Farsightedly Stable FTA Structures

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The Era of Regionalism

- Since the late 1980's, the number of regional trade agreements (RTAs), including free trade agreements (FTAs) and customs unions (CUs), has rapidly increased. Examples include:
  - European Union (1993)
  - ASEAN Free Trade Agreement (AFTA, 1993)
  - North American Free Trade Agreement (NAFTA, 1994)
  - MERCOSUR (1995)

  etc.

Rapid increase in # of RTAs since early 90's

Source: http://www.wto.org/english/tratop_e/region_e/regfac_e.htm

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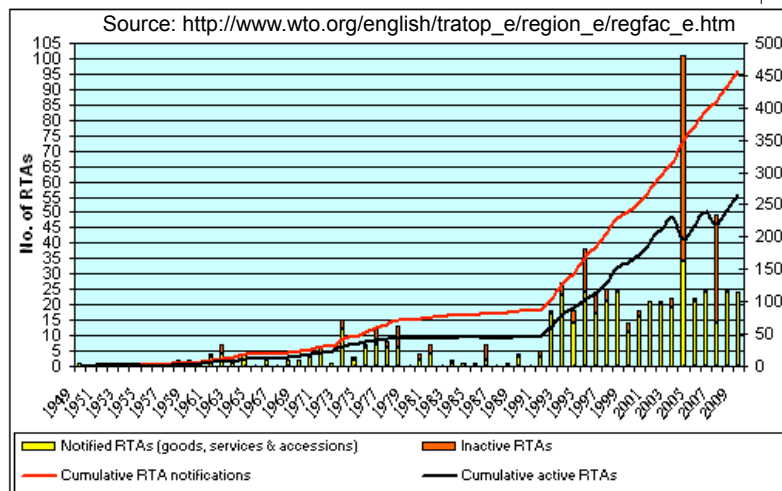
Bhagwati (1993)'s Questions

In view of the prevalence of the bilateralism/ regionalism, Prof. Bhagwati raised the following questions:

- Whether preferential trading blocs reduce or increase the world welfare?
- Building block or stumbling block---Can the bilateralism/regionalism eventually lead the situation to the global free trade? (The dynamic time-path problem)

Literature (1): Overview

- Coalition/Network formation game approach
  - Yi (1996), Das and Ghosh (2006), Saggi and Yildiz (2010)
  - Furusawa and Konishi (2005 JER, 2007 JIE), Goyal and Joshi (2006 IER)
- Some "dynamic" game approach
  - Aghion, Antras, and Helpman (2010), Macho-Stadler and Xue (2007), Seidmann (2009), Xue and Zhang (2009)

Literature (2): Coalition/network formation approach

- Solution concept or construction of games reflecting the myopia of the countries
  - Subgame Perfect NE (Yi [1996])
  - Coalition Proof NE (Das and Ghosh [2006], Saggi and Yildiz [2010])
  - Pairwise stability (Furusawa and Konishi [2005, 2007], Goyal and Joshi [2006]) developed by Jackson and Wolinsky (1996)
- Totally silent about whether and how an equilibrium FTA structure can be reached from non-equilibrium outcome

Literature (3): Some "dynamic" game approach

- Aghion, Antras, and Helpman (2007), Macho-Stadler and Xue (2007), Seidmann (2009)
- Transferable utility
- The grand-coalition superadditivity/Efficiency of the global free trade
- Coalitional externalities: positive and/or negative
- Strategic positioning (Seidmann [2009])
- Pairwise farsighted stable set (Xue and Zhang [2009])

Literature (4): Results in the previous studies

- Coalition/network formation game approach
  - The global free trade can be "stable."
  - Other inefficient outcomes can also be "stable."
- Dynamic game approach
  - Basically, the realization of the global free trade is predicted.

