

Theoretical Explanation for WTO “objection” to non-tariff barriers

September 28 and October 3

Theoretical explanation for WTO “preference” for tariffs over NTBs

- Recall that WTO allows “bound” (i.e., capped) tariffs, but tries to prevent use of NTBs
- Simple explanation is that tariffs are more transparent and easier to negotiate.
- Game theoretic explanation (Ederington paper).

Basics of Game theory: Non-cooperative Nash Equilibrium (NE)

- In a game, an agent's payoff depends on her own and other players' actions.
- The “best action” for a player typically depends on what other players do.
- A non-cooperative NE occurs when all players are playing their best action, given the actions that other players use.
- There are no profitable “*unilateral* deviations” from a NE: the NE is “self-enforcing”.

		Firm 1	
		H	L
Firm 2	H	10, 10	2, 15
	L	15, 2	5, 5

Supergames and trigger strategies

- A supergame is an infinitely repeated “one-shot” game. Players discount the future.
- A trigger strategy tells you (for example) to “play nice” as long as rivals have played nice in the past.
- Not all trigger strategies are Nash equilibria. The temptation to “cheat” in current period may be too great to resist, even if it leads to “punishment” in the future

Discounting

- A discount rate, d converts a future flow into a “present value” (PV): $d=1/(1+r)$ where $r =$ “interest rate”. $d<1$ because $r>0$.
- The present value of receiving \$1 next year is d . The present value of receiving \$1 two years from now is d^2 . The present value of receiving \$1 “ n ” years from now is d^n .
- The present value of receiving \$1 *each* year from now until infinity is $1/(1-d)$.

Why do we need discounting?

- A dollar today is not the same thing as a dollar one year from now – they are apples and oranges.
- If we have costs and benefits in different periods, we need a way to compare these, i.e. a way to “convert apples to oranges”.
- By converting future dollars to their “present value” we can compare costs and benefits in different periods.
- Supergames are played over infinitely many periods.

Example of trigger strategy

- Proposed strategy: choose H in first period and in every later period, provided that rival has used H in every previous period. Use L forever, if rival has ever used L in past.
- PV of following proposed strategy = $10/(1-d)$.
- PV of cheating = $15 + d5/(1-d)$
- Proposed strategy is a NE if and only if $10/(1-d) > 15 + d5/(1-d)$, i.e. if $d > 0.5$ (so $r > 1$)

Basic points

- *Cooperation can be self-enforcing* (i.e. a NE) in the infinitely repeated game (the supergame).
- Cooperation requires that agents value future sufficiently highly (i.e., they are patient, i.e. have low r , i.e. have high discount factor d). Patience needed in order to resist temptation to “cheat”.
- In games with many actions, agents may not be patient enough to support complete cooperation, although they may still be able to support some cooperation, and thus get higher payoff than at non-cooperative equilibrium to one-shot game.

What does this have to do with the WTO?

- A bit of background: One “rational” (i.e. self-interested) reason for using a tariff is to restrict demand for imports in order to reduce the price of imports, i.e. to “improve the terms of trade” (lower the price of imports).
- Only “large countries” are capable of lowering price of imports by means of a tariff.
- Suppose that countries are “large”, so that they have an incentive to use tariffs to improve terms of trade.

Finally, the story...

- Two large countries. Each has a purely domestic production distortion (e.g. pollution).
- Each has two policy instruments, a tariff and a domestic production tax.
- In (one-shot) NE countries use production tax to correct production distortion, and they use tariff to improve terms of trade (thus harming their trading partner).
- This is example of “Principle of Targeting” (using the “right tool for the job”).

The story, continued

- In the first-best (cooperative) outcome, countries use production tax to correct production distortion; consumers in the two countries face same commodity prices (e.g. free trade). This outcome involves “full cooperation”.
- Consider the outcome supported by threat of reversion to the one-shot non-cooperative NE.
- Suppose that agents are not sufficiently patient for *full cooperation* to be self-enforcing. Partial cooperation is still possible, leading to payoff higher than NE to one-shot game.

The punchline

- Under “technical conditions”, the “best” partial cooperation outcome (the one that gives countries the highest payoff) involves:
 - i) Using production policy only to correct pollution problem (*not to alter terms of trade*).
 - ii) Using a tariff that is lower than the level in the one-shot NE

In other words....

- In the “best” non-cooperative NE to the supergame, countries retain tariffs, but the tariffs are lower than the levels that countries would set if they consulted only self-interest.
- Domestic policies (here, the production policy) are *not* used as disguised trade barriers.
- Similar to WTO, article III.