Reputational Bargaining in the Shadow of the Law

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Bargaining in the Shadow of Law

- Two parties (e.g. a union and a firm, or partners of a company) negotiate to resolve a conflict.
- Each party is
  - unjustified (no evidence supporting a claim), or
  - justified (verifiable evidence supporting a claim)
- Two parties can settle the conflict on their own.
- Or they can let the court resolve their conflict when they get the chance.
  - A justified party goes to a third party (e.g., court, arbitrator) whenever there is a chance.
  - An unjustified party may go to the court strategically.
  - Opponent can avoid the court cost by agreeing.

Reputational Bargaining (Abreu and Gul, 2000)

- Two players negotiate to divide a unit pie.
- Each player is
  - rational (flexible and strategic), or
  - persistent (inflexible and behavioral)
- Time is continuous.
- Players persist or concede.

Reputational Bargaining in the Shadow of the Law

- Two players negotiate to divide a unit pie.
- Each player is
  - rational (flexible and strategic), or
  - persistent (inflexible and behavioral)
- Time is continuous.
- Players persist or concede or threaten to go to the court (ultimatum).

Results

1. Testable implication

   How likely a player sends an ultimatum depends on own reputation and opponent's reputation, and is *not* monotonic in time.

2. New economic forces

   Having the ultimatum may or may not benefit the challenger.

   - Negative effect "no news is bad news": harder to build reputation.
   - Positive effect "no news is good news": easier to build reputation.

3. Comparisons with Abreu and Gul (2000)

   Players' limit payoffs depend on discount rates and the arrival rates of challenge opportunities.

   Players' reputations do not necessarily build up when both sides can send ultimatums (vs reputations always build up in Abreu and Gul (2000)).

Reputational Bargaining (Abreu and Gul, 2000)

- Players 1 and 2 negotiate to divide a unit pie.
- Time is continuous. Player i's discount rate is r_i.
- With probability z_i player $i = 1, 2$ persistently demands a_i.
- Assume difference $D \equiv a_1 + a_2 - 1 > 0$.
- At each instant, each player can persist or concede.

Equilibrium: War of Attrition

1. Players' reputations (probabilities of being a persistent type) increase over time and reach 1 at the same time.

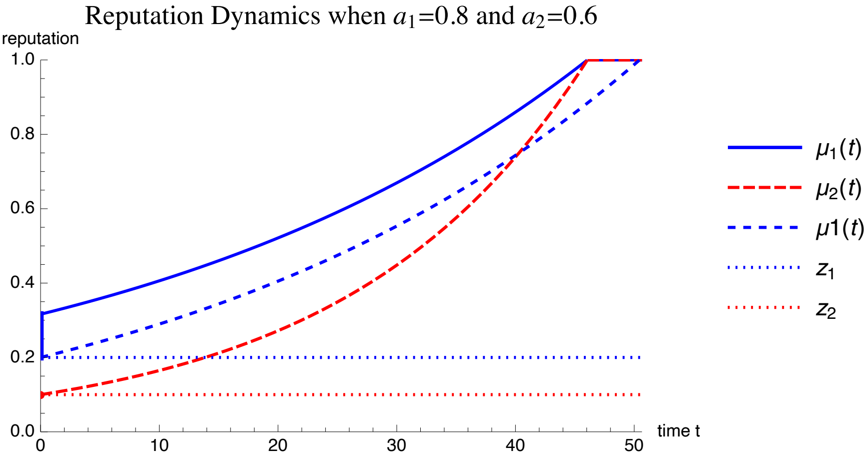
2. Each player mixes between persisting and conceding at every moment, and concedes at a constant rate

