Containing Rogues: A Theory of Asymmetric Arming

By: Andrew J. Coe

Introduction to the Model

- Shows the interaction between a Strong state and a weak state
  - Ex: USA and Iraq
- In order to shift the balance of power weak state most unconventionally arm (WMD's)
- Strong State can either:
  - Fight a preventative war (Iraq)
  - Negotiate (Iran)
  - Containment (North Korea)

Basics of the Model

- Weak state will unconventionally arm when
  - The cost to do so (investments) is less than the shift in power it produces, taking into account chance of success
  - Unconventionally arm = Investment cost < power shift * p
- Strong state observes attempt then can either
  - Tolerate -> shift in power to weaker state, no cost
  - Containment -> reduces chance of shift, costly
  - War -> eliminates chance of shift, both sides lose
- Both sides can avoid shift and war by agreeing to a deal
- Two equilibria War or Asymmetric Arms race

Asymmetric Arms Race

- Weak state unconventionally arms by investing in the development of a nuclear weapon
  - Sacrifices present power for chance of great power in the future
- Strong state conventionally arms by investing in containment
  - This investment presently increases power and lowers chance of power shift
- The determinant for whether War or an Asymmetrical arms race occurs in equilibrium is based on which is more cost effective

Model Setup

- Two states A (strong) and B (weak) play a game over many periods
- A starts the game by either tolerating B or choosing containment (arming)
- If containment is chosen A then gets to choose whether to go to war with B or negotiate a deal
  - If war is chosen the game ends
- B then chooses whether to accept the deal or go to war
- B then chooses whether to invest in unconventional means
  - The round then ends with B either successful or not
  - If not successful game goes to next period
- Next period A has intelligence that B invested the last period

Analysis: No deal

- Proposition 1: Assuming no deal is made B will seek unconventional means if chance of success success and power shift are greater than investment cost

- Proposition 2: Assuming no deal is made A will choose containment if the chance of B succeeding under containment is lower than the cost of containment and War if containment is unlikely to prevent B
  - Cost refers to “total value destroyed”

- Equilibrium of this game when a No deal is made is either war or an Asymmetrical arms race

Analysis: Deal is made

- Proposition 3:
  - A deal is made if it bears the same or less cost then war and toleration for A
  - If it bears the same cost as war under toleration for B
  - War occurs if there is a combination of asymmetric information and commitment problem

The United States and Iraq

- Applying the model to the US-Iraq relations between 1991 and 2003
- Containment was first less costly than all out war for the US
- As time wore on war became less costly then continuing the current containment policy
- Gulf War was started by Bush Sr
- During the war the administration decided it would be less costly to attempt containment again because they thought it would be less costly and just as effective
- Containment continued through Clinton administration because it was not as costly
- Cost of Containment rose and those of war fell because of containment, US went back to war

Broader Implications

- War is driven by cost effectiveness and bargaining problems
- Arming is costly as well as war
- Presents new way to define arming through Containment
- Introduces the idea of Asymmetrical arming into model

Arms Negotiations, War Exhaustion, and the Credibility of Preventive War

By: William Spaniel

Research Question

"Why do some states suspend weapons programs in exchange for compensation while others fail to come to terms?"

Theory

- Commitment problems
- When weaker, states have incentive to negotiate with rivals in order to prevent a build up of arms
- When stronger, state can use the threat of a war in order to stop weaker rivals from building arms

Model

- Two players A(antagonist) and B (arms builder)
- A makes an offer to start the game, B can:
  - Reject the offer and war ensues
  - Accept the offer and receive x while A receives 1-x
  - Build arms, then becomes A's turn
- A can either:
  - Choose war
  - Send another offer to B after the power shift resulting from B's build up
  - B's decision to arm is information A has
  - The offer made in the beginning is "retractable"
- The game repeats infinitely

