Economic analysis of the formation of global alliance in shipping and airline industries and its impact on markets from the viewpoints of industrial organization

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Background and objectives

• Global alliance as strategic option for global business
• Global alliance more beneficial/important
• Each three alliance in shipping/airline industries
• Objectives are:
  – to examine the formation and development of global alliance in shipping/airline industries
  – to analyze its impact on corporate performance and markets from the viewpoints of industrial organization in economics
Order of presentation

• Changes in cooperative behaviors and regulatory framework in shipping and airline industries
• Details of global alliance and its economic impact on performance
• Impact of formation and development of global alliances on competition in shipping and airline industries

• Changes in cooperative behaviors and regulatory framework in shipping and airline industries
Definition of alliance

• Alliance is cooperative behavior/joint entity which two or more firms pursue, while each firm maintains its own corporate control/governance.
• Cooperative behaviors are subject to antitrust law (competition policy) and penalties without approval.
• Most cooperative behaviors in shipping not subject to antitrust; they are antitrust-immunized.
  – shipping conference cartel (both closed and open),
  TAA(Trans-Atlantic Agreement),
  TSA(Transpacific Stabilization Agreement),
  merger and acquisition

Shipping conference (Liner conference)

• Dominating liner services since the first conference was established between U.K.- Calcutta in 1875.
• Objective: to avoid competition.
• Its function includes:
  – price-fixing cartel on a particular route
  – same tariffs/surcharges and terms setting
  – revenue-sharing and capacity-control
• Currently, losing its power and its price-fixing cartel not working in many routes.
Consortium and Global Alliance

- Consortium/Bilateral Alliance
  - cooperative behavior where shipping firms share resources/assets in specific markets through coordination of operations and marketing
  - objective: to provide efficient/convenient services
- Global Alliance/Multilateral Alliance
  - cooperative behavior where more than three firms form a group in global markets rather than specific markets and share resources/assets in wider scope in terms of operation than consortium

Business environments affecting change in cooperative behaviors in shipping industries

- Containerization; enabling intermodal freight transport and reducing entry barrier into liner services
- Integration of world economy and increase in international trade
  - Fragmentation/dispersion of production process across countries through foreign direct investment
  - Customer’s needs for transport more diversified and cost-sensitive
- Implementation of competition policy toward the shipping conference and liberalization in airline services
Competition policy of the US and EU toward shipping conference

- Shipping is operated under less restrictive regulatory framework compared with other service industries, such as finance, telecommunication, and airlines.
- Under the principle of “Freedom of the Seas,” shipping firms can provide transport service between any two country without restriction.
- Shipping conferences granted antitrust immunity.
- However, review of the antitrust immunity started in EU, the US and other countries.
- In EU, block antitrust immunity to shipping conference has been abolished in 2006.

The Shipping Act of 1984 and the Ocean Shipping Reform Act of 1998 in US

- continued to grant antitrust immunity, simplified and shortened approval process of antitrust immunity, and expanded the scope of immunity into intermodal rates, but
- as competitive measures, ordering shipping conference to allow each conference member to set discounts freely without notifying other members, the so called independent action, and to resort to price-competition in contract of large volume (service contract).
Regulatory Framework for Airlines and their Alliances

- Sharp contrast between shipping and airlines
- Airline services have been operated under severely restrictive bilateral regulatory frameworks, Bermuda and Predetermination:
  - Nationality clause: substantially owned and effectively controlled by nationals of designating countries
  - Capacity, frequency, route and price need approval of government.
  - Few fifth (and sixth) freedoms, allowing airlines to carry traffic beyond a bilateral partner country
- Currently, still most of existing bilaterals are restrictive

Bilateral Liberalization: Open skies

- The U.S. government has been promoting open skies liberalization since 1992.
- No regulation on route between two countries and beyond bilateral partner countries, free capacity, free airfare
- Free alliances and granted antitrust immunity as long as they are pro-competitive
- 94 countries as of April 2009, including Asian countries such as Korea, Indonesia, Taiwan, Singapore, and in January 2010 Japan
- Open skies in other bilateral markets: New Zealand-Australia, Germany-New Zealand, Canada-UK
Multilateral Liberalization: Case of EU

- EU Economic Integration
- Free entry of EU carriers into EU markets, including domestic markets, without capacity/price regulation
- Changing nationality rule: common airline operating licenses and certificates by EU members and free cross-border investment among EU carriers
- EU’s horizontal agreement with non-EU countries: removing nationality restrictions and allowing airlines to fly between any EU point and any point of other countries, such as the US, New Zealand and Singapore

- Details of Global Alliance and its economic impact on performance
Global Alliance in Shipping Liner Services

<table>
<thead>
<tr>
<th>TNWA</th>
<th>GA</th>
<th>CKYH</th>
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| • The New World Alliance  
• About 100 vessels  
• 13 routes  
• APL (Singapore), MOL (Japan), Hyundai (Korea)  | • Grand Alliance  
• About 140 vessels  
• 14 routes  
• NYK(Japan), Hapag-Lloyd (Germany), OOCL(Hong Kong), MISC (Malaysia)  | • CKYH Alliance  
• About 170 vessels  
• 17 routes  
• COSCO (China), K Line (Japan), Yang Ming (Taiwan), Hanjin (Korea) |