$$\lambda_j = \frac{r_i(1 - a_j)}{D}$$

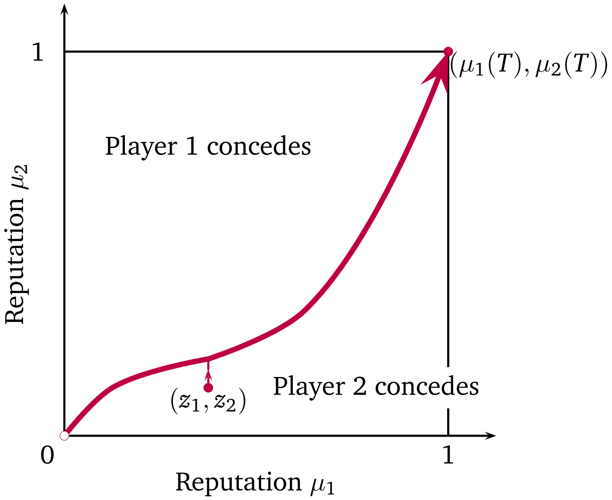
   to make opponent indifferent between persisting and conceding.

3. At most one player concedes with a positive probability at time 0.

Reputation Dynamics



Reputation Coevolution



Reputational Bargaining

- Players 1 and 2 negotiate to divide a unit pie.
- Time is continuous. Player i's discount rate is r_i.
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Reputational Bargaining with One-Sided Challenge

- In addition, player 1 can pay cost c_1 to challenge:
  - A justified player 1 challenges with Poisson rate γ_1.
  - An unjustified player 1 can (strategically) challenge any time.
- A justified player 2 always sees the challenge.
- An unjustified player 2 can choose.
  - If 2 yields to the challenge, 1 gets a_1 and 2 gets $1 - a_1$.
  - If 2 pays cost c_2 to see the challenge, a court determines outcome:
    - An unjustified player loses to a justified player.
    - An unjustified challenger wins with prob w against an unjustified opponent.

Challenging is like bluffing: it can be beneficial (if the opponent concedes) or harmful (if the opponent calls).

Incentives to Challenge and See the Challenge

- If player 1's reputation is ν_1, player 2 is indifferent between responding and yielding when

$$(1-\nu_1)(1-w)D - c_2 = 0.$$

$$\nu_1 = 1 - \frac{c_2}{(1-w)D} \equiv \nu_1^*.$$

- An unjustified player 1 does not challenge if

$$\mu_2 > 1 - \frac{c_1}{D} \equiv \mu_2^*$$

  Player 1's highest gain from challenging is

$$(1-\mu_2)D - c_1.$$

Mutual Indifference in Unique Equilibrium

- Players concede at Abreu-Gul rates.
- When for $\mu_2 \leq \mu_2^*$, player 2 responds with probability

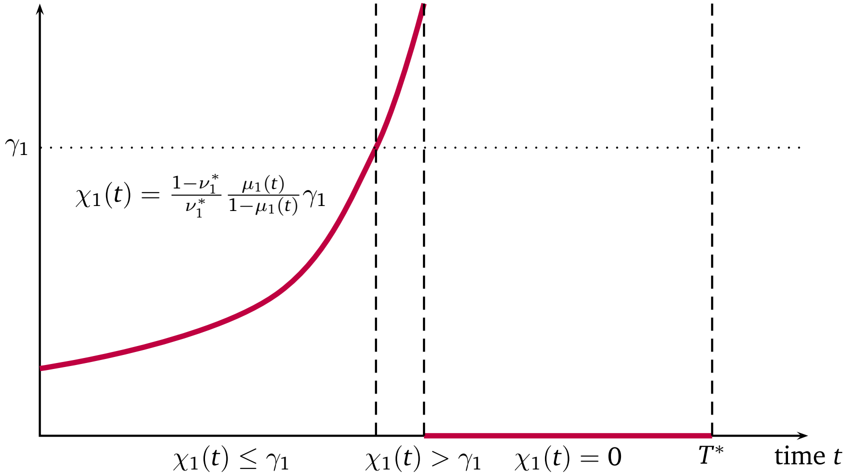
$$s_2(\mu_2) = \frac{1}{1-w}\left[1 - \frac{c_1}{D}\frac{1}{1-\mu_2}\right].$$

  to make 1 indifferent between challenging and conceding.
- When $\mu_2 < \mu_2^*$, player 1 challenges with rate χ_1:

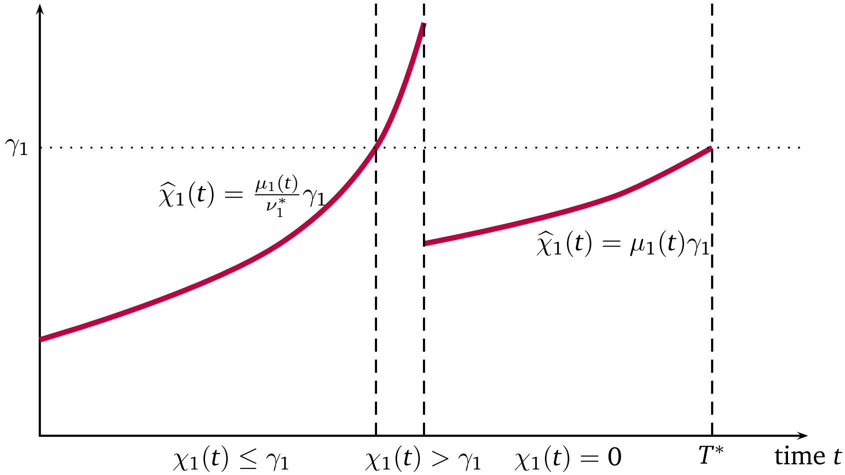
$$\frac{\mu_1\gamma_1}{\mu_1\gamma_1 + (1-\mu_1)\chi_1} = \nu_1^* \;\Rightarrow\; \chi_1 = \frac{1-\nu_1^*}{\nu_1^*}\frac{\mu_1}{1-\mu_1}\gamma_1$$

  to make 2 indifferent between responding and yielding to the challenge.

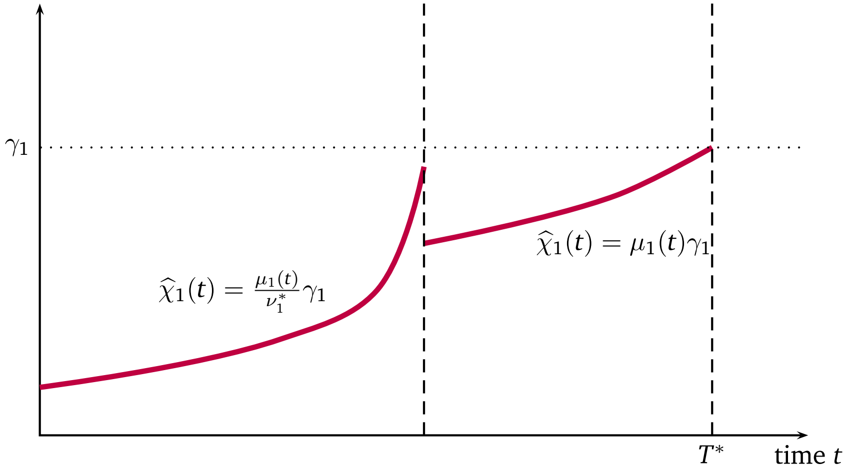
An Unjustified Player's Equilibrium Challenge Rate