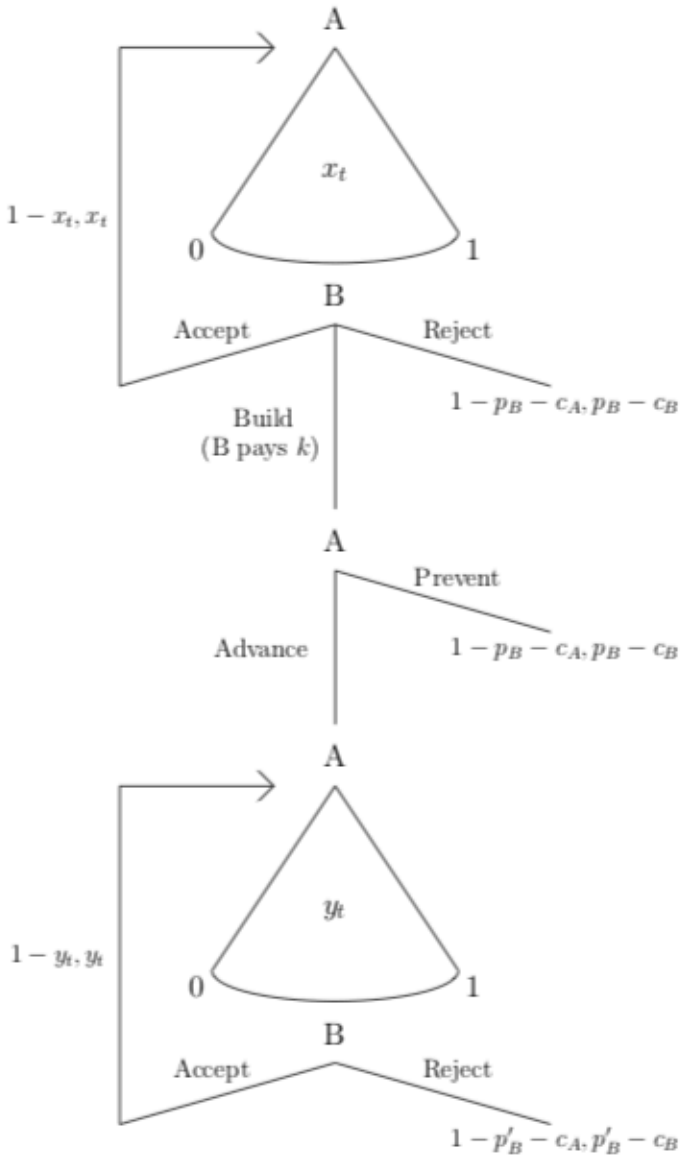

Figure 1: The baseline model. All payoffs listed are for the period, though the war outcomes lock in their respective payoffs every period for the rest of time.

Equilibria

- Lemma 1: “In every SPE, in every post-shift period, A offers $y_t = p'B - cB$, and B accepts.”
  - A will make a the right offer
  - War creates DWL and never makes it viable for either
  - B will always accept
- Proposition 1: Too Hot
  - When the power shift from building is greater than the inefficiency of war A will always go to war
  - Appears as if B has an incentive to build
  - Knowing this B will accept the offer from A
  - Lemma holds

Equilibria pt.2

- Proposition 2: Too Cold
  - When power shift is too small it is not worthwhile for B to pursue
  - Accepts offer from A
- Proposition 3: Just Right:
  - A knows that the Power shift gained from B is not too high it needs to go to war but also not too low B won't attempt
  - A offers B whatever it would gain in future
  - Makes it viable for both because of discount rate

