Reasons for Peace

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Motivation

Since 1914,

i. Prob. of interstate disputes leading to war fell from 11 to 3 % and the mean # of peace talks and time spent negotiating doubled
ii. Wars are increasingly likely to pit combatants with similar military capacity
iii. Combatants spend 4.5+ more months fighting, casualties per day and army rose by 46-147 %, and the share of wars ending within a week of peace negotiation fell 50 to 23%

* When wars between highly unequal parties takes place, military advantage often fails to translate to favorable terms
* E.g., US vs. Vietnam or Afghanistan, USSR vs. Afghanistan, Civil Wars

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Objectives

i. What prevents wars? What rationalizes wars lasting longer and peace negotiations became less effective?

ii. If war is seen as a negotiation, does military power translate to bargaining power? Why or why not?

* I propose a new, tractable model of war
* The model extends the reputational bargaining framework by modeling the effect of fighting and asymmetric, military power
* In the paper: model is tested and its predictions are corroborated using an IV approach

** For sake of time, I only go over the theoretical results here

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v. Prob. that strong concedes when info. arrives **increases** as the expected amount of time spent fighting **decreases**
vi. Weak combatant has the **most** bargaining power

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Empirical Results

Some policy background:

- Ceasefires (i.e., pre-agreed pauses in fighting) were formally defined in the Hague Convention of 1907
- In World War 1, combatants effectively used ceasefires to gradually reach the war's end

My main result is that

i. Peace negotiations are an effective way to bring a war to an end
ii. But only when combatants fight as they negotiate

Road Map

1. Model
2. Theoretical Results

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2.

Model

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- The surplus is a continuous-time Markov process
- At time 0, surplus is normalized to 1 (i.e., $s_0 = 1$)
- At time $t \geq 0$, surplus falls $s_{t-} \to s_t = \epsilon s_{t-}$ for constant $\epsilon \in (0, 1)$
- Rate at which the surplus is destroyed is $\lambda\psi_t$ where $\lambda > 0$ is a constant and $(\psi_t) \subset \{0, 1\}$ is an (s_t)-adapted process
- $\psi_t = 1$ means that combatants fight at time t
- $\psi_t = 0$ means that combatants don´t fight at time t

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Model: Irreversible Events and Strategy

- At time $t \geq 0$, combatant $k = i, j$ decisively wins the war and keeps the **entire** surplus s_t
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- Once the lines of communication break down, $\psi_\tau = 1$ at each $\tau \geq t$
- Before either combatant wins or communication breaks down, each combatant k demands a share $\omega_{kt} \in [0, 1]$ of the remaining surplus
- Alternatively, k can concede to opponent´s demands

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$$U_{kt} = e^{-rt}\omega_{kt}s_t - c_{-k}\int_0^t \psi_s e^{-rs}\text{ds} \tag{1}$$

* $r > 0$ is a common discount factor
* $c_{-k} > \nu_k > 0$ is the flow cost that $-k$ imposes on k while fighting

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Model: Relative strength

- Combatant $k = i, j$ is stronger than $-k$ if $(c_k, \nu_k) \gg (c_{-k}, \nu_{-k})$
- Intuitively, a combatant is stronger than his opponent if he inflicts larger costs and attains a decisive victory faster than his opponent

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- Intuitively, a combatant is stronger than his opponent if he inflicts larger costs and attains a decisive victory faster than his opponent
- I assume that i is stronger than j
- In addition, all model parameters are common knowledge
- Note that the preceding literature (e.g., Fearon 1995, Pillar 1983, Filson and Werner 2002, Powell 2004, etc.) assume that c_k and ν_k are not observed by $-k$
- Indeed, war is caused by this sort of imperfect information
- The limitation of such assumption is that wars between highly unequal parties occur e.g., Civil Wars, US vs Vietnam, UK vs Zulus or Argentina, etc.

Model: Reputational Types

- Instead, I assume that combatants may be motivated about each other´s motives to go to war and said motives need not be rational
- For example, a combatant may be motivated by a desire for vengeance or ethnic/religious differences
- In such case, combatants are unwilling to make any concession and only accept their opponent´s surrender
- And a lack of common knowledge of combatants rationality will prompt combatants to accept fighting i.e., weak, strategic combatants (if strategic) fight to extort stronger foe

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- A combatant is obstinate with a small probability $\mu \in (0, 1)$

* All random variables and processes are pairwise independent

- Obstinate k picks at each time t, $\omega_{kt} = 1$ and never concedes

Road Map

1.
2. Theoretical Results

Breakdown Payoff

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Breakdown Payoff

Lemma

If communication broke down by time t when the surplus already fell $n = 0, 1, \ldots$ times, then $k = i, j$'s payoff is $-B_{kn}$ where

$$B_{kn} = \frac{c_{-k}}{r + \sum_{k'} \nu_{k'}} - \left[\frac{\nu_k}{r + (1-\epsilon)\lambda + \sum_{k'} \nu_{k'}} \right] \epsilon^n > 0. \tag{2}$$