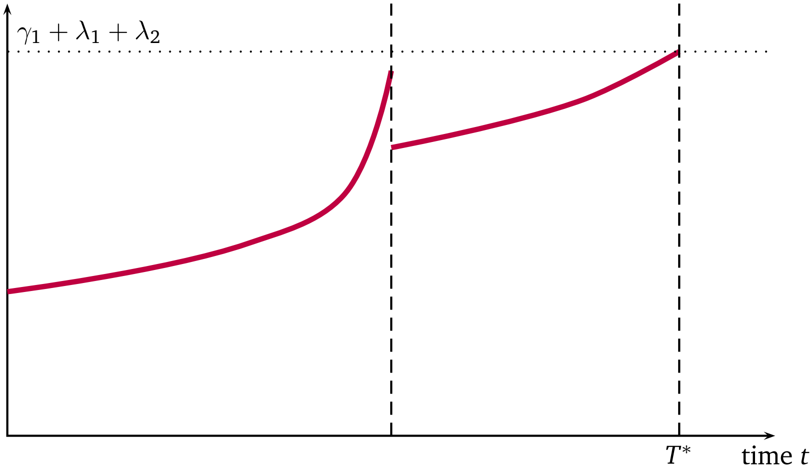
Overall Challenge Rate



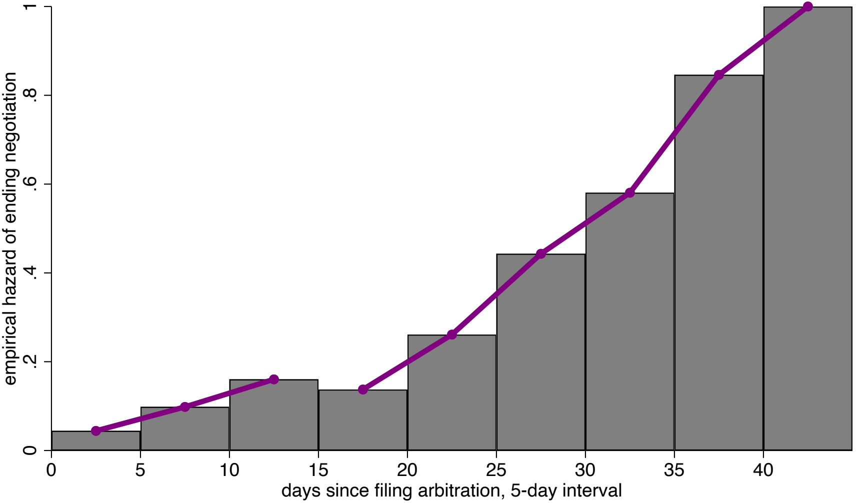
Overall Challenge Rate, Case 2



Predicted Hazard Rate of Ending the Game



MLB Salary Arbitration, 2011-2020



Reputation Dynamics

2's reputation follows

$$\mu_2'(t) = \lambda_2 \mu_2(t).$$

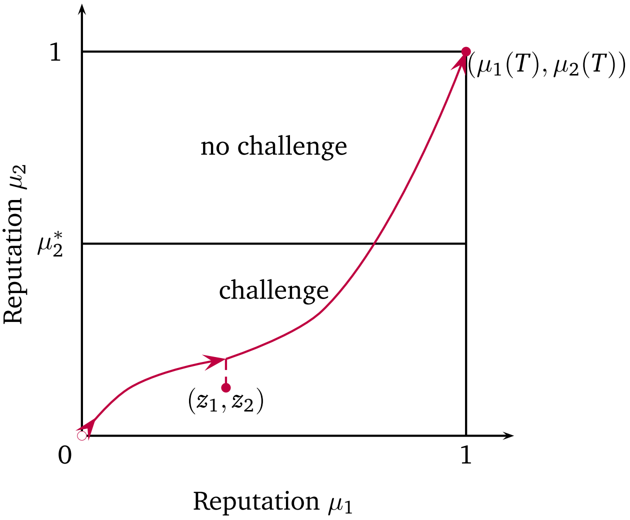
1's reputation follows Bernoulli in the no-challenging phase ($\mu_2 > \mu_2^*$):

$$\mu_1'(t) = \lambda_1 \mu_1(t) - \gamma_1 (1 - \mu_1(t)) \mu_1(t) < \lambda_1 \mu_1(t).$$