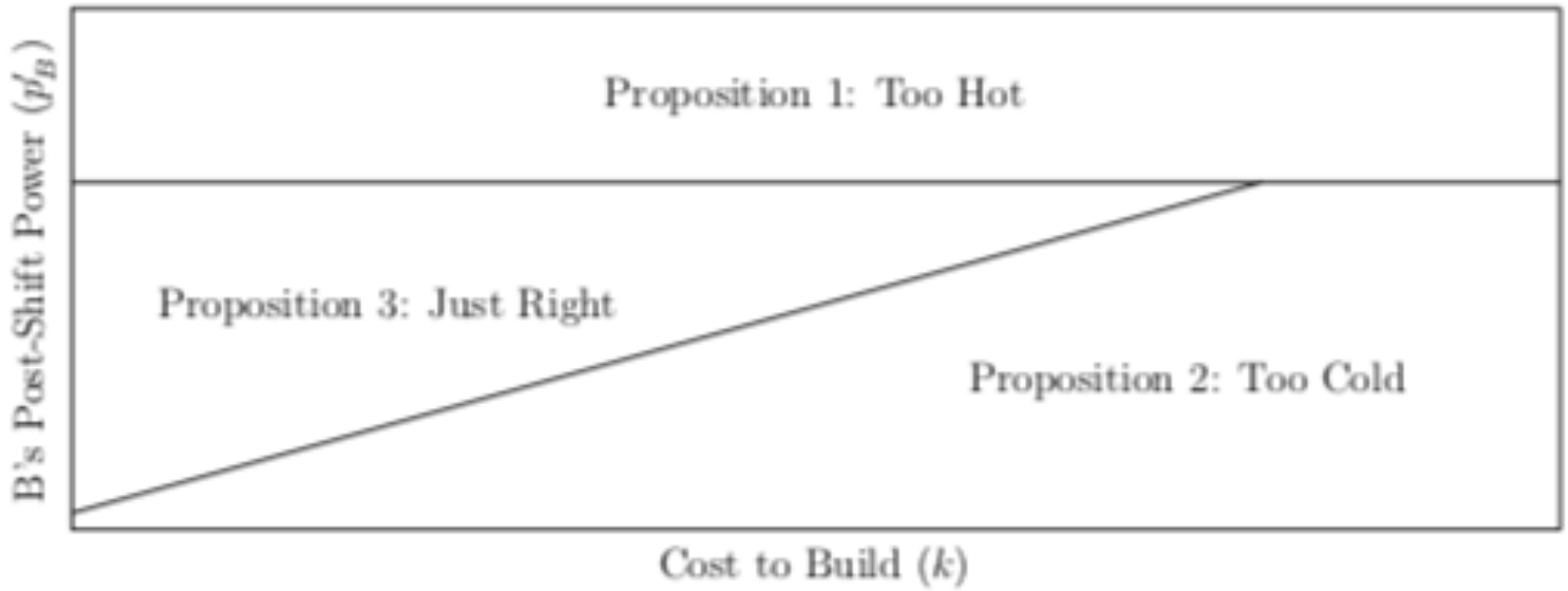

Figure 2: Equilibrium outcomes as a function of p'_B and k. Figure drawn with values $p_B = .3$, $c_A = .3$, $c_B = .1$, and $\delta = .9$.

How Bargaining Can Fail

- Original model does not explain why states invest in arms
- "Window of Opportunity"
  - Cost of war vary over time, eventually costs will be just right
  - B faces a "now or never" chance to build arms
- Modified model
  - A's cost of war is varied over time
  - A becomes less likely to fight over time
  - Common knowledge allows B to anticipate A's actions in future periods

Inefficient Equilibria

- Condition 1:
  - Examines effects of diminished effects of A fighting a war in future periods
  - Equilibrium holds
- Condition 2:
  - Examines the effects of “Large, Rapid shifts” in power
  - Creates a commitment problem
  - B will never build while return on investment is less than cost
- Proposition :
  - B accepts treaty until cost of preventative war is too low for A due to condition 1
  - B knows now that it will not receive offer in the future and thus builds from t^*-1

Mechanism in the Soviet Union

- Post WWII USA had monopoly on nuclear weapons
- Soviets began attempting to develop their own
- At this point the US viewed a preventative war as too costly
  - Does not fit too hot case
  - War exhaustion post WWII
- Preventative was not credible during the early years before the Soviets developed a nuke
- Need a credible threat for the bargaining to even take place
- But shouldn't't the Soviets have taken a deal knowing that war exhaustion would fade?
- Stalin decided to pursue weapon at a rapid speed before war exhaustion faded in USA