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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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# 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

| 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

# 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:

| A \ B | Not pay | Pay |
|---|---|---|
| Not pay | (0，0) | (3，2-C) |
| pay | (3-C，2) | 3-αC，2-(1-α)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.

# 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

# 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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