Case of joint-operation in Asia-North America route in TNWA

• 9 loops (including a few loops beyond US west-coast to US east-coast), average 5-6 weeks, 4000TEUs～6000TEUs
• About 50 vessels
• Major destination ports: Kaohsiung, Hong Kong, Yokohama, Tokyo, Busan, Shanghai in Asia, and LA, Oakland, Vancouver, Seattle in the US
• Extensive intermodal connection to mid-west and east-cost of the US
Case of joint-operation in Asia-North America route: GA

- 9 loops (including a few loops to US east-coast), average 5-6 weeks, 3000TEUs～8000TEUs
- About 60 vessels
- Major destination ports: Hong Kong, Shanghai, Yokohama, Busan in Asia, LA, Oakland, Seattle, Norfolk, Savannah, New York in the US

Case of joint-operation in Asia-North America route: CKYH

- 4 loops, average 8-9 weeks, 3500TEUs～5500TEUs
- Hong Kong, Shanghai, in U.S. focusing on east-coast ports including Savannah and New York
- Extensive feeder connection in intra-Asia market.
The total number of vessels operated by each member both within and outside global alliances in liner services

<table>
<thead>
<tr>
<th>Alliance</th>
<th>TNWA</th>
<th>GA</th>
<th>CKYH</th>
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<tr>
<td></td>
<td>About 280</td>
<td>About 320</td>
<td>About 370</td>
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<tr>
<td></td>
<td>About 100 within global alliance</td>
<td>About 140 within global alliance</td>
<td>About 170 within global alliance</td>
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Global alliances in airlines

<table>
<thead>
<tr>
<th>Alliance</th>
<th>star alliance</th>
<th>skyteam</th>
<th>oneworld</th>
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<tr>
<td></td>
<td>since 1997</td>
<td>since 2000</td>
<td>since 1998</td>
</tr>
<tr>
<td></td>
<td>15%</td>
<td>11%</td>
<td>11%</td>
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<tr>
<td></td>
<td>26 members: United, ANA, Lufthansa, SAS, Air Canada, Air China, BMI, Air New Zealand, Asiana, Austrian, Continental, Swiss, Singapore, Thai, TAP, Turkish, US Airways others</td>
<td>10 members: Alitalia, China Southern, KLM, Czech, Delta, Northwest, Air France, Aeroflot, Aeromexico, Korean</td>
<td>11 members: American, BA, Cathay, Finnair, Iberia, JAL, LAN, Malév, Mexicana, Qantas, Jordanian</td>
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Contents of cooperative arrangements in global alliance

• Joint operation: space charter/exchange, revenue pooling, revenue and marketing pooling, codesharing (in airlines), including feeder routes and intermodal freight transport
• Joint marketing, sales and promotion and joint venture in logistics operation
• Single-roof facility strategy: sharing facilities including cargo and passenger terminals, logistics warehouse, handling, offices, check-in counters and airport lounges
• Common procurement in broad range of items, IT platform, management system infrastructure, insurance, oils
• Joint effort/development to reduce fuel consumption/CO2 emission

Economic effects on performance: Positive effects

• Expanding network in terms of frequencies and destinations with limited resources and without additional costs
• Providing more convenient and seamless services to customers
• Obtaining additional flow traffic by establishing effective network, such as hub and spoke network, pendulum services
• Accordingly, increased demand and larger vessels operation, leading to improved productivity and decreased average cost, the so-called economies of density
Economic effects on performance: positive and negative effects

- Learning intangible assets, such as management know-how and reputation, not tradable in the market because such assets immobile and exhibit lack of information
- Increasing monopoly power: negative impact upon consumers in terms of competition policy
- Negative effects:
  - Complicated governance/decision making process
  - Free-riding and opportunistic behaviors
  - Coordination problem among members, particularly in the area of distributing costs and benefits equally among members


- Data: Top 30 major international airlines between 1986 and 1995
- Dependent variables: Profitability and Productivity
- Independent variable: Number of bilateral alliances
- Control variables: relative partner size, cultural similarity, firm size, technological investments, restructuring, route distance, business proportion, etc
- Estimation results: statistically significant and positive relationship between alliances and productivity and positive but not significant relationship between alliances and profitability
• Impact of formation and development of global alliances on competition in shipping and airline industries

Competition policy issues regarding global alliances

• Does the formation of global alliances promote competition or hinder competition in shipping and airline industries?
• How does the subsequently reduced number of players affect competition and price?
• What kind of competition is proceeding in the shipping and airlines industries where the formation of global alliances is progressing?
Basic theories about relationship between number of firms and competition: three market structures

• More Competitive
  – Perfect competition
    • so many firms produce same goods
  – Oligopoly (Duopoly)
    • several firms (two firms) produce same goods
  – Monopoly or Cartel (Joint profit maximization)
    • a single firm dominates market or several firms jointly maximize their profits by forming cartel