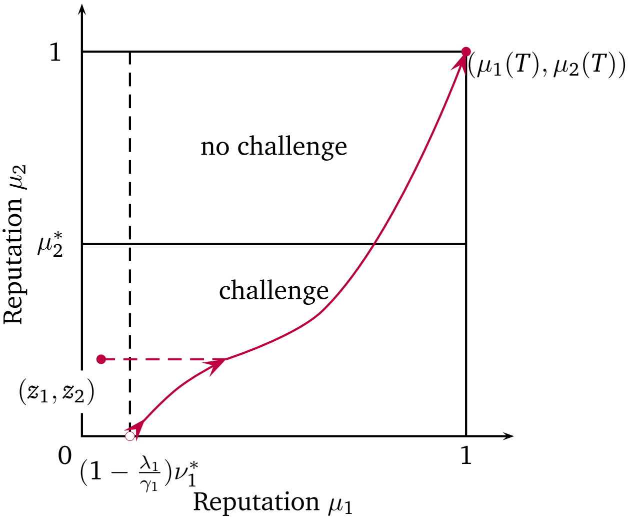
1's reputation follows Bernoulli in the challenging phase ($\mu_2 < \mu_2^*$):

$$\mu_1'(t) = \lambda_1 \mu_1(t) - \gamma_1 (1 - \mu_1(t)) \mu_1(t) + \left(\frac{\gamma_1}{\nu_1^*} - \gamma_1 \right) \mu_1^2(t) \begin{cases} \leq \lambda_1 \mu_1(t) & \text{if } \mu_1(t) \leq \nu_1^* \\ > \lambda_1 \mu_1(t) & \text{if } \mu_1(t) > \nu_1^* \end{cases}$$

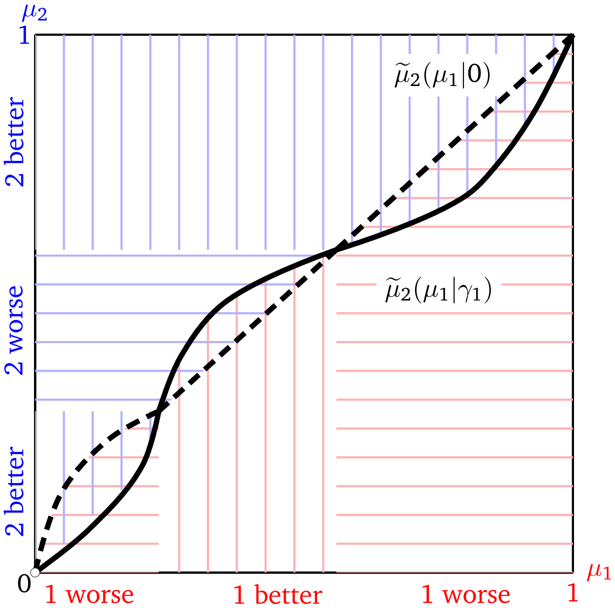
Reputation Coevolution: $\gamma_1 \leq \lambda_1$



Reputation Coevolution: $\gamma_1 > \lambda_1$



Who Benefits from Challenge Opportunity?



Multiple Types

Suppose players can choose their initial demands a_i and a_j from finite sets A_i and A_j, respectively.

Unique Equilibrium

There exists a unique sequential equilibrium.

Limit Payoffs

"Sufficiently rich" sets and small probabilities of persistence:

- Agreements are efficient: limit payoffs add up to 1.
- Player 1's limit payoff in Abreu and Gul (2000) is Rubinstein (1982) payoff

$$\frac{r_2}{r_1 + r_2}.$$

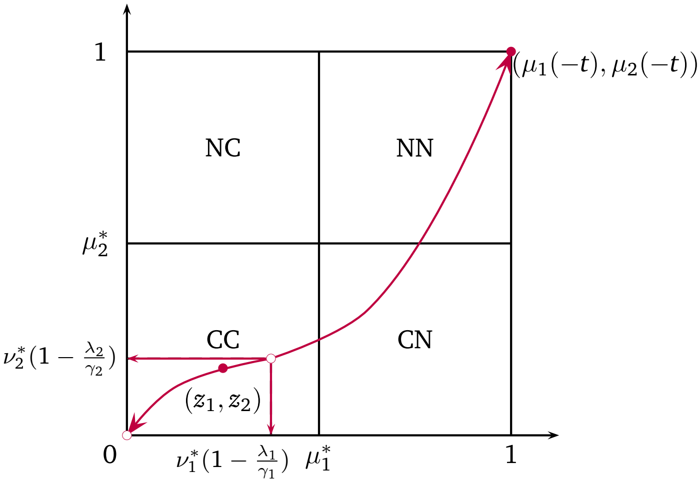
- Player 1's limit payoff in bargaining with one-sided challenge is

