
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

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?
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Outline

- Introduction
 - History
 - Critics on OCA theory
 - Improved cost-benefit analyses
 - A game approach
 - Interest groups
 - New view on EMU
 - East Asia
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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
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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
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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
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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
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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
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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, endogeneity 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.
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A more optimistic OCA

- Overall reevaluation 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
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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.
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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
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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
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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
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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

A \ B	Not join	join
Not join	(Ia) A_0, B_0	(IIa) A_1, B_1
join	(IIIa) A_2, B_2	(IVa) A_3, B_3

A \ B	Not join	join
Not consider	(Ib) A_0, B_0	(IIb) A_1, B_1
consider	(IIIb) A_2, B_2	(IVb) A_3, B_3

An abstract model

- Assume: $A_3 > A_0 = 0, B_3 > B_0 = 0$
- Game results:

Number relations		# of Equilibrium	Nature of equilibrium
$B_1 < B_0 = 0$	$A_1 > A_3$ or $B_2 > B_3$	One prisoner dilemma eq.	Not social optimal
	$A_1 < A_3$ and $B_2 < B_3$	Two Eq.	One is not social optimal, another is
$B_1 > B_0 = 0$	$A_1 > A_3$	One dollarization eq. ,	Social optimal
	$A_1 < A_3$	One eq.	Social optimal

Examples with numbers I, II

A \ B	Not join	Join
Not consider	$(0, 0)^*$	$(4, -2)$
consider	$(-1, 1)$	$(3, 3)$

A \ B	Not join	Join
Not consider	$(0, 0)^*$	$(2, -2)$
consider	$(-1, 1)$	$(3, 3)^*$

Examples with numbers III, IV

A \ B	Not join	Join
Not consider	(0, 0)	(4, 1)*
Consider	(-1, 1)	(3, 3)

A \ B	Not join	join
Not consider	(0, 0)	(2, 1)
Consider	(-1, 1)	(3, 3)*

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.

A \ B	Not join	Join
Not join	$(a + b, a + b)$	$(a + b, a + b - s)$
join	$(a + b - s, a + b)$	$(a + 2b - s, a + 2b - s)$

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

$$E(L_A^{mem}) - E(L_A^{lead}) = \theta_A \left(\frac{\tilde{U}^2}{\theta_{MU}^2} - \frac{\tilde{U}^2}{\theta_A^2} \right) + \frac{1}{1 + \theta_A} \sigma_A^2 + \frac{1 + \theta_A}{(1 + \theta_{MU})^2} \sigma_{MU}^2 - \frac{2}{1 + \theta_{MU}} \sigma_{A,MU}$$

- 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
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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
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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:

A \ B	Not pay	Pay
Not pay	(0, 0)	(3, 2-C)
pay	(3-C, 2)	$3-\alpha C, 2-(1-\alpha)C$

- 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.
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A new view on EMU

- In the literature:
 - euro area is not an OCA
 - Krugman & Obstfeld(1998) : labor immobility,etc.
 - Eichengreen(1997): make comparision 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
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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
 - 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
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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
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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
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Many thanks
for your intention!

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