- Note that for each $n = 0, 1 \ldots, B_{in} < B_{jn}$ i.e., the weak incurs larger costs than his opponent

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- To illustrate results, I first consider the case where $\psi_t = 0$ almost surely i.e., combatants negotiate during a ceasefire
- As Abreu and Gul (2001) finds, a strategic combatant cannot gain from making non-obstinate demands
- Hence, $k = i, j$´s strategy is a CDF H_k such that at each time $t \geq 0$, H_{kt} denotes the probability that k concedes by time t conditional on the lines of communication not breaking down
- $-k$ further expects that k is obstinate at time t with a probability $\mu_{kt} \in [0, 1]$ if lines of communication remain open
- Solution Concept is the Perfect Bayesian Equilibrium

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  1. If for some $k = i, j$ $\mu_{kt} = 1$, then it must also be the case that $\mu_{-kt} = 1$ i.e., beliefs converge to 1 at the same time
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- These results hold true in the general case
- Next, let $c_{-kt} \equiv (1 - \mu_{-kt})\dot{H}_{-kt}$ be the rate at which k expects $-k$ to concede and W_{kt} be k´s expected payoff

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- The Feynman-Kac formula implies that W_{kt} satisfies

$$rW_{kt} = \overbrace{\phi[-B_{k0} - W_{kt}]}^{\text{Communication breaks}} + \overbrace{c_{-kt}(1 - W_{kt})}^{j \text{ concedes}} + \dot{W}_{kt}$$

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- And thus $c_{-kt} = \phi B_{k0}$ i.e., $c_{it} \gg c_{jt}$
- Moreover, $-k$ updates his belief that k is obstinate from not observing a concession. If time t beliefs are μ_{kt}, then by time $t+\mathrm{dt}$ (small $\mathrm{dt} > 0$) beliefs become

$$\mu_{kt+\mathrm{dt}} = \frac{\mu_{kt} \times \overbrace{(1-0)}^{\text{No Concession, obstinate}}}{(1-\mu_{kt}) \times \underbrace{[1-(H_{kt+\mathrm{dt}} - H_{kt})]}_{\text{No concession, strategic}} + \mu_{kt} \times (1-0)} \tag{3}$$

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$$\mu_{kt+\mathrm{dt}} = \frac{\mu_{kt}}{(1-\mu_{kt}) \times [1-(H_{kt+\mathrm{dt}} - H_{kt})] + \mu_{kt}} \tag{4}$$

- Subtracting both sides of the expression by μ_{kt}, dividing by dt, and then taking the limit as dt goes to 0 implies that

$$\dot{\mu}_{kt} = \mu_{kt}(1-\mu_{kt})\dot{H}_{kt} = \mu_{kt}c_{kt} = \phi B_{-k0}\mu_{kt} \tag{5}$$

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- Beliefs than have the solution $\mu_{kt} = \min\{1, \mu_{k0^+} exp(\phi B_{-k0}t)\}$

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Ceasefire Equilibrium

Lemma

j concedes at time 0 with a probability of $q^* = \mu^{1-\frac{B_{i0}}{B_{j0}}}$. Otherwise, each $k = i, j$ concedes gradually at a constant rate of ϕB_{-k0} until time $T^* = \frac{-\ln \mu}{\phi B_{jk}}$ or sooner if communication breaks down.

- j=weak
- i=strong

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Equilibrium beliefs illustration

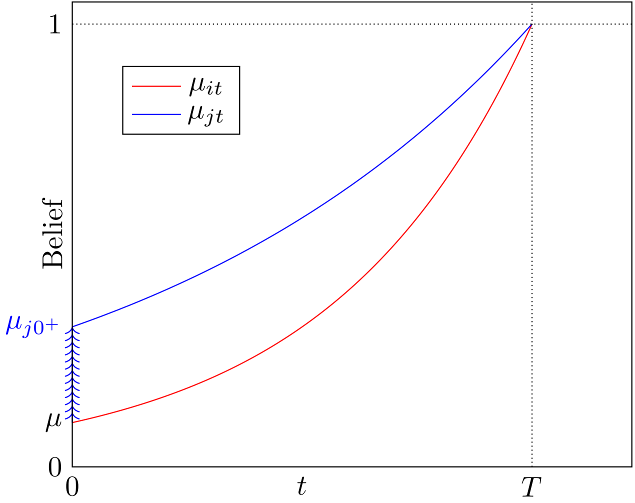

Figure: Equilibrium Beliefs as a function of time conditional on talks not breaking down

