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Beyond OCA: a game approach on monetary union based on “long term and common benefits” and its implications for East Asia

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on Nov. 19th, 2008
at Hitotsubashi University, Tokyo, Japan
Regional Monetary Union is being carried on
- in different paths and to different extents
- eg: EMU, Africa, Gulf countries, former Soviet Union
- strengthening regional monetary system
- accelerating under the ongoing crisis

East Asia lags behind, why? common wisdom:
- East Asia is not an OCA
- lagged real integration
- political and cultural obstacles (Kahler, 2000)

Are these true?
Outline

- Introduction
- History
- Critics on OCA theory
- Improved cost-benefit analyses
- A game approach
- Interest groups
- New view on EMU
- East Asia
The Geography of Money in history

- Basic observations in history:
  - private money → national money
  - empirical regularity (Mussa, 1997) “one country, one money”

- Two forces affect the domain of money circulation
  - market: the geographic expansion of transaction
  - state: the country’s territory

- After nationalization of money, state factor dominates
The Geography of Money in history

- However, national money induces efficiency losses, which are increasing with the expansion of market!
- Why not “many country, one money”?
- The difficulties:
  - lack of “focal point”
  - coordination and cooperation failures.
- Within a country, easy to overcome these difficulties (Qin Dynasty(221BC), German Unification)
- But not easy internationally
Two MUs in history

- Latin MU (1865-1927, France, Italy, Belgium, Switzerland)
  - cause of setting up: discovery of gold → gold ↓ → silver coins disappear → Switzerland non-cooperative action (lower silver content 20%) → adverse effects on others → 1865 meeting
  - cause of collapse: print money competitively to finance WWI

- Scandinavian MU (1873-1931, Norway, Sweden, Den.)
  - cause of setting up: major trade counterpart (Britain and Germany) started to use gold
  - cause of collapse: WWI

Setting up: to seek common interests by taking cooperative actions

But eventually collapses:
- as coordination and cooperation hard to maintain, when
  - the circumstance became more uncertain and volatile
  - difficulty to play game repeatedly
  - short sighted
The classical OCA

- **Theory of OCA**
  - Mundell (1961), Mckinnon (1963), Kenen (1969), etc.
  - **Basic idea:**
    - Joining MU induces macro cost, either unemployment or inflation
    - cost decreases if matching OCA criteria better.
  - **OCA criteria:**
    - Symmetric shocks
    - Flexible wages
    - Labor mobility
    - High trade openness
    - Diversified production structure
    - Financial integration and capital mobility
    - Similar inflation rate

- **Applications of OCA to test an area**
Three critics on classical OCA

- First, problem of inconsistency of OCA theory and complex relationships within these criteria
  - Substituting, overlapping, causality, contradictory.
  - For example, should not emphasize too much on labor mobility
    - too strong to become a criteria (social and cultural cost etc.)
    - only in relative sense (Mundell himself said so)
    - can be substituted by wage flexibility, financial integration.
  - For another example, “diversified production structure” somewhat contradicts with “high trade openness”.
  - Also, the importance of financial integration and capital mobility is underestimated.
    - In the US currency area, shocks on the state’s GDP, smoothed 39% by capital market, 23% by credit markets, 13% by federal government. Totally 62% by financial means.
    - faster and easier adjustment, reduce macro-cost
Three critics on classical OCA

- Second, the assumption of OCA is very much Keynesian
  - money and exchange rate policy: an effective macro-tools
  - however, monetarism school and rational expectation school offer new insights.
  - a smaller CA in Keynesian world, but a bigger CA in monetarism world (Grauwe, 2000)

- Third, endogenity problem
  - OCA criteria can be met ex post
    - trade openness
    - financial integration and capital mobility
    - inflation rate
  - economic integration and monetary integration can be paralleling.
A more optimistic OCA