Outline of our model

- Symmetric, 4 country model: $N = \{1, 2, 3, 4\}$
- One oligopolistic firm in each country; Cournot competition in separated markets
- Exogenous pre-agreement tariff rates: very high case and very low case
- Representing FTA networks by "graphs"
- Farsightedness of the countries.
- von Neumann-Morgenstern stable set as the solution concept

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Representing FTA networks by undirected graphs

- An FTA network is represented by a graph.
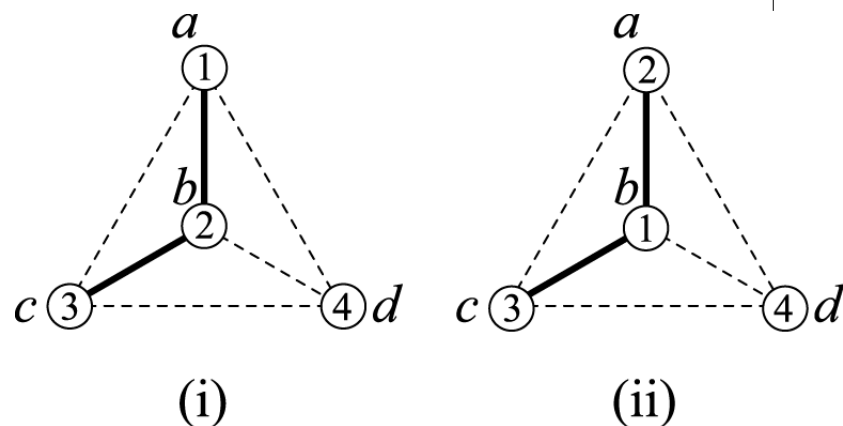- The set of all graphs is denoted by Γ, which is divided into 11 isomorphic classes.
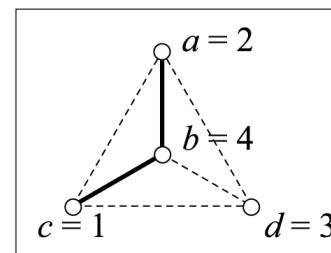
ex.) Country 4 forms two FTAs with countries 1 and 2, but countries 1 and 2 do not form FTA between them. Country 3 has no FTA.
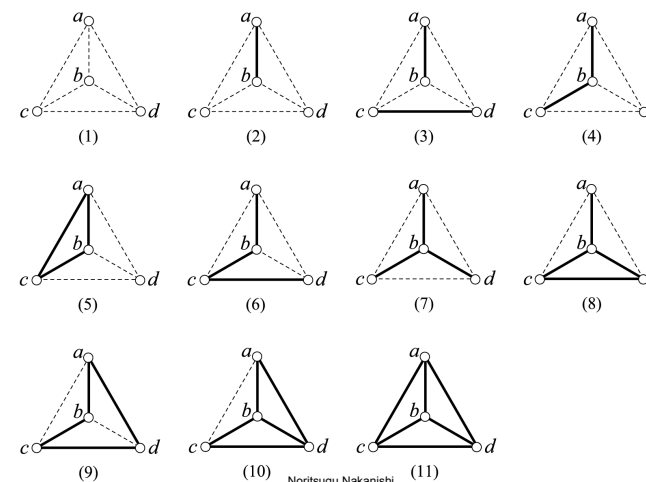
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Isomorphism

(i)   (ii)

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11 isomorphic classes (shapes) of possible FTA networks

(1)   (2)   (3)   (4)

(5)   (6)   (7)   (8)

(9)   (10)   (11)

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Welfare and FTA networks

- Welfare of a country depends not only on the shape of the graph G of a current FTA network, but also on the relative position ("address") of the country in G.
- The welfare of country i can be represented by a utility function of graphs: $U_i(G)$

Formation/dissolution of FTAs: the inducement correspondence

- If two countries i and j agree to form a new FTA or to dissolve their FTA, the current graph G changes to another graph H: we write
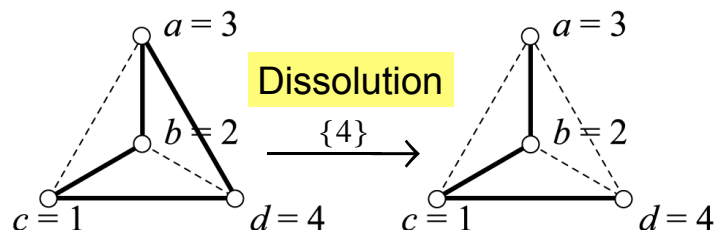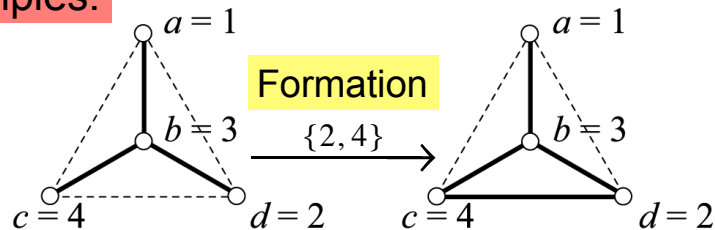
$$G \xrightarrow{\{i,j\}} H$$

