Great Powers and Financial Architecture in Asia Pacific

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Asia’s Trade with US and China

[Chart showing trade trends from 2000 to 2012 between Japan-US, Japan-China, ASEAN-US, and ASEAN-China.]
Public Goods Provision

Voting Powers in the Board of Governors

Source: IMF
Public Goods Provision

Currency Distribution of Global Foreign Exchange Market Turnover

Source: BIS Triennial Central Bank Survey
Dynamics within Asia Pacific

Regionalism? Great Power Competition?
- ASEAN Economic Community, TPP, RCEP
- Chiang Mai Initiative, ABMI, AMRO \(\Rightarrow\) Asian Monetary Fund?
- ADB, AIIB
The Rise of China

- Public good provision: US no longer capable but China reluctant?
- Implication for the hegemonic structure, particularly to East Asia?
Alesina and Spolaore (1997)

- “On the Number and Size of Nations”
- A unit mass of citizens who pay taxes for public goods provision
- Each public good constitutes a nation
- The utility of an individual depends on the “distance” to the public good
This Paper

- Club good: excludable and non-rival
- Two modes of public good provision
  - A hegemon single-handedly provides the club good
  - A coalition provides club good for its members
- Discrete countries in $\mathbb{R}^2$ (vs a unit mass of citizens on [0, 1])
- Consensus voting (vs. majority voting)
- Non-cooperative and cooperative game
 Setting 

- $N$ countries $\{x_1, x_2, ..., x_N\}$ represented by $N$ points on $\mathbb{R}^2$.
- Total income of country $i$:

$$I_i(g) = y_i + g(1 - \alpha_i(g)d_i(g)) - t_i(g)$$

where $y_i$ the endowment
$g$ is the public good
$d_i(g)$ is the distance of $i$ from $g$
$t_i(g)$ is the fee paid to use $g$

- $g$ is a fixed type of club good.
- $t_i(g) = t(g)$ for all users of $g$.
- We assume $\alpha_i(g) = \alpha$. 
Each country faces a discrete maximization problem

$$\max_{g} l_i$$

The choice set \( \{g\} \) consists of public goods by hegemons or by coalitions.
Hegemons

A hegemon determines the location of public good $g$.

- A hegemon has income greater than $\bar{k}$
- Under the hegemon $H$, $d_H(g) = 0$.
- Cost of production is $\bar{k}$. There is no coordination cost for producing $g$. 

Hegemons - Congestion Games

With deterministic hegemons, competition to form hegemonic structure can be analysed using a congestion game \( \Gamma = \{ S_N, R, A, I \} \) where:

1. The players are \( N \) countries in \( S_N \)
2. The set of resources \( R = \{ H_1, H_2, ..., H_n \} \) consisting of \( n \) potential hegemons, \( n \leq N \).
3. \( A = \prod_{i=1}^{N} A_i \) where \( A_i \) is the set of strategies for player \( i \).
   \( A_i = \{ \emptyset, 1_{H_1}, 1_{H_2}, ..., 1_{H_n} \} \)
4. \( I \) is the set of incomes in response to the element in \( A \).
Hegemons - Congestion Games

With the explicit form of utility, the exact potential of the game can be defined as:

$$\Phi(a_1, a_2, ..., a_N) = \sum_{i=1}^{N} g_{Hi}(1 - \alpha l_{Hi}) - \sum_{j=1}^{n} k \left(1 + \frac{1}{2} + ... + \frac{1}{n_{Hj}}\right)$$

which satisfies

$$\forall a_i, a'_i \in A_i, \forall a_{-i} \in A_{-i}$$
$$\Phi(a_i, a_{-i}) - \Phi(a'_i, a_{-i}) = l_i(a_i, a_{-i}) - l_i(a'_i, a_{-i})$$
Hegemons - Congestion Games

Well-defined solution concepts

- There exists a Nash equilibrium
- With a finite number of players and finite number of strategies, we can make finite number of “improvement steps” to reach a Nash equilibrium
Coalitions - Hedonic Games

- For $S_N$, define coalition partition as $\Pi = \{S_1, S_2, ..., S_l\}$ such that $S_k$'s are disjoint and $\bigcup_{i=1}^{l} S_k = S_N$.
- Each $S_k = \{x_1, x_2, ..., x_k\}$ produces public good as a coalition.
  - The location of $g$
    
    $$x_g = \frac{x_1 + x_2 + ... + x_k}{k}$$

    $x_g$ minimizes $D = \sum_{j=1}^{k} |x - x_j|^2$
  - Besides $\bar{k}$, $S_k$ incurs a coordination cost, $C(S_k)$, to produce $g$
- Hedonic property: for each $x_i$, there is a preference relation $\succeq_i$ over $\{S_{\Pi}(i)\}$ which depends solely on the membership of the coalitions
Coalitions - Hedonic Games

Stability concepts

- **Nash stability** (Nobody wants to move)

- **Core stability**: \( \Pi \) is core stable if there is no \( T \subset S_N \) such that \( T \preceq_i S_\Pi(i) \ \forall x_i \in T \), with at least one strict preference

- Core stability \( \not\Rightarrow \) Nash stability \( \not\Rightarrow \) Core stability (Bogolmanaia and Jackson (2002))
Coalitions - Hedonic Games

- Sufficient conditions for core stability by Bogolmanaia and Jackson (2002) and Banerjee, Konishi and Sonmez (2001)
- This paper develops a “proposing algorithm” to find the core stable coalition if it exists
Countries on Arcs
Countries on Arcs

Comparative Statics

- Fix the location of two hegemons
- For a given $r$, find the range of $\theta$ for which different structures arise.
Simulation - One Hegemon

\[ g = 5, \bar{k} = 7, \alpha = 1, N = 11 \]

\[ r = 0.6, \theta = \frac{\pi}{9} \]
Simulation - Competing Hegemons

(a) $\theta = \frac{\pi}{9}$

(b) $\theta = \frac{7\pi}{108}$

(c) $\theta = \frac{13\pi}{216}$

(d) $\theta = \frac{\pi}{18}$
Simulation - Incumbent Hegemon versus Coalitions

$r = 0.8$

$r = 0.1$
Simulation - Hegemons and Coalitions