

## New Equilibrium Construction

From “to\_do\_list.tex”:

Take out renegotiation

- Add more basic tradeoff
- (??) Draw inverted U for lobby
- Now my short punishments don't rest on renegotiation
  - So now, for main analysis, must assume that we're constraining attention to a certain class of punishments: symmetric, and “Punish for  $T$  periods then go back to cooperation”
    - \* Go back to start if deviate should work for governments, but I think I need something else for lobbies since they would like that
  - Can I show that mine are optimal in this class?

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- Must show players are best responding in every subgame, on and off the eqm path
- I'm going to try to use reversion to the static nash, but this is not necessarily subgame perfect (deviations can trigger changes in future periods)
  - Basic intuition: lobby wants punishment to go longer, leg wants it to go shorter
  - Ideally, want each to choose static BR in each period of punishment: in non-cooperative state, you can pick whatever you want, but the other guy is doing whatever he wants;  $\tau^{tw}$  is independent of what he does
    - \* BUT it's not independent of lobby's effort

Equilibrium: Executives set trade agreement at  $t = 0$ . At  $t \geq 1$ , lobbies choose  $e$ , leg chooses applied  $\tau$

- $\forall t \geq 1$ , leg applies  $\tau^A$  if
  1.  $\tau \leq \tau^A$  was applied last period

2. There have been  $T$  periods of punishment: I think  $\tau \geq \tau^N$  and  $e \leq e^N$
- Not sure how to specify lobby in these cooperation periods:  $e = 0$  if  $\tau \geq \tau^A$  (in any period? how are they involved in punishment? they're not really)
- if  $\tau > \tau^A$  within the last  $T$  periods, leg applies  $\tau^N(e^N)$

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- Think of punishment scheme being designed either by execs or by supranational body like WTO
- Then want to know whether it's an eqm for leg and lobbies to follow the rules

Classes of subgames

1.  $\tau \leq \tau^A$  and  $e = 0$  last period; if there had ever been a violation, it was at least  $T$  periods previous.
  - Should I have “and  $e < \bar{e}$ ” instead?
2. Conditions in (1) held in period  $t - 2$ , but there was a violation in period  $t - 1$ 
  - Play static Nash this period and for  $T - 1$  more periods before switching back to (1); more precisely,  $\tau^D \geq \tau^N$  and  $e^D \geq e^N$ .
3. Static Nash punishment was initiated  $i < T$  periods ago, and punishment has been followed since then
  - Punish this period and  $T - i - 1$  more periods before switching back to (1)
4. In any punishment period, legislature does not follow punishment: i.e.  $\tau^D < \tau^N$ 
  - Restart punishment at (2)
5. In any punishment period, lobby does not follow punishment:  $e^D < e^N$ 
  - Legislature chooses (??) BR to  $e^D$ , then restart at (1)

Conditions for equilibrium

- Checking that punishment is incentive compatible

– Legislature:

$$W(\gamma(e^N), \tau^N) + \frac{\delta - \delta^{T+1}}{1 - \delta} W(\gamma(e^N), \tau^N) + \delta^{T+1} W(\gamma(0), \tau^a) \geq W(\gamma(e^N), \cdot) + \frac{\delta - \delta^{T+2}}{1 - \delta} W(\gamma(e^N), \tau^N)$$

by definition, anything provides lower one-shot payoffs than  $\tau^N$ , and Nash payoffs are lower than trade agreement payoffs (need to prove this—or is it just by assumption?)

– Lobby:

$$\pi(\tau^N) - e^N + \frac{\delta - \delta^{T+1}}{1 - \delta} [\pi(\tau^N) - e^N] \geq \pi(\tau^D) - e^D + \frac{\delta - \delta^{T+2}}{1 - \delta} [\pi(\tau^a)]$$

best deviation, given that leg will one-shot best respond is also  $e^N$ ; given  $\pi(\tau^N) - e^N \geq \tau^a$ , which is necessary for any of this to be interesting, this condition holds.

From old construction, need to be rechecked:

- I've shown condition for lobby is constant through time except in last period, where they'll never pay
  - In general, need to check how conditions change through time in punishment
- Need to pay special attention to leg's condition in the last period