$$\frac{r_2}{\max\{r_1, \gamma_1\} + r_2}.$$

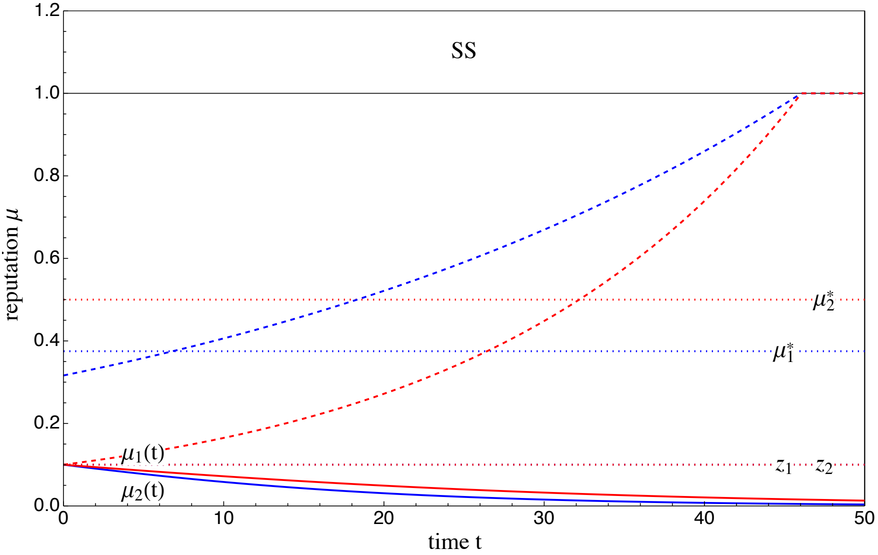
Bargaining with Two-Sided Challenges

- Player 1 and player 2 bargain to divide a unit pie.
- With probability z_i player i persistently/irrationally demands a_i.
- Assume $d \equiv a_1 + a_2 - 1 > 0$.
- Time is continuous. Player i's discount rate is r_i.
- At each instant, each player can persist or concede, **or**
  - A justified player $i = 1, 2$ challenges with Poisson rate γ_i.
  - An unjustified player $i = 1, 2$ can challenge any time.
- If player i pays cost c_i to challenge, player $j \neq i$ has to respond.
  - A justified player j always sees the challenge.
  - If player j yields to the challenge, player i gets a_i and player j gets $1 - a_j$.
  - If player j pays cost c_j to see the challenge, a court determines outcome:
    - An unjustified player loses to a justified player.
    - An unjustified challenger wins with probability w against an unjustified player.

Reputation Not Building Up



Reputation Not Building Up



Conclusion

- The paper builds a model of reputational bargaining with an opportunity to challenge the opponent.
- A player increases the challenge rate initially, and then does not challenge at all.
- The challenge opportunity may or may not benefit the challenger.
- Limit payoffs may depend on the arrival rate of challenge opportunities.
- The paper incorporates the continuous-time bargaining model of Abreu and Gul (2000) as a special case, and provides an economic interpretation and application of “irrationality”/“persistence”.

THANK YOU!

References I

Abreu, Dilip and Faruk Gul, "Bargaining and Reputation," *Econometrica*, 2000, *68* (1), 85–117.

Rubinstein, Ariel, "Perfect Equilibrium in a Bargaining Model," *Econometrica*, January 1982, *50* (1), 97–108.