- If a single country i dissolve the existing FTA(s), the current graph G changes to another graph H: we write

$$G \xrightarrow{\{i\}} H$$

Examples:

Formation

$\{2,4\}$

$a=1$, $b=3$, $c=4$, $d=2$

Dissolution

$\{4\}$

$a=3$, $b=2$, $c=1$, $d=4$

Myopic incentives to form or dissolve FTAs

- Two countries i and j have "myopic incentives" to form or dissolve an FTA if

$$G \xrightarrow{\{i,j\}} H \text{ and } U_k(G) < U_k(H) \text{ for } k=i,j.$$

- A single country i has a "myopic incentive" to dissolve FTAs if

$$G \xrightarrow{\{i\}} H \text{ and } U_i(G) < U_i(H).$$

Farsighted incentives: Indirect domination relation

- For two graphs G and H, if there exist a sequence of FTA configurations $\{G_r\}$ and a corresponding sequence of coalitions with no more than two countries $\{S_r\}$ that satisfy the following conditions:

$$G = G_0 \xrightarrow{S_1} G_1 \xrightarrow{S_2} G_2 \to \cdots \to G_{R-1} \xrightarrow{S_R} G_R = H$$
$$U_i(G_{r-1}) < U_i(H) \text{ for all } i \in S_r \text{ and for all } r = 1, \ldots, R.$$

- then, we say that *H* indirectly dominates *G*, and write

$$G \ll H$$

Definition: The farsighted von Neumann-Morgenstern stable set

- A subset K of Γ satisfying the following conditions is called the farsighted von Neumann-Morgenstern stable set:

Internal Stability

(i) For all $G, H \in K$, neither $G \ll H$ nor $H \ll G$;

External Stability

(ii) For all $G \in \Gamma \setminus K$, there is $H \in K$ such that $G \ll H$.

Explanation: The farsighted von Neumann-Morgenstern stable set

- Internal stability explains why a particular FTA network actually persists once it has been realized.
- External stability explains how the stable FTA networks are reached from other unstable FTA networks.

Features of our model (1)

- The grand-coalition superadditivity holds (i.e., the global free trade is efficient)
- Negative externalities imposed on the outsider countries' welfare

Note: These features play important roles in establishing the global free trade on the equilibrium path in the "dynamic" game approach.

Features of our model (2): High pre-agreement tariff case

- If a country is involved in one or more FTAs, it has incentive to form an additional FTA (Goyal and Joshi [2006])
- In an FTA network in which on country is isolated and the other countries constitute a complete component FTA network, the isolated country has no myopic incentive to form an additional FTA (Goyal and Joshi [2006])
- The global free trade is efficient.

Features of our model (3): Low pre-agreement tariff case

- If FTAs not involving country k are formed, the welfare of country k decreases. ➔ Negative externality.
- If FTAs involving country k and no other FTAs are formed, the welfare of country k increases. ➔ Every country always has incentives to form additional FTAs.
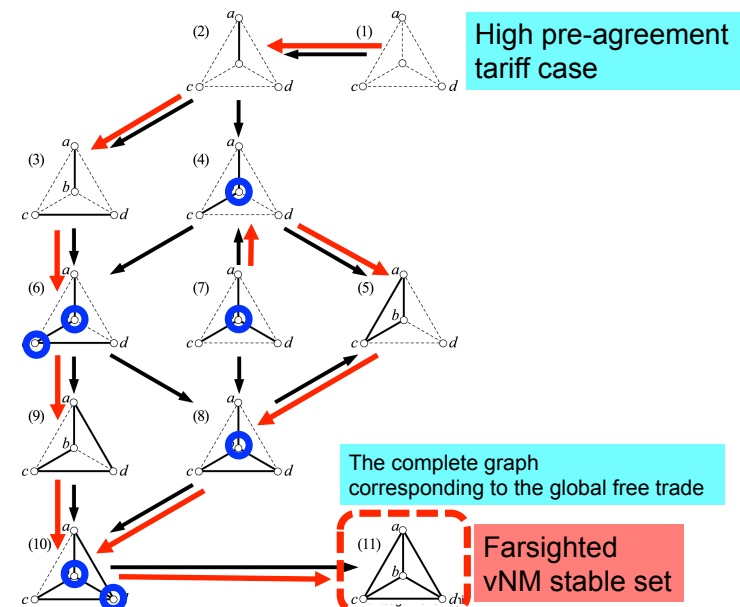- The global free trade is efficient.

