<table>
<thead>
<tr>
<th>Title</th>
<th>Beyond OCA: a game approach on monetary union based on &quot;long term and common benefits&quot; and its implications for East Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author(s)</td>
<td>Zhu, Dantao</td>
</tr>
<tr>
<td>Citation</td>
<td></td>
</tr>
<tr>
<td>Issue Date</td>
<td>2008-11-19</td>
</tr>
<tr>
<td>Type</td>
<td>Presentation</td>
</tr>
<tr>
<td>Text Version</td>
<td>publisher</td>
</tr>
<tr>
<td>URL</td>
<td><a href="http://hdl.handle.net/10086/16351">http://hdl.handle.net/10086/16351</a></td>
</tr>
</tbody>
</table>

**Table**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Beyond OCA: a game approach on monetary union based on “long term and common benefits” and its implications for East Asia

Zhu, Dantao
the Development Research Center (DRC) of the State Council, China
on Nov. 19th, 2008
at Hitotsubashi University, Tokyo, Japan
Introduction

- 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>
</tr>
</thead>
<tbody>
<tr>
<td>join</td>
<td>(Ia) A₀, B₀</td>
<td>(IIa) A₁, B₁</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not join</td>
<td>(IIIa) A₂, B₂</td>
<td>(IVa) A₃, B₃</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>Not join</th>
<th>join</th>
</tr>
</thead>
<tbody>
<tr>
<td>consider</td>
<td>(Ib) A₀, B₀</td>
<td>(IIb) A₁, B₁</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not consider</td>
<td>(IIIb) A₂, B₂</td>
<td>(IVb) A₃, B₃</td>
<td></td>
<td></td>
</tr>
</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>
<td>( A_1 &gt; A_3 ) or ( B_2 &gt; B_3 )</td>
<td>One prisoner dilemma eq.</td>
</tr>
<tr>
<td></td>
<td>( A_1 &lt; A_3 ) and ( B_2 &lt; B_3 )</td>
<td>Two Eq.</td>
</tr>
<tr>
<td>( B_1 &gt; B_0 = 0 )</td>
<td>( A_1 &gt; A_3 )</td>
<td>One dollarization eq.</td>
</tr>
<tr>
<td></td>
<td>( A_1 &lt; A_3 )</td>
<td>One eq.</td>
</tr>
</tbody>
</table>
## Examples with numbers I, II

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>Not join</th>
<th>Join</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Not consider</td>
<td>(0, 0)*</td>
<td>(4, -2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>consider</td>
<td>(-1, 1)</td>
<td>(3, 3)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>Not join</th>
<th>Join</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>Not consider</td>
<td>(0, 0)*</td>
<td>(2, -2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>consider</td>
<td>(-1, 1)</td>
<td>(3, 3)*</td>
<td></td>
</tr>
</tbody>
</table>
Examples with numbers III, IV

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

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>Not join</th>
<th>join</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not consider</td>
<td>(0, 0)</td>
<td>(2, 1)</td>
<td></td>
</tr>
<tr>
<td>Consider</td>
<td>(-1, 1)</td>
<td>(3, 3)  *</td>
<td></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.

<table>
<thead>
<tr>
<th></th>
<th>A Not join</th>
<th>B Not join</th>
<th>Join</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not join</td>
<td>$(a+b, a+b)$</td>
<td>$(a+b, a+b-s)$</td>
<td></td>
</tr>
<tr>
<td>join</td>
<td>$(a+b-s, a+b)$</td>
<td>$(a+2b-s, a+2b-s)$</td>
<td></td>
</tr>
</tbody>
</table>
Cooperation failure I: countries with different inflation tolerance levels

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

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

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

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

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

- 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
  \[
  E(L_A^{mem}) - E(L_A^{lead}) = \theta_A \left( \frac{\tilde{U}^2}{\theta_M^2} - \frac{\tilde{U}^2}{\theta_A^2} \right) + \frac{1}{1 + \theta_A} \sigma_A^2 + \frac{1 + \theta_A}{(1 + \theta_M)^2} \sigma_M^2 - \frac{2}{1 + \theta_M} \sigma_{A,MU}
  \]
  - 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 \( \rightarrow \) 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>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>Not pay</th>
<th>Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not pay</td>
<td>(0, 0)</td>
<td>(3, 2-C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pay</td>
<td>(3-C, 2)</td>
<td>3-(\alpha C), 2-(1-(\alpha ))C</td>
<td></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: \( \alpha =0.6 \), 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 can not 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
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
    - German raise interest rate after unification → negative effect on others → 1995 German 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!

zhudt@drc.gov.cn