- Overall revaluation on OCA:
  - of actually enemy towards MU (Owen & Cole, 1999)
  - hold cautions on applying OCA to guide practice.
- New thoughts:
  - macro adjustment cost is not that high or can become smaller ex post.
  - take a more optimistic view on monetary union.
- New Criteria System of Optimum Currency Area
- OCA: only about macro-cost
- Not easy to explain CFA Franc area, which has small internal trade and high rigidity in wage
- More broader view on benefit and cost
Cost and benefit analyses of MU

- The existing literature:
  - Ishiyama, 1975; Tower & Willet, 1976, etc.
  - benefit: reduce transaction cost, stimulate trade and investment, better risk-sharing, monetary policy reputation
  - cost: macro-adjustment cost; transition cost; losing sign
  - insufficiency on exploring the positive externality aspects of benefits
  - insufficiency on noticing of the benefit of longer term while overemphasizing on one time cost.
An improved cost and benefit analyses

- The interdependence of countries joining MU → network externality → “Common Benefits”, such as
  - saving international reserve
  - money as the means of transaction and store of value
  - investment externality and growth enhancing
  - international seigniorage and competitiveness

- Some benefits apparent only after some periods of time → “Long-term Benefits”, such as
  - a more stable macro-economy
  - more and better investment: long term risk difficult to hedge)
  - international seigniorage and competitiveness
An improved cost and benefit analyses

- Therefore, one needs a broader and longer view on benefit and cost of MU
- If not, benefits underestimated and costs overestimated
- Take these into consideration, economic net benefit is sufficient to justify EMU.
  - short-term net benefit < 1.2% of GDP
  - long-term net benefit > 1.2% of GDP
- Different regions have different cost-benefit structure
  - some countries gain more on monetary policy reputation
  - British pound as the strong sign of the country
  - CFA franc area: tight and close financial and trade connection with France
New approach: a game model

- a macro game model:
  - country A’s benefit depending on B’s decision of whether joining MU or not
  - “one country, one currency”: a prisoner dilemma type Nash equilibrium - not social optimal
  - “coordination failure” or “cooperation failure”
  - the existing literature
    - Ogawa & Ito (2002): pegging “basket” collectively, which is social optimal in terms of reduce trade fluctuations, needs coordination

In the subsequence:
- an abstract game model
- four specific economic settings
An abstract model

- Two ways of understanding the game
  - A and B decide independently whether to join a MU
  - A (leader) decides whether to consider B’s interest when conducting monetary policy; B decides whether to join

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>Not join</th>
<th>join</th>
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<tr>
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<td>(IIa) A₁, B₁</td>
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<td>(IIIa) A₂, B₂</td>
<td>(IVa) A₃, B₃</td>
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<td>(IIb) A₁, B₁</td>
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<td></td>
<td>(IIIb) A₂, B₂</td>
<td>(IVb) A₃, B₃</td>
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</tbody>
</table>
An abstract model

- Assume: \( A_3 > A_0 = 0, B_3 > B_0 = 0 \)

- Game results:

<table>
<thead>
<tr>
<th>Number relations</th>
<th># of Equilibrium</th>
<th>Nature of equilibrium</th>
</tr>
</thead>
<tbody>
<tr>
<td>( B_1 &lt; B_0 = 0 )</td>
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<td></td>
</tr>
<tr>
<td>( A_1 &gt; A_3 ) or ( B_2 &gt; B_3 )</td>
<td>One prisoner dilemma eq.</td>
<td>Not social optimal</td>
</tr>
<tr>
<td>( A_1 &lt; A_3 ) and ( B_2 &lt; B_3 )</td>
<td>Two Eq.</td>
<td>One is not social optimal, another is</td>
</tr>
<tr>
<td>( B_1 &gt; B_0 = 0 )</td>
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<tr>
<td>( A_1 &gt; A_3 )</td>
<td>One dollarization eq.</td>
<td>Social optimal</td>
</tr>
<tr>
<td>( A_1 &lt; A_3 )</td>
<td>One eq.</td>
<td>Social optimal</td>
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### Examples with numbers I, II