In general

- The main restriction in the special case above is that it avoids the cost of fighting, surplus destruction, and decisive victories
- Additional discontinuous concessions take place when the surplus is destroyed
- At time 0, it remains the case that j is the one who might concede
- Otherwise, who makes a concession when information arrives depends on beliefs, the number of past time that the surplus fell, and the expected future path of (ψ_t)

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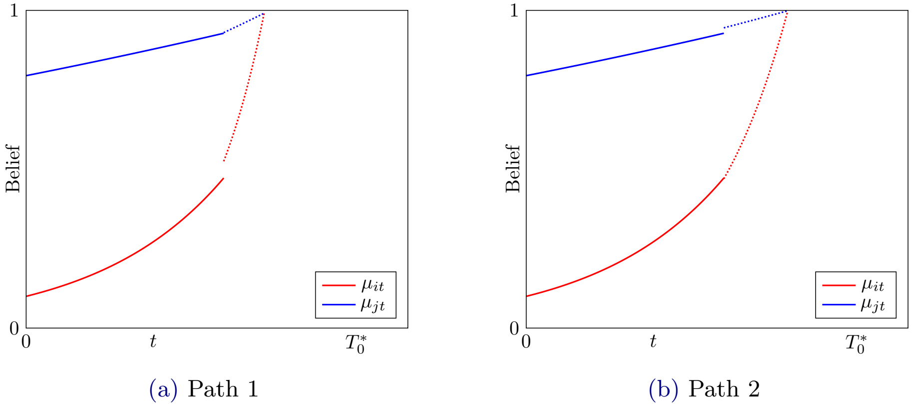
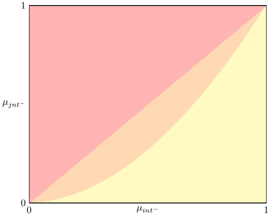
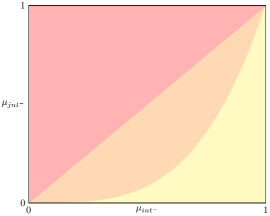


Figure: Equilibrium beliefs when the time spent fighting changes after the surplus is destroyed for the first time.

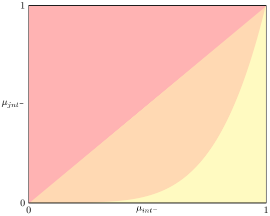
In general: Beliefs concession diagram



(a) $n = 0$



(b) $n = 1$



(c) $n = 2$

Role of (ψ_t)

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- The effect on the gradual concession rates is simple: if the surplus already fell n times by time t and beliefs are less than 1, concession rate is $c_{knt} = \frac{B_{-kn}}{\epsilon^n} + \psi_t \Delta_{kn}$ where $\Delta_{nk} \equiv c_k/\epsilon^n - \nu_{-k}$
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- The effect of discontinuous concessions is more subtle:
- $t = 0$ or $t > 0$ and j concedes: As the time that combatants spend fighting $falls$, the probability that j concedes also $falls$

* This observation implies that policies reducing the time combatants fighting end up increasing the probability of fighting

Continuation

- $t > 0$ and i concedes: As the time that combatants spend fighting $falls$, the probability that j concedes $increases$

* Hence, a policy calling for a ceasefire mid war is likely to help one party at the cost of their foe

In general: Bargaining Power

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- Lastly, war can be seen as a costly form of bargaining
- Taking this perspective seriously, it is then important to note what is bargaining power i.e., a combatant´s ability to impose their will
- In particular, bargaining power is independent of the model specific frictions and depends on combatants going to war
- Let $p_{\mu\rho\phi nt}$ be the $\rho > 0$ discounted probability that $k = i, j$ wins the war conditional on the war continuing to time t i.e.,

$$p_{\mu\rho\phi nt} \equiv E_{nt}[e^{-\rho(\tau - t)}\chi(k \text{ wins or } -k \text{ concedes})]. \tag{6}$$

- k´s bargaining power is then $p_k^* \equiv \lim_{\mu\searrow 0 \lambda\searrow 0 \rho\searrow 0, \phi\searrow 0} p_{\rho\phi n0^+}$

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Military Power $\neq$ Bargaining Power

Lemma

Combatant $k = i, j$'s bargaining power is

$$p_k^* = \frac{c_{-k}}{c_k + c_{-k}}. \tag{7}$$

* A combatant´s ability to impose their will plays no role in determining their bargaining power
* Weak combatant (i.e., j) has the most bargaining power

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Conclusion

- This paper studies how war dynamics evolved over the last 200 years and the potential causes of said changes
- Wars became less common post-1914 but they last longer and diplomacy is less effective
- Combatants are now more likely to have comparable military capacity
- I further provide a stylized, workhorse model of war that captures many real-world dynamics
- Using the model predictions, I find evidence suggesting that pauses in fighting prolong the time spent fighting
- This effect is magnified when combatants negotiate during said pauses in fighting

Thank you!

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