• Less Competitive

Definitions

• Quantity/output (Q)
• Price (P)
• Demand curve (DD): Relationship between price and demand (quantity)
• Supply curve (SS): Relationship between price and supply (quantity)
• Marginal cost (MC) : first derivative of total cost function (C)
  (marginal cost=supply)
• Marginal revenue (MR) : first derivative of total revenue
Degree of Competition

• Price: \( P^X \) (in Perfect Competition) < \( P^Y \) (Oligopoly) < \( P^Y \) (Monopoly and Cartel)
• Quantity: \( Q^X \) (in Perfect Competition) > \( Q^Y \) (Oligopoly) > \( Q^Y \) (Monopoly and Cartel)
• Price-cost margin: \( \frac{\text{Price} - \text{Marginal Cost}}{\text{Price}} \)
  – the smaller margin, the more competitive,
  – the larger margin, the less competitive,
  – in perfect competition it is 0, larger margin in monopoly and joint profit maximization

Conjectural Variation (1)

• Oligopolistic market where some shipping firms offer same services to many consumers
• Total market supply \( Q \); price \( P \); and inverse total market demand function \( P = P(Q) \)
• Supply of \( g \)th shipping firm \( q_g \); \( Q \) equal to the sum of each firm’s supply
• The \( g \)th shipping firm’s profit function \( \pi_g = P(Q)q_g - C_g(q_g) \), where \( C_g(q_g) \) is its total cost function
• \( MC_g \) is marginal cost of the \( g \)th shipping firm
Conjectural Variation (2)

gth firm’s profit maximization condition:
\[
\frac{\partial \pi}{\partial q} = P + \frac{\partial P}{\partial Q} \frac{\partial Q}{\partial q} - \frac{\partial C}{\partial q} = P + \frac{\partial P}{\partial Q} \frac{\partial Q}{\partial q} - MC = 0
\]

the sum of supply except gth firm: \( Q-g \)

Conjectural Variation (degree of competition)
\[
\gamma = \frac{\partial Q}{\partial q}
\]

-1 in perfect competition, 0 in Duopoly, \((Q/qg)-1\) in cartel

Conjectural Variation (3)

Market share of gth firm: \( s_j = \frac{q_j}{Q} \)

price elasticity of demand:
\[
\alpha = -\frac{\partial Q}{Q} \frac{P}{\partial P}
\]

Conjectural variation expressed as follow
\[
\gamma_g = \frac{P - MC_g}{P} \frac{\alpha}{s_g} - 1
\]
Estimation results of conjectural variations in airline industry

• Chicago-based US domestic routes where United Airlines and American Airlines had 75% market shares combined (Brander/Zhang1990)
  – 0.12 in United and 0.06 in American: Cournot Duopoly
• U.S. domestic routes originating in Atlanta, Delta Air Lines’ hub airport (Fischer et al.2003b)
  – Cournot Duopoly in most routes
• Three major Japanese airlines (Endo2005)
  – Between -0.1 and +0.1: duopoly or slightly tougher than duopoly after deregulation of 1986 until 2002

Panzar-Rosse H statistics

• \( H = \sum (\frac{dR^*}{dW_i} \cdot \frac{W_i}{R^*}) \) : sum of elasticities of revenue regarding factor prices
• \( R^* \) revenue function, \( W_i \) factor(i) price
• \( H \) shows market structure as well as corporate behaviors
• Less than 0: monopoly or joint monopoly (perfect collusion)
• Between 0 and 1: monopolistic competition and the degree of competition if certain conditions are satisfied
• Equal to 1: perfect competition and contestable
Estimating H statistics in shipping (Endo2005b): specification

- $\ln R = a_0 + a_1 \ln(PK) + a_2 \ln(PL) + a_3 \ln(PF) + a_4 \ln(\text{real GNP of Japanese economy})$
- $\ln$: natural logarithm
- H statistics: $a_1 + a_2 + a_3$
- Data: 52 observations collected from Japanese three shipping liner companies (NYK, MOL and K-Line) between 1986 and 2002, panel data
- R: total revenue in liner shipping services

Variables

- PL, PK, PF: factor prices of labor, capital and operation
- PL: real average labor cost composed of such as wages, salaries and benefits
- PF: operation cost divided by deadweight deflated by GDP
- PK: (depreciation cost/tangible fixed assets) + (interests and bond payment/long-term debt and bond) and then multiplying the result by capital goods price index
Estimation results

- Estimation Method: Fixed-effect model in panel technique
- H statistics 0.53:
- Two hypotheses (H=1, Perfect Competition and H=0, Joint monopoly) are not accepted by F-test.
- From the results, shipping liner firms may not exercise monopoly power and the formation of global alliance may not hinder competition.

Estimations of H statistics in other transport sectors

- European Airlines: 0.17 between 1992 and 1997 and 0.44 between 1997 and 2002 (Endo 2006)
- U.S. truck industry: 0.52 (Savage 1995)
- US air transport services departing from Atlanta: positive and more than 1 (Fischer et al. 2003a)
References


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