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<tbody>
<tr>
<td>A</td>
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<td></td>
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<tr>
<td>Not consider</td>
<td></td>
<td>(0, 0)*</td>
<td>(4, -2)</td>
</tr>
<tr>
<td>consider</td>
<td></td>
<td>(-1, 1)</td>
<td>(3, 3)</td>
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<tr>
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<th>Join</th>
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<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not consider</td>
<td></td>
<td>(0, 0)*</td>
<td>(2, -2)</td>
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<td>(3, 3) *</td>
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### Examples with numbers III, IV

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<tbody>
<tr>
<td>A</td>
<td>Not consider</td>
<td>(0, 0)</td>
<td>(4, 1)*</td>
</tr>
<tr>
<td></td>
<td>Consider</td>
<td>(-1, 1)</td>
<td>(3, 3)</td>
</tr>
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</table>

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<thead>
<tr>
<th></th>
<th>B</th>
<th>Not join</th>
<th>Join</th>
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<tbody>
<tr>
<td>A</td>
<td>Not consider</td>
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<tr>
<td></td>
<td>Consider</td>
<td>(-1, 1)</td>
<td>(3, 3) *</td>
</tr>
</tbody>
</table>
Coordination failures: network externality and transition cost

- Benefit of using certain currency: \( a + nb \)
  - \( a \) is the normal benefit
  - \( b \) is the benefit related to network externality
  - \( n \) is the # of countries using the currency
- Transition cost: \( s \), which is smaller than \( b \)
- Return matrix
- If A has a better expectation that B will coordinate, the social optimal results can be reached.

\[
\begin{array}{c|cc}
A & B & \text{Not join} & \text{Join} \\
\hline
\text{Not join} & (a + b, a + b) & (a + b, a + b - s) \\
\text{join} & (a + b - s, a + b) & (a + 2b - s, a + 2b - s) \\
\end{array}
\]
Cooperation failure I: countries with different inflation tolerance levels

- Country A and B minimize welfare loss:
  \[ L_i = (U_i - \widetilde{U})^2 + \theta_i \pi_i^2 \]

- Short term Philips curve:
  \[ U_i = (\pi_i^e - \pi_i) + \eta_i \]

- Policy makers’ reaction function:
  \[ \pi_i = \frac{1}{1 + \theta_i} (\pi_i^e + \eta_i - \widetilde{U}) \]

- Market’s reaction function:
  \[ \pi_i^e = -\frac{\widetilde{U}}{\theta_i} \]

- Cross two functions:
  \[ \pi_i = -\frac{1}{\theta_i} \widetilde{U} + \frac{1}{1 + \theta_i} \eta_i \]

- B is tolerant inflation more than A (A is the leader)
Cooperation failure I: countries with different inflation tolerance levels

- **A**, compare welfare if “considering” or not
  \[
  E(L_{A_{mem}}) - E(L_{A_{lead}}) = \theta_A \left( \tilde{U}_A^2 - \tilde{U}_{MU}^2 \right) + \frac{1}{1 + \theta_A} \sigma_A^2 + \frac{1 + \theta_A}{(1 + \theta_{MU})^2} \sigma_{MU}^2 - \frac{2}{1 + \theta_{MU}} \sigma_{A,MU}
  \]
  - bigger than 0
  - prefers to be a leading country

- **B**, compare welfare of join or not
  - closer inflation tolerance to A, B tend to join;
  - shocks more positively correlated with A, tend to join

- Justify why the inflation needs to be close to facilitate cooperative behavior
Cooperation failure II: countries with different fiscal expenditure

- two sources of revenue: normal tax and inflation tax: \( g_i = t_i + \phi_i \)
- Country A and B minimize the distortions due to tax revenue: \( L_i = \pi_i^2 + t_i^2 \)
- B has bigger government expenditure
- Compare the welfares for A and for B
- Bigger fiscal scale differences → more difficulty to get out of the bad equilibrium
Cooperation failure III: free rider and cost sharing

- Two countries, one’s benefit bigger than the other; have to pay for a joint cost

- Returns:

<table>
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<tr>
<th>A</th>
<th>B</th>
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<th>Pay</th>
</tr>
</thead>
<tbody>
<tr>
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<td>(0, 0)</td>
<td>(3, 2-C)</td>
<td></td>
</tr>
<tr>
<td>pay</td>
<td>(3-C, 2)</td>
<td>3-αC, 2-(1-α)C</td>
<td></td>
</tr>
</tbody>
</table>

- Results:
  - C > 5: “no MU”- social optimal
  - 5 > C > 3: “no MU”- Nash Eq., not social optimal
  - 3 > C > 2: “MU” - A pay all the cost, B is the free rider
  - 2 > C > 0: “MU”- both can pay all the cost.
  - Best sharing rule: α = 0.6, since it can endure cost close to 5
Policies to overcome coordination and cooperation failure

- Individual rationality and collective irrationality
- Regional institutions built up is important
  - smooth communication, reduce uncertainty
    → “Common Benefits” easily realized
  - surveillance and to punish non-cooperative behavior
  - create incentives of playing game repeatedly
    - tit-for-tat strategy: bad for both in the long run
  - be more patient (higher discount rate)
    → “long-term Benefits” easily realized
- Political linkages rather than union needed.
A new view on EMU

- In the literature:
  - euro area is not an OCA
    - Krugman & Obstfeld (1998): labor immobility, etc.
    - Eichengreen (1997): make comparison with the US
    - Bayoumi & Eichengreen (1993): only “core” close to an OCA
  - benefit and cost analyses cannot justify EMU

- In this framework:
  - macro-adjustment cost not that high (Europe reorientation)
  - common and long term benefit is significant and economic benefit can justify EMU
A new view on EMU

- Moving away from bad equilibrium by regional institutional enhancement and enrichment
  - Payment union (1950) → money committee (1957) → Central banker committee (1964) →
  - snake and EMCF to surveillance (1972) →
  - EMS and European monetary fund (1979, ECU) → EMU (Maa. treaty, 1993; EMI, 1994; SGP, 1996)
- A learning process to sustain coordination and cooperation.
  - Example-1992 EMS crisis:
    - freed capital movement but monetary autonomy
    - Germen raise interest rate after unification → negative effect on others → 1995 Germen lower interest rate

Future EMU:
- can be sustained by common and long term benefit.
- continuously perfecting coordination mechanism
Domestic interest group: not matter much

- Compare the domestic distributional effects between trade policy and monetary union policy, the latter:
  - not easily identifiable interest groups
  - more uncertainty
  - distributed relatively evenly within a country

- Domestic groups pro or against MU: not strong

- Treating the country as a whole

- Not necessary to consider distributional effects on domestic interest groups
Conclusion and Asian implications

- A optimistic OCA and East Asia
  - labor mobility, fiscal integration and political union: not important
  - East Asian’s internal trade: Europe 1970 level (“snake” started)
  - regional investment of East Asia is not low
  - wage flexibility higher than US and Europe, a faster adjustment
  - increasing co-movement of GDP within the region
  - more financial openness:
    - good for easing shocks
    - but more linked to outside rather than financially integrated in region.
    - current crisis provides chance: confidence loss on dollar assets
  - monetary cooperation can parallel with real integration

- Improved cost and benefit analyses and East Asia
  - recognize and realize common and long term benefits
    example: saving foreign reserve

- Therefore, hold a more optimistic attitude towards Asian monetary cooperation and monetary union
Conclusion and Asian implications

- East Asia: insufficiency of building up regional institutions
  → “common and long-term benefits” can not be easily recognized and realized
  → “one country, one currency” bad equilibrium

- Building effective regional institutions: critical

- Learn from Europe and follow our own path
  - start from operational and specific projects (Europe: coal and steel (strategic materials), common agricultural policy)
  - Asian Payment Union (European payment Union)
  - Asian monetary fund: multilateral and centralized, foundation for regional exchange rate mechanism
  - gradually increase the enforceability of the cooperation mechanism
Many thanks for your intention!

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