap
- As long as we can sign the risk premium, we can -using the HZ process- predict the outcome of the negotiation between the

RDEU Axiomatics

- The Rank-Dependent Expected Utility (RDEU) model was initially developed by Quiggin (1982) in order to address a number of important weaknesses apparent in the EU approach
- Under RDEU, the linearity in probabilities of the EU model is replaced by a probability weighting, perception, or distortion function (Chateauneuf, Cohen, and Meilijson (2005)) which assigns weights to the probabilities of the different states of nature
- The weights are themselves functions of the rank of the given state of nature, in terms of the level of satisfaction that the individual derives
- RDEU separates risk attitudes, on the one hand,

RDEU Characteristics

- Under RDEU axiomatics, U : R➔ R, defined up to a monotone increasing transformation, plays the role of a utility function under certainty, and φ: [0; 1] ➔ [0; 1], which satisfies the restrictions φ (0) = 0 and φ (1) = 1, is a unique function that plays the role of a probability transformation function. U and φ are both continuous and increasing
- It allows one to rigorously define the concepts of optimism and pessimism. Optimism corresponds to φ being concave, while pessimism corresponds to φ being convex.

Perspective in RDEU Framework

- In an RDEU framework, the equivalent to our first inequality is given by:

$$U(L) + \varphi(1-p)\left[U(W) - U(L)\right] > U(S)$$

- RDEU axiomatics correspond to a situation in which agents are certain of receiving at least the worst outcome U(L), and perceive a distorted probability φ (1 – p) of achieving the higher outcome U(W). When φ is the identity function we have the standard EU case

$$\frac{U(W) - U(S)}{U(W) - U(L)} > 1 - \varphi(1-p)$$

RDEU and Conflict

- Conflict breaks out when: $r_\varphi = \frac{W - S - \pi_\varphi}{W - L} > p.$

We can now compute the risk premium π_φ

$$\pi_\varphi = [(1-p) - \varphi(1-p)](W-L) + \frac{\sigma_\varphi^2}{2} A(E).$$

- When the utility function is linear, we are in a situation that corresponds to Yaari's (1987) dual theory functional. In this case, since U"(.) = 0, the expression given for the risk premium simplifies to:

$$\pi_\varphi = [(1-p) - \varphi(1-p)](W-L)$$

Deductions

- Under RDEU and decreasing marginal utility functions, if preferences are pessimistic, it will always be the case that $\pi_{\varphi} > 0$ and conciliation is more likely under the HZ bargaining framework. If preferences are optimistic and $\pi_{\varphi} > 0$; conciliation is more likely under the HZ bargaining framework. True even with constant marginal utilities (Fearon). If preferences are optimistic and $\pi_{\varphi} < 0$. Conflict is more likely under the HZ bargaining framework

- Case of risk-loving behavior: it is immediate that optimistic preferences will always be associated with a greater likelihood of conflict, while the outcome under pessimistic preferences will depend upon the degree of convexity of the utility function

General Conclusions

- Similarity between our results and a paper by Volij (2002) who works in the Rubinstein (1982) framework
- Difference between our approach and that of Volij, (i) HZ framework, (ii) we allow for a modicum of asymmetric information in that each player cannot observe the other's true critical risk ratio
- Basic message: when preferences can be characterized as being optimistic, conflict is more likely. When preferences are pessimistic, conflict is less likely and a negotiated outcome will obtain.

More Research Topics

- Changing attitudes toward risk or changing probability weighting functions, already mentioned S-curves
- Asymmetric situations

Thank You For Your Attention