Main results (Theorem 2)

- In the case of high pre-agreement tariffs with four countries, there exists a unique farsighted vNM stable set K_H and it is characterized by

$$K_H = \Gamma_{11} = \{G^*\}$$

- The global free trade is the only stable outcome in this case.

High pre-agreement tariff case

The complete graph corresponding to the global free trade

Farsighted vNM stable set

Main results (Theorem 5)

- In the case of low pre-agreement tariffs with four countries, there exists a unique farsighted vNM stable set K_L and it is characterized by
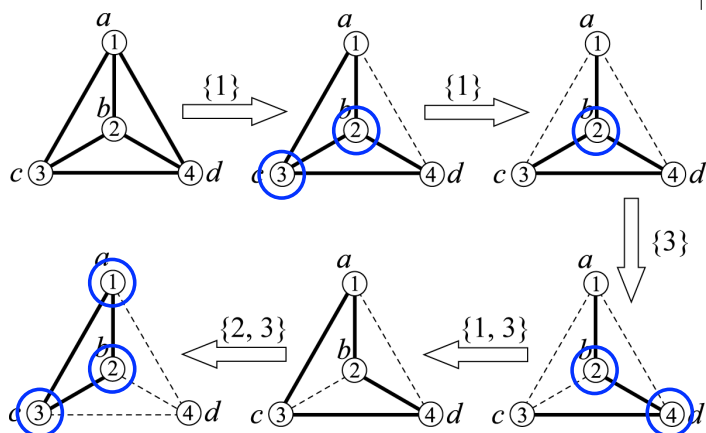
$$K_L = \Gamma_5$$

- The global free trade cannot be stable in this case.
  - Ironically, the closer the world economy is approaching the global trade, the harder it become to reach there.

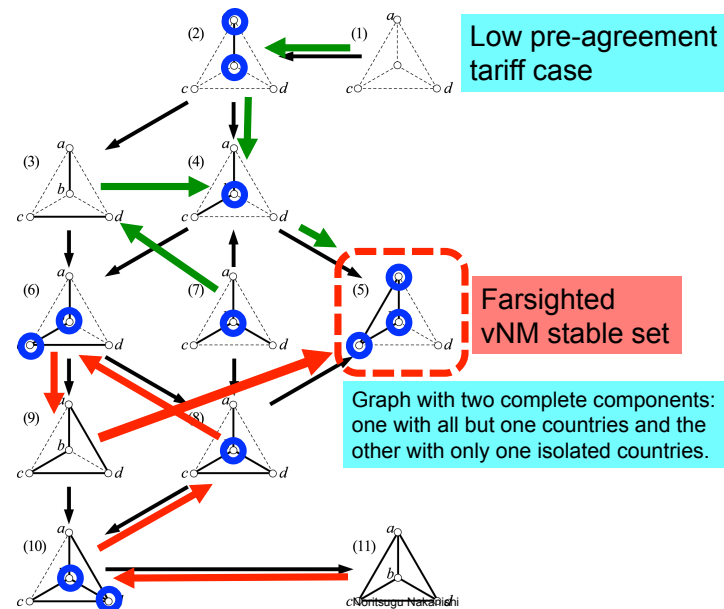Low pre-agreement tariff case

Farsighted vNM stable set

Graph with two complete components: one with all but one countries and the other with only one isolated countries.

How can the global free trade be "destabilized" ?

Remarks

- Answers to the Bhagwati's dynamic time-path problem:
  - If the pre-agreement tariffs are very high, the global free trade is realized even under bilateralism ("building block");
  - If the pre-agreement tariffs are very low, the global free trade is not achieved, but other inefficient outcomes are realized as the stable outcomes ("stumbling block").
- What if the pre-agreement tariffs are endogenous?
  - Tariff complementarity effect ➜ "Positive externality" of FTA formation ➜ Possibility of the global free trade (cf. Xue and